

**SCHOOL FACTORS INFLUENCING STUDENTS' PERFORMANCE IN
CHEMISTRY IN KENYA CERTIFICATE OF SECONDARY EDUCATION IN
MAKUENI COUNTY, KENYA**

Makato Benard Kyalo

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Award of the Degree of Master of Education in Curriculum Studies**

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DECLARATION

This research project is my original work and has not been presented for the award of a degree in any other university.

Benard Kyalo Makato

E55/72420/2014

This research project has been submitted for examination with our approval as University Supervisors.

Dr Grace Nyagah

Senior Lecturer

Department of Educational Administration and Planning

University of Nairobi

Dr Mercy Mugambi

Lecturer

Department of Educational Administration and planning

University of Nairobi

DEDICATION

I dedicate this work to my dear wife Miriam Mueni and our children Rodah Kaluki, Ruth Mwikali, Joseph Makato and Rose Mwende.

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ABBREVIATIONS AND ACRONYMS

CEMASTE	Centre for Mathematics Science and Technology Education in Africa
GPA	Graded Point Average
ICT	information and communication technology
INSET	In-service Training
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KICD	Kenya Institute of Curriculum Development
KISE	Kenya Institute of Special Education
KNEC	Kenya National Examination Council
MOE	Ministry of Education
NACOSTI	National Commission for Science, Technology and Innovation
NECO	National Examination Council
SES	Social Economic Status
SMASSE	Strengthening Mathematics and Science in Secondary Education
TIVET	Technical, Industrial, Vocational and Entrepreneurship Training
UK	United Kingdom
UNESCO	United Nations Educational and Cultural Organization
US	United States
WAEC	West African Examination Council

ABSTRACT

The study was on school factors influencing students' performance in chemistry in Kenya Certificate of Secondary Education (KCSE) in Mbooni East Sub County, Makueni County, Kenya. Students' performance in Chemistry in KCSE has been influenced by various factors which include students' entry grade in science in Kenya Certificate of Secondary Education (KCPE), teaching and learning methods, students' attitude in chemistry and assessment methods in chemistry. The study was guided by the following objectives; to establish the extent to which students' entry grade in science in KCPE, teaching and learning methods, students' attitude towards chemistry and assessment methods in chemistry influence students' performance chemistry in KCSE. The study was based on Constructivist theory developed by Jorem Bruner in 1966 which states that learning is an active process in which learners construct new ideas based upon their current or past knowledge. The theory holds that the learner selects and transforms information, constructs hypothesis and makes meaning from information and experiences while relying on cognitive structure to do so. The study used descriptive survey design because it administered questionnaires to collect data. The target population was 38 public secondary schools in Mbooni East Sub County consisting of 38 principals, 76 chemistry teachers and 1920 form three chemistry students. Simple random sampling was used to select 12 schools of the 38 public secondary schools, 12 principals and 24 chemistry teachers. The 1920 form 3 chemistry students were selected using stratified random sampling out of which 192 students were picked to participate. Statistical package for social sciences (SPSS) IBM version 20 was used to analyze the data. The analyzed data was then presented through tabular representation of frequency tables, pie chart and bar graphs. The findings showed that teachers involve students in teaching and learning by giving individual tasks, group tasks and performing demonstration of experiments. Most students indicated they do not understand chemistry when lecture method is used. The study established that students have negative attitude towards chemistry since they perceived chemistry as a difficult subject. Students taking chemistry in preparation for KCSE do not like chemistry and could drop it given another option. Majority of the schools do not organize field trips in chemistry the teachers do not use project work as an assessment method. The study made recommendations that the teaching of science in primary schools be strengthened so that pupils gain a good base in science in preparation for transition to secondary schools where specialization in science subjects begins to avoid wastage when candidates score low grades in chemistry which is a crucial career subject. SMASE and teacher training institutes to emphasize on teaching methods. Students to do physical science instead of pure chemistry. The government through Kenya National Examination Council to consider introducing projects in KCSE as part of assessment for chemistry in secondary schools.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Education helps the society shape and mold individuals to fit well in the environment. One indicator that quality education is being provided is the way the learners perform in standardized examinations after completing a formal schooling cycle (UNESCO, 2005). According to Global Competitiveness Report, 2013 – 2014, the competitive economy attained by developed countries like Norway, Canada, Denmark, Australia, Belgium, Estonia, Finland, German, Netherlands and Switzerland has been attributed to excellent educational system as well as a strong commitment to advancing technological readiness.

Chemistry is one of the most important disciplines in the school curriculum; its importance in the general education has world-wide recognition. It is worth to emphasize that the field of chemistry, science and technology are related to the economic heart of every highly-developed, industrialized and technologically advanced society (Burmeister 2012). Teaching and learning of science have significant roles towards technological development in a developing nation since chemistry is embedded in our life and society, economical, ecologic and societal influences (Hofstein 2011).

In Pakistan, students' academic performance is measured by Graded Point Average (GPA) (Galiner, 2006). The performance is also measured through the result of a particular subject like Chemistry (Hijazi & Naqvi, 2006). The studies carried out in

Norway, Australia, Belgium, Pakistan, South Africa, West Africa, Tanzania, Uganda and Kenya focused on different school factors influencing performance in Chemistry. These school factors included class size, number and type of textbooks, homework, environment of the class, technology used in the class, examination systems, extracurricular activities, family and work activities, and financial status of parents. Students' performance is significantly correlated with satisfaction with academic environment and the facilities of library and computer laboratory within the school.

Acato (2006) argues that, admission points which are a reflection of the previous performance influence future academic performance. There are specific skills the students are supposed to have prior to the beginning of instruction. Entry grade is taken to mean marks obtained in science at Kenya Certificate of Primary Education (KCPE) and the previous grade attained by the student before coming to the current class. Entry grade is determined to a large extent by the amount of quality time a student spends studying that subject. Performance in a subject may be defined by the learners' entry grade and previous exposure to the content of that subject (Orodho 1996, Nderitu 2007). The quality of grades in the KCPE science paper is likely, to a certain extent to influence the performance of physics, chemistry and biology. There is a strong correlation between science grade attained in primary school and performance in chemistry (Hudson 2006)

There is a wide worldwide consensus that improving quality of education depends on quality of classroom practices such as good methodology, group discussion and use of teaching aids (Adeyemi, 2008).

In Portugal, studies conducted in schools that had reduced failure rates highlight the importance of variables such as school organization, including a collaborative learning with parental involvement, relevant curriculum and classroom activities, the quality of science teaching, including teacher support and expectancies (Fonseca, 2003). A number of psychosocial, organizational, teacher and student variables seem important in influencing success or failure. Student perceptions of meaningfulness, challenge, choice and appeal of class activities have been associated with motivation and learning (Raineri & Gerber, 2004). The science teacher has been found to be the most important factor in improving student achievement in schools (Ballone & Czerniak 2005).

A greater deal of work has been done in an effort to identify the school factors that influence performance in chemistry in secondary schools in South Africa. These factors include: physical classroom and laboratory, school management and teaching methodology (Johnson 2011). Teaching is a form of interaction, a particular form of exchange of knowledge, skills and understanding (Brenner, 2004). Effective teaching comes from the knowledge of the relationship between classroom process measured through observation of systems and student outcomes, most notably gains in standardized achievement test, for instance in Kenya Certificate of Secondary Education (KCSE). There are some features about Chemistry that have implication on how it should be taught as a science (Fisher, 2003). Science is about constructing meaning out of knowledge. It is not a simple matter of a teacher ascertaining whether or not a student has understood a concept (Winn, 1993) because the construction of

knowledge comes about through the need to assimilate, translate and accommodate knowledge into our schema of existing ideas. This is possible when teaching methodology is suitable for the teaching of that content. When planning for teaching, the teacher must develop teaching and learning methods that will make the process of learning more meaningful, the type of teaching and learning process that will make students change their unscientific conceptions. Khatete (1995) suggests that teaching and learning process should be a spiral mode of teaching which would facilitate the restructuring of student's concepts hence better understanding of Chemistry which translates to high performance.

Attitudes associated with science appear to influence students' participation in science subjects and impacts in science (Linn, 1992). Further research on psychological influence has found that students' self-concept of ability to perform in science positively correlates with achievement. It has been observed that many students fear Chemistry. Such fear is characterized by mass disenchantment among the students towards the subject. Attitude is important in understanding human behavior. It is a complex mental state involving beliefs (Hussain, Ali, Khan, Ramzan&Qadeer, 2011). It is an individual's prevailing tendency to respond favourably or unfavourably to an object, person or group of people, institutions or events. The word attitude is defined within the framework of social psychology as a subjective or mental preparation for action. Attitudes determine what each individual will see, hear, think and do. They are rooted inexperience and do not become automatic routine conduct. Attitudes can be positive or negative. Attitude towards a subject denotes interest or feeling towards studying the subject. It is the students'

disposition towards “like” or “dislike” in a subject. The end product has been the declining popularity of the subject over the years.

According to Keeves and Morgenstern (1992), students’ anxiety towards the learning of Chemistry makes them lose interest in sciences. On the other hand, Deboer (1987) points out that students’ achievement is influenced by favourable attitudes towards oneself (positive self-concept) as well as the subject. A student with positive self-concept of ability in a subject has a higher probability of developing favourable attitudes towards that subject, and as a result spends more time and energy in the subject thus gaining mastery of the subject resulting in success.

Assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004). Questions such as; what does a student think about a situation or a topic, why is a student’s performance of certain skilled task deteriorating among others are of vital importance to a classroom teacher. The use of assessment to ask and answer such questions improves the information available to the teacher and makes it possible to identify and address learning difficulties (Beck & Earl, 2002; Black, 2002). The other issue necessary for consideration is how a student’s previous encounter with the assessment outcome of the subject affects overall performance. According to Embeywa (1985), to feel positively towards a subject area, one has to achieve highly in that subject. There is strong motivational orientation towards a subject area with high performance. Perhaps consistent poor performance in Chemistry de-motivates students thus enabling the vicious circle of poor performance in Chemistry.

Kenya's Vision 2030 identifies life-long training and education as critical elements in the creation of a globally competitive and adaptive human resource base. According to UNICEF (2007) children achievement to education is influenced by the degree of support they receive at home, the quality of teachers, the teaching methods employed, and the availability of the necessary teaching aids and resources. Chemistry has wide applicability in career choices. Chemistry is compatible with Biology and Physics when choosing any career which is science based. Unfortunately, close scrutiny and analysis of results show that, Chemistry is not performed well in the country. The candidates' performance nationally in Biology, Chemistry and Physics are presented in table 1.1.

Table 1.1 National Mean Score in Biology, Chemistry and Physics 2010 – 2014

Subject	Mean Score out of 200 Marks				
	2010	2011	2012	2013	2014
Biology	58.39	64.87	52.41	63.26	63.65
Chemistry	49.79	47.31	55.86	49.00	63.31
Physics	70.22	73.28	75.82	80.20	77.68

Source: The Kenya National Examinations Council (2015).

From the presented table, it is evident that the learners have a lower performance in Chemistry nationally compared to the other science subjects.

A similar comparison of the performance in the sciences in the Sub Counties in Makueni County indicate that Mbooni East Sub County has consistently posted lower scores in the County. This analysis is presented in table 1.2

The data shows that Mbooni East Sub County was not performing well in the five years under study in the Kenya Certificate of Secondary Education (KCSE) in chemistry compared to the other sub counties in the county. It was a concern to the researcher especially noting that the sub county has old and well established schools which have been presenting candidates for KCSE over a long time.

The data in table 1.2 shows that Mbooni East Sub County mean scores in chemistry in KCSE were 4.22, 3.89, 4.16, 3.80 and 3.24 in the years 2010, 2011, 2012, 2013 and 2014 respectively. Compared to the other sub counties in Makueni county, the sub county has performed poorly scoring a lower mean score than the other sub counties and the performance showing a declining trend from 4.22 in 2010 to 3.24 in 2014 except in year 2012 where the mean score rose slightly to 4.16 which is also a drop from the mean score of year 2010 which was 4.22 the highest ever.

Table 1.2 KCSE analysis in Makueni County, Mean Scores for Biology, Chemistry and Physics.

YEAR	2010			2011			2012			2013			2014		
COUNTY/SUBJECT	BIO	CHEM	PHY	BIO	CHEM	PHY	BIO	CHEM	PHY	BIO	CHEM	PHY	BIO	CHEM	PHY
1. MAKUENI	5.71	4.33	6.20	4.52	4.36	6.60	4.55	4.38	6.44	5.73	4.41	6.75	4.68	4.50	5.80
2. KILUNGU	5.68	4.68	5.36	4.60	4.54	5.88	4.82	4.53	6.08	5.66	4.58	6.87	4.76	3.98	5.44
3. MUKAA	5.43	4.30	4.90	4.72	4.19	5.42	4.68	4.17	5.66	5.45	4.01	6.46	4.55	4.25	5.82
4. KIBWEZI	4.48	4.26	4.92	3.99	4.17	4.82	4.16	4.19	4.84	4.52	3.82	4.48	4.40	3.51	5.21
5. KATHONZWENI	4.03	4.24	5.53	4.24	4.73	5.58	4.29	4.20	5.56	4.12	5.27	5.24	4.33	3.76	5.52
6. MAKINDU	4.18	4.26	6.13	4.50	4.37	6.25	4.88	4.31	6.22	4.20	3.97	4.74	4.62	3.90	4.81
7. MBOONI-EAST	4.39	4.22	6.23	4.21	3.89	4.52	4.59	4.16	4.47	4.50	3.80	5.59	4.40	3.24	4.54
8. MBOONI-WEST	4.42	4.27	4.72	4.52	3.90	4.68	4.45	4.22	4.64	4.38	3.92	4.90	4.92	5.42	6.20
9. NZAUI	4.11	4.23	4.43	4.39	4.19	5.21	5.52	4.18	5.23	4.19	4.20	6.00	4.20	3.71	4.72
AVERAGE	4.72	4.31	5.38	4.63	4.22	5.44	4.66	4.26	5.46	4.75	4.22	5.67	4.54	4.03	5.34

Source: Makueni County Director of Education office

1.2 Statement of the problem

Mbooni East Sub County has posted low mean scores in Chemistry national examination results consistently for five years compared with the other Sub Counties. This has raised concern for investigation to find out what could be the cause of the poor performance. Efforts have been made by the Government to improve performance in the science subjects. These efforts include equipping laboratories and provision of funds to purchase text books to acquire a student: textbook ratio of 1:1 through free day secondary education funds but performance in chemistry continued to post lower grades.

In an attempt to improve on the performance, the Government of Kenya through the Ministry of Education in collaboration with other stakeholders adopted a number of interventions. The interventions include SMASE initiative for both primary and secondary teachers on teaching methodology that is learner centered, revision of chemistry syllabus to exclude areas termed as difficult and rearrangement of topics in chemistry. For example, carbon and its compounds moved from form 3 to form 2, organic chemistry was split to form organic chemistry 1 taught in form 3 and organic chemistry II taught in form 4 and also curriculum review and rationalization to reduce the load both on students and teachers, on-the-job training of science teachers through Strengthening of Mathematics and Science in Secondary Education (SMASSE) to enhance subject mastery levels and strengthening of inspectorate department to improve curriculum implementation and supervision (KESPP, 2005). SMASSE in service In-service Training for Teachers (INSETS) continue to be conducted yearly. Despite this, students' performance in Chemistry is poorer compared to the other

science subjects nationally. According to the information given in table 1.2, Mbooni East Sub County has performed poorly consistently for 5 years compared to other sub counties in Makueni County. The researcher therefore wishes to investigate to find out if the trend is as a result of school factors.

1.3 Purpose of the study

The purpose of the study was to investigate on school factors influencing performance of students in Chemistry in KCSE in public secondary schools in Mbooni East Sub County, Makueni County.

1.4 Research objectives

The study was guided by the following objectives:-

- i) To establish the extent to which students' entry grade in science in KCPE influence performance in Chemistry in KCSE in public secondary schools in Mbooni East Sub County.
- ii) To determine how teaching and learning methods influence students' performance in Chemistry in KCSE in public secondary schools in Mbooni East Sub County.
- iii) To determine how students' attitude towards Chemistry influences performance in Chemistry in KCSE in public secondary schools in Mbooni East Sub County.
- iv) To determine the extent to which assessment methods in chemistry influence students' performance in the subject in KCSE in public secondary schools in Mbooni East Sub County.

1.5 Research questions

The study was guided by the following questions:-

- i) How does students' entry grades in science influence performance in Chemistry in KCSE in public secondary schools in Mbooni East Sub County?
- ii) How does teaching and learning methods influence students' performance in Chemistry in KCSE in public secondary schools in Mbooni East Sub County?
- iii) In what ways does students' attitudes towards chemistry influence performance in Chemistry in KCSE in public secondary schools in Mbooni East sub County?
- iv) To what extent do assessment methods in chemistry influence students' performance in the subject in KCSE in public secondary schools in Mbooni East Sub County?

1.6 Significance of the study

The study may be important to other researchers, education stakeholders and other academicians in that it may contribute to the generation of knowledge on school factors influencing performance in chemistry in public secondary schools. The findings may inform curriculum planners on the aspects that involve students' entry grade in science, teaching and learning methods, students' attitude and assessment methods and how these factors influence performance in chemistry in KCSE in public secondary schools in Mbooni –East sub County. Chemistry teachers may be helped in selecting teaching and learning methods and assessment methods that would improve the quality of teaching and learning.

Further the study may provide teachers in public secondary schools with knowledge on how to improve students' performance in chemistry as a crucial subject in career choosing. Finally the study will contribute to the body of knowledge which can be of use to other researchers.

1.7 Limitations of the study

Some administrators were not willing to release their students chemistry performance in KCSE and grades obtained in science in KCPE. Therefore the researcher assured them of anonymity and confidentiality. The researcher was not able to control the respondents' attitude towards responding to the questionnaires but asked them to be truthful when responding to research instruments. The researcher relied on respondents' opinions with expectation that, all responses given were to the best of respondents' knowledge. The schools in Mbooni East Sub County were sparsely populated since the area is semi-arid. This affected the sample size because of the wide distance between the schools hence the researcher was not able to do a census for the schools in the study area but used simple random sampling to avoid biasness.

1.8 Delimitations of the study

The study was carried out in Mbooni East Sub County in Makueni County. It targeted all the 38 public secondary schools because they had been posting low mean scores in Chemistry examinations in KCSE over the years. The respondents were sampled from the 38 public secondary schools, 12 Principals, 24 Chemistry teachers and 192 form three Chemistry students of the public secondary schools. There may have been other factors influencing performance in Chemistry but this study specifically focused on

the school factors with reference to students' entry grade in science, teaching and learning methods, students' attitudes and assessment methods, because these were the factors that directly impacted on teaching and learning and performance in the subject.

1.9 Assumptions of the study

In the study, the following assumptions were made.

- i) That all respondents would be cooperative and would give truthful and honest responses to the questionnaires.
- ii) The syllabus coverage was uniform for all the schools.
- iii) The students who participated in this study learned under similar conditions as those whose KCSE results were analyzed in the period ranging from 2010 to 2014

1.10 Definition of significant terms

The following are terms and their related meaning as used in this study by the researcher in the entire work:

Assessment refers to the process of determining students' performance through tests, projects and examinations.

Attitude refers to learned predispositions to respond positively or negatively to Chemistry as a science subject.

Challenges refers to setbacks and hardships encountered in the process of teaching chemistry in public secondary schools.

Chemistry curriculum refers to all the experiences a learner goes through in learning Chemistry. They include: content, practical work, project, group discussions, excursions and field work.

Chemistry performance refers to the competency level attained in chemistry including mastery of basic skills (observation, recording, reporting), knowledge and concepts measured in terms of grades a student scores at KCSE level.

Entry grade in science refers to the grade in science obtained by the pupil in KCPE.

Performance refers to a measure of students' academic achievement in terms of the grade a student scores in chemistry.

School factors refers to those physical resources, human resource, teaching and learning resources used by schools in promotion of academic achievements and may vary in a significant way from one school to another.

Teaching and learning methods refers to the various styles of teaching and learning used by the teachers and students in teaching and learning chemistry.

1.11 Organization of the study

The study has been organized into five chapters. Chapter one, introduction, comprises of background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, limitations of the study, delimitations of the study, assumptions of the study, definitions of significant terms in the study and organization of the study.

Chapter two, literature review, which consists of introduction, students' entry grade in science, teaching and learning methods, students' attitude in Chemistry and the

assessment methods and how they influence students' performance in Chemistry in KCSE, then Theoretical Framework and Conceptual Framework of the study.

Chapter three deals with research methodology covering introduction, research design, target population, sample size and research instruments, validity and reliability of research instruments, data collection procedures and data analysis techniques and ethical considerations.

Chapter four presents data analysis, interpretation and discussions. It covers introduction, questionnaire return rate, demographic information of principals, demographic information of chemistry teachers, demographic information of form three students, entry grade of students in science in KCPE, teaching and learning methods in chemistry, students attitude and assessment methods in chemistry

Chapter five presents summary of the study, conclusions and recommendations. Suggestions for further study are also included.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter covers introduction and review of literature on school factors influencing students' performance in Chemistry in public secondary schools in Kenya. The school factors include students' entry grade in science, teaching and learning methods in chemistry, students' attitude towards chemistry and assessment methods and how they influence performance in Chemistry. The section will also present the theoretical framework and conceptual framework of the study.

2.2 Overview of school factors influencing students' performance.

Several scholars have put forth ideas on school factors in relation to performance. Performance in a subject may be defined by the learners' entry behavior and previous exposure to the content of that subject. One aspect of entry behavior is the grade attained in a previous examination before joining a given class in the next level. For instance in Kenya, KCPE grade in Science. The quality of grades in the KCPE science is likely to influence the performance of chemistry in secondary school.

Borg and Shapiro (1996) argued that students perform well in classes where learner centered learning and teaching methods are used. According to Bhagwan (2005), a growing body of research in the cognitive science suggest that students learn and better retain what they learn when engaged in "authentic" learning tasks. Twoli (2006) maintains 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, equipment and chemicals under the guidance of the teacher. No single teaching method such as direct instruction or social construction of meaning can be the method of choice for all occasions. Effective teaching and learning needs to focus on the zone of proximal development, which is the range of knowledge, concepts and skills that the students are not yet ready to acquire on their own but can acquire with the help from their teachers. Teachers use different teaching and learning methods to help students learn particular chemistry concepts and skills and there is no one right way to teach.

Attitude in science means the scientific approach assumed by an individual for solving problems, assessing ideas and making decisions in the sciences (Olatunde, 2009). The teacher plays a significant role during the learning process and can directly or indirectly influence students' attitudes toward science which in consequence can influence students' performance. Student beliefs and attitudes have the potential to either facilitate or inhibit learning and hence result to low performance.

According to Ayot (1986) the assessment methods and frequency of assessment profoundly affect the content of the curriculum, how it is taught and ultimately performance. Assessment includes informal classroom processes such as observing pupils tackling a task, questioning them about their work, looking at the records of their previous work or listening in on their discussions. More formal processes include testing and setting assignment for marking and the national system of tests and examinations. Generally, assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004). The use of assessment to ask and

answer such questions improves the information available to the teacher and makes it possible to identify and address learning difficulties (Beck & Earl, 2002).

This study is expected to find out the school factors that influence performance of chemistry in public secondary schools in KCSE in Mbooni East Sub County.

2.3 Students entry grade in science and performance in Chemistry

Students' entry grade refers to the grade a learner obtains after doing an examination. The grade is considered when admitting students in the next level. The entry grade is significant in predicting the students' performance at the end of the course. If a student enters in form one with very low marks, very little can be done to improve the student's performance. Thus, when a teacher is dealing with learners of mixed abilities, the teacher needs to vary his motivation style. This will enhance interest between the two groups involved during learning.

A study on correlation between entry grade and performance in A'level chemistry at the school of basic and remedial studies, Yobe State University, Damaturu was carried out. The grade in chemistry at the West African Examination Council (WAEC) or National Examination Council (NECO) was the predictor and ordinary pass of between 50% to 54% was taken as the National entry grade while the criterion was the grade earned in the short structured test administered at the end of Basic 1. Three research questions and one hypothesis guided the study. A population of 99 regular students who registered for A 'level chemistry were used for the study. The students' data file and a check list were the instruments used for data collection. The Pearson

Product Moment Correlation Coefficient (R) calculated from the data analyzed revealed negative correlation of 16.36×10^{-2} the paper concluded that there was no relationship between performance of the students in the A' level chemistry and the entry grade (O' level chemistry) in the Basic programme. Babalola, (2015).

A study carried out by Mwangi and Nyagah (2013) in Kiambu County focused on KCPE entry marks to form 1. It was noted that 63.86% of the sampled students had scored between 201-300 marks out of 500 marks at KCPE meaning poor academic background. About ninety three percent (92.7%) and 78.5% of students and teachers responses respectively showed that schools never took seriously the concept of entry grade in science value addition per subject hence targets are not set. In this research, the researcher proposes to find out if there could be positive correlation in the entry grade in science in KCPE and performance in Chemistry in KCSE in Mbooni East Sub County of Makueni County.

2.4 Teaching and learning methods and students' performance in chemistry

Teachers can use various methods to achieve instructional objectives in chemistry. The most common methods include; Class experiment, teacher demonstration and Lecture method. In lecture method, the teacher is the only active participant and the pupils are passive listeners. Exposure of students to practical work helps them understand and retain the theoretical concepts in practical work.

A study by Wachanga (2005) found out that when students perform class experiments, they gain manipulative and observation skills. Due to this, the students learn, get

trained and retain the learned skills. Bandura (1997) emphasized the use of practicals in learning of science subjects by saying that they motivate students' interests. Thus carrying out of practical enables students to learn more effectively.

Mwangi and Nyagah (2013) carried out a study in Kiambu County on the methodologies used in the teaching process that affected performance in KCSE in general. They found that most science teachers use demonstration methods even where class experiments are possible. Lecture method was widely used as a method of teaching than any other methods. This was agreed by 59.05% of teachers sampled and 55.8% of students involved in the study. Method used influences understanding and retention of learned matter hence influences performance. The researcher aimed at finding out the extent to which teaching methods influenced performance in chemistry as a science subject.

2.5 Students' attitude and Performance in Chemistry

Attitudes are ways of thinking or feeling about something or somebody, usually reflected in person's behaviour. They may be resistant to change because they are wrapped up with a person's needs, feelings and self-concept. Such is referred to as positive attitude. Where there is negative attitude, the person responds by showing dislike and defense (Olatunde, 2009). According to Sogomo (2001), students' attitudes are a reflection of teachers' attitudes. Those students who do well in a subject generally have more positive attitudes towards that subject and those who have more positive attitudes towards a subject tend to perform better in the subject (Olatunde,

2009). Students' attitude towards the learning of Chemistry is a factor that has long attracted the attention of researchers.

According to Bassey, Umoren and Udida (2008), students' academic performance in Chemistry is a function of their attitude. Jones and Mooney (1981) in a study of factors influencing performance in Chemistry found out that students have traditionally considered Chemistry as being one of the most difficult areas of science. This is negative attitude that causes dismal performance. Ogembo, Otunga and Nthenya (2015) in a study carried out in Kwale County on students and teachers attitude and performance in chemistry in secondary schools found out that, a number of factors relate to students attitude. These factors are teaching methods, teacher's attitude, influence of parents, gender, age, career interest, societal view of science and scientists, social implications of science and achievement. Empirical studies have revealed the influence of methods of instruction on students' attitude towards science. Kempa and Dube (1974) worked on the influence of science instruction; the result was that attitude becomes more positive after instruction.

Long (1981) also concluded that diagnostic-prescriptive treatment promotes positive attitude. Hough and Peter (1982) further found out that groups of learners who scored significantly high in science achievement test also scored significantly high in attitude test. Gibbons, Kimmel and O'Shea (1997) opined that students' attitudes about the value of learning science may be considered as both an input and outcome variable because their attitudes towards the subject can be related to educational achievement in ways that reinforce higher or lower performance. Since many factors relate to

students' attitude towards chemistry, the researcher intended to find out the influence of the formed attitude on performance in chemistry in Mbooni East Sub County in Makueni County.

2.6 Assessment methods and Students Performance in Chemistry

Formal processes of testing include setting assignment for marking and the national system of tests and examinations. Generally, assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004). The use of assessment to ask and answer questions improves the information available to the teacher and makes it possible to identify and address learning difficulties (Beck & Earl, 2002). According to Kenya Institute of Education (KNEC), research findings on summative evaluation (2010) showed that most schools use traditional written tests, whereas observation and projects are rarely used. This view is at odds with current theories of cognition that emphasizes meaningful learning which entails reasoning, problem solving and active construction of knowledge.

Assessments are integral to instruction and allow students to display the thinking, reasoning and strategic processes that underlie their competences can ensure more valid inferences regarding the nature and level of students understanding (Snow & Hohman, 1989). Orado (2009), in a study on factors influencing performance in Chemistry practical work among secondary schools, indicated that although laboratories in secondary schools are equipped with basic apparatus and materials to carry out a variety of activities, teachers taught and stressed skills mainly assessed by the KNEC, leaving out key scientific skills such as experimental design and hypothesis

formulation. What is taught and assessed thus appears to be dictated by the demands of the national examinations. The researcher proposed to find out if assessment methods influenced performance in chemistry in KCSE.

2.7 Summary of Literature Review

From the literature reviewed it is clear that school factors influence students' performance in Chemistry in KCSE in public secondary schools. Several studies have been conducted in this area. Various factors that influence performance in Chemistry at the national level have been isolated. It was found that students' entry grade in science has not been researched independently but a study carried out by Mwangi and Nyagah (2013) in Kiambu County focused on KCPE entry marks to form 1. On teaching and learning methods the same study showed that the methodologies used in the teaching process influenced performance in KCSE and found out that most science teachers use demonstration methods even where class experiments are possible. Lecture method was widely used than any other teaching method. Students' attitude towards chemistry was studied by Ogembo, Otunga and Nthenya (2015) in a study carried out in Kwale County on students and teachers attitude and performance in chemistry in secondary schools. They found out that, a number of factors relate to students attitude. These factors are teaching methods, teacher's attitude, influence of parents, gender, age, career interest, societal view of science and social implications of science and achievement.

Finally assessment study was done by K.I.E, and research findings on summative evaluation (2010), indicated that most schools use traditional written tests, whereas observation and projects are rarely used. The researcher proposed to find out if these

situations have changed or could be influencing the performance in chemistry negatively in public secondary schools in Makueni County.

2.8 Theoretical framework

A theoretical framework is a collection of interrelated concepts, like a theory. It guides the research, determining what things to be measured, and what statistical relationships will be measured (Microsoft Encarta, 2008). This research study was based on constructivist theory by Bruner (1966).

The theory states that learning is an active process in which learners construct new ideas based upon their current or past knowledge. The learner selects and transforms information, constructs hypothesis and makes meaning from information and experiences while relying on a cognitive structure to do so, Brunner (1990).

The theory assumes that learners bring experience and understanding to the classroom, they do not encounter new information out of context but rather applying what they know to assimilate this information or reframe what they know to match new understandings they have gained. Therefore, the process of knowing is an interactive one. The theory advocates for active participation of learners in the learning process rather than being passive receivers of knowledge. Learners should be involved in physical action and hands-on experience that engages the mind as well as the hands. Bruner (1990). This theory is related to research on school factors influencing performance in Chemistry in that, chemistry has its unique content that requires learners to bring into the classroom their experiences and understanding and to apply what they know in accommodating new knowledge.

2.9 Conceptual framework

Orodho (2004), defines conceptual framework as a model of representation where a researcher conceptualizes or represents relationship between variables in the study and shows the relationship graphically or diagrammatically.

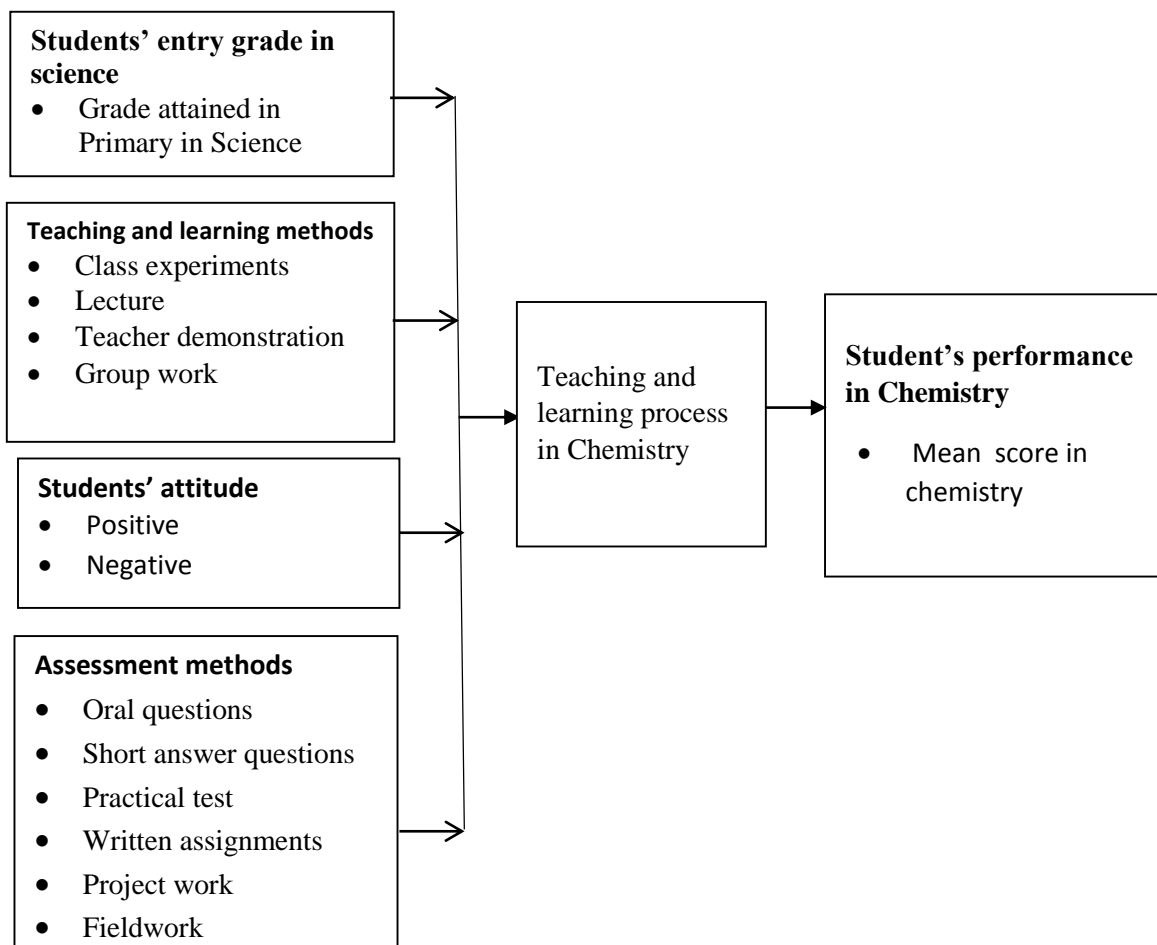


Figure 2.1 The interrelationship between school factors and students' performance in Chemistry in KCSE.

The conceptual framework shows the interaction between the variables influencing performance in Chemistry. The school factors are independent variables. According

to Fullan (1991) model once change is initiated there are intervening factors which influence outcome. In this case assessment methods, teaching and learning methods, students' attitude towards chemistry and students' entry grade in science in KCPE influence performance in Chemistry. Students' performance in Chemistry in KCSE will depend on the way the outlined school factors are applied in the teaching and learning process.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This Chapter presents methodology used in the study. It is presented under; research design, target population, sample size and sampling procedure, research instruments, validity of research instruments, reliability of research instruments, data collection procedures, data analysis techniques and ethical considerations.

3.2 Research Design

This study employed a descriptive survey research design. According to Mugenda & Mugenda (2003), a survey is an attempt to collect data from members of a population in order to determine the status of the population with respect to one or more variables. The design explored and evaluated in depth the influence of school factors and the students' performance in chemistry in KCSE.

This design was considered appropriate because it was capable of facilitating collection of data that described specific characteristics of phenomena in order to determine the status of a population with respect to one or more variables.

3.3 Target Population

The study targeted the 38 public secondary schools in Mbooni East Sub County. The target population consisted of 38 principals and 76 Chemistry teachers. Form 3 Chemistry students were also targeted, 1920 in the 38 public secondary schools since

they were considered to have been in the school system long enough to understand the school factors influencing their performance in Chemistry. The study targeted schools that had been presenting candidates for KCSE examination up to 2014. Sub County Director of Education, Mbooni East Sub-County, (2016)

3.4 Sample Size and Sampling Technique

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the larger group thus representing the characteristics found in the entire group (Orodho, 2003). According to Mugenda and Mugenda (2003) a sample size of 10% and 30% is adequate for a population of below 1000. For this study, 10% was used to sample the form 3 students.

Table 3.1

Sampling frame

Category of respondents	Population	Sample	Percentage
Principals	38	12	30
Chemistry teachers	76	24	30
Form three students	1920	192	10
Total	2034	228	

The principals were purposively selected because they are charged with responsibility of supervising curriculum implementation in the school. Two Chemistry teachers per sampled school and 16 students were randomly selected using stratified random sampling technique for each of the sampled school.

3.5 Research Instruments

The main tool of data collection for this study was questionnaires. Principals' questionnaire, teachers' questionnaire and the students' questionnaire.

3.5.1 Questionnaires

The questionnaire was used for data collection because it offers considerable advantages in the administration, presents an even stimulus potentially to large numbers of people simultaneously and provides the investigation with an easy accumulation of data. Gay (1992) maintains that questionnaires give respondents freedom to express their views or opinion.

Questionnaires for Principals

The questionnaire for principals was structured, comprising of five sections. Section one collected data on the background information of principals. Each of the other four sections collected information related to school factors influencing students' performance in Chemistry in public secondary schools in relation to, students' entry grade in science, teaching and learning methods, students' attitude towards chemistry and assessment methods. The questionnaire will comprise of closed ended and open-ended items.

Questionnaires for Chemistry Teachers

The questionnaire for Chemistry teachers was structured into five sections: Section one collected data on the background information of the teachers. Each of the other four sections collected information on school factors influencing students' performance in Chemistry in KCSE, in relation to students' entry grade in science, teaching and learning methods, students' attitude towards chemistry and assessment methods.

Questionnaires for Form 3 students

The questionnaire for form 3 Chemistry students was structured into five sections: Section one collected data on the background information of the students. Each of the other four sections collected information on school factors influencing students' performance in Chemistry in KCSE, in relation to students' entry grade in science, teaching and learning methods, students' attitude towards chemistry and assessment methods. The questionnaire will comprise of closed ended and open-ended items.

3.6 Validity of Research Instruments

Validity is the degree to which the empirical measure or several measures of the concept, accurately measure the concept. It is the degree to which results obtained from the analysis of the data actually represent the phenomena under study (Mugenda & Mugenda, 2003). According to Borg and Gall (1989) content validity of an instrument is improved through expert judgment. The researcher sought assistance from the supervisors for help to enhance content validity of the instruments. Their corrections were incorporated. To enhance the validity of the instrument a piloting was

conducted. The aim of pre-testing was to gauge the clarity of the instrument items so that those items found to be inadequate for measuring variables were either discarded or modified to improve the quality of the research instruments.

3.7 Reliability of Research Instruments

Mugenda and Mugenda (2003) define reliability as a measure of the degree to which a research instrument yields consistent results. Test-retest reliability method was used to establish the coefficient of internal consistency of the research instruments. This method involved giving the same test to the same respondents on two separate occasions. Four schools were selected for piloting study. The four schools were not involved in the final study. The scores on the two occasions were then correlated using the Pearson's Product Moment Correlation Coefficient. Where,

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

KEY:

Where:

r - Pearson's product moment correlation coefficient

X- Results from the first test

Y- Results from the second test

N- Number of observation (Kombo & Tirop, 2006)

According to Mugenda and Mugenda (2003), a coefficient of 0.70 or more, shows that there is high reliability of the instruments. For this study, a coefficient of 0.8167 for the questionnaires was obtained and was considered acceptable.

3.8 Data Collection Procedure

The researcher first sought clearance from the Department of Educational Administration and Planning in the university and then applied for a permit from National Commission for Science, Technology and Innovation (NACOSTI) which is charged with responsibility of issuing the permits for research in Kenya. The researcher then proceeded to seek further clearance from Sub-County Director of Education Office.

Thereafter the researcher wrote letters to the principals to be allowed to do the study. The selected schools were visited to book appointments on when to visit the schools. Questionnaires were dropped and picked on the same day.

3.9 Data Analysis Techniques

The used Statistical Package for Social Sciences (SPSS) IBM version 20 to analyze data. This was done by first cleaning, coding, entering and then analyzing. The data was analyzed both qualitatively and quantitatively. Quantitative data was edited to eliminate inconsistencies, summarized and coded for easy classification in order to facilitate tabulation and interpretation. Descriptive statistics was used in describing the sample data in such a way as to portray the typical respondent and to reveal the general

response pattern. Qualitative data analysis was done by describing the distribution of single variables. The relationships and links between the independent and dependent variables was discussed and logical conclusions made. The analyzed data was then presented through tabular representation of frequency tables for each variable, percentages and means.

3.10 Ethical Considerations

The following ethical consideration were adhered to; the researcher ensured equitable selection of subjects and obtained consent from any subjects who participated in the study. The researcher also communicated to respondents the objectives of the investigation, established rapport with the respondents, was honest at all times and ensured that all subjects participated voluntarily, respondents were made to understand the nature of the study and confidentiality and anonymity of respondents was maintained.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter covers; introduction, questionnaire return rate, demographic information of principals, demographic information of chemistry teachers, demographic information of form three chemistry students, entry grade in science from KCPE, teaching and learning methods, students attitude and assessment methods and their influence on students' performance in chemistry in KCSE.

4.2 Questionnaire return rate

Questionnaire return rate is the proportion of questionnaires returned after they have been issued to the respondents (Baruch, 1999). Table 4.1 shows questionnaire return rate for the study.

Table 4.1 Questionnaire return rate

Category of Respondent	Questionnaires issued	Questionnaires returned	Percentage return rate
Principals	12	12	100
Chemistry teachers	24	24	100
Form three Chemistry students	192	192	100
Total	228	228	100

All the respondents filled and returned the questionnaires on the same day they were administered. The return rates were above 80% and hence deemed adequate for data analysis. Baruch (1999). States that, a response rate of above 80% is adequate for social sciences.

4.3 Demographic information of respondents

This section presents the demographic information of the respondents. It includes general profile of the study respondents with regard to gender, age and duration for principals, chemistry teachers and chemistry students. It was necessary to take demographic information of the respondents so that the study samples experienced respondents who understand the real situation in their schools regarding school factors influencing students' performance in chemistry at KCSE.

4.3.1 Demographic information of principals

The demographic information of principals was based on gender, age, the duration they had served as principals and highest academic qualification held. The study sought to find out the gender of principals and to establish the same. The researcher asked principals to indicate their gender. The results are shown in table 4.2

Table 4.2 Distribution of principals by gender

Principals' gender	Frequency (f)	Percentage (%)
Male	7	58
Female	5	42
Total	12	100

The results revealed that 58% of the principals were males. This shows there were slightly more male principals than female principals in the public secondary schools in Mbooni East Sub County. This distribution of female and male principals is fair and gender balancing has been observed in this sub county. To establish the age of principals, the researcher asked them to indicate their age. The results are shown in table 4.3

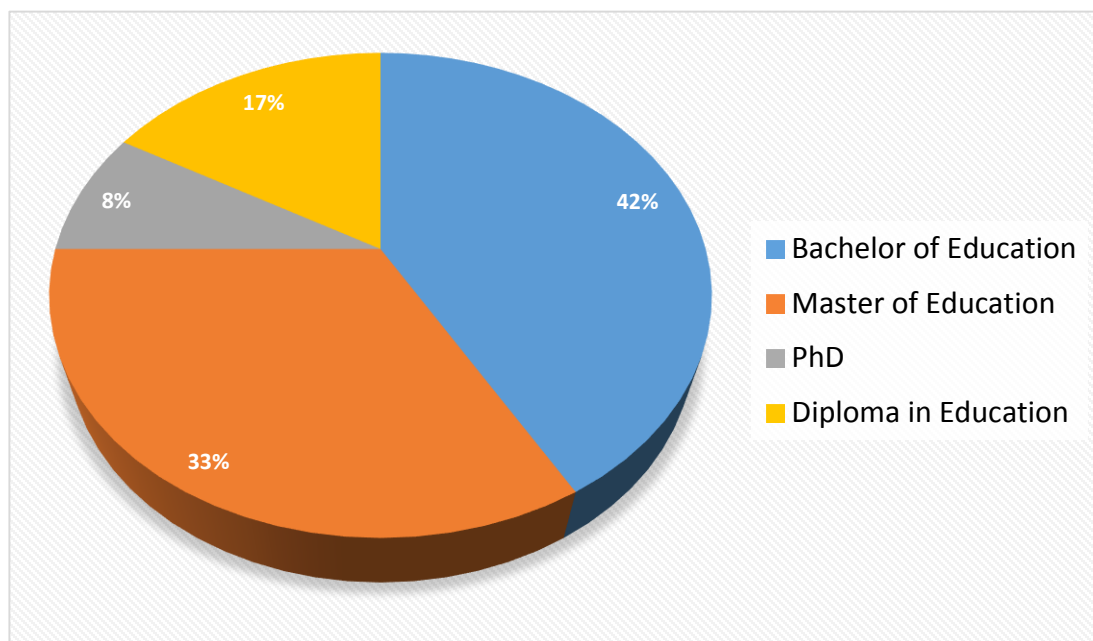
Table 4.3 Distribution of principals by age.

Age bracket	Frequency (f)	Percentage (%)
< 40 years	2	17
41 – 50 years	8	66
51 – 60 years	2	17
Total	12	100

The data in table 4.3 shows that, 66% of the principals are between 41 -50 years and therefore are able to address the school factors influencing students’ performance in chemistry in their schools. From this data it can be deduced that majority of the respondents were mature enough an indication that they had worked for long enough as principals to understand better school factors’ that influence the students’ performance in chemistry.

The researcher also sought to find out the level of education of the principals. The researcher asked them to indicate their level of education and the results are shown in figure 4.1

Figure 4.1 Distribution of principals by their level of education



The findings in figure 4.1 show that 17% of the principals hold Diploma in Education, 42% a bachelors' degree, 33% masters' in education and 8% PhD. The implication is that principals had the required education qualification hence were in a position to understand the school factors influencing students' performance in chemistry in KCSE and to promote the use of recommended teaching and learning methods and assessment methods in chemistry. Principals play management function hence need various skills in order to cope with the demands for management and teaching tasks. The skills can be attained through further formal training since objective number two is on teaching methods and how they influence performance in chemistry. According to the literature reviewed, training and experience are necessary for a teacher to display competence in the choice and use of teaching method since there is no single teaching method that can be sufficient in making students understand and retain content.

The study sought to establish the length of service as the principals in their capacity as a principal in that particular public school. The principals were asked to indicate the number of years they have served as principals in that school and their responses are shown in table 4.4

Table 4.4 Principals service in their current station

Years of service	frequency (f)	percentage (%)
1 – 5 years	2	16.7
6 – 10 years	6	50
11-16 years	3	25
Over 16 years	1	8.3
Total	12	100

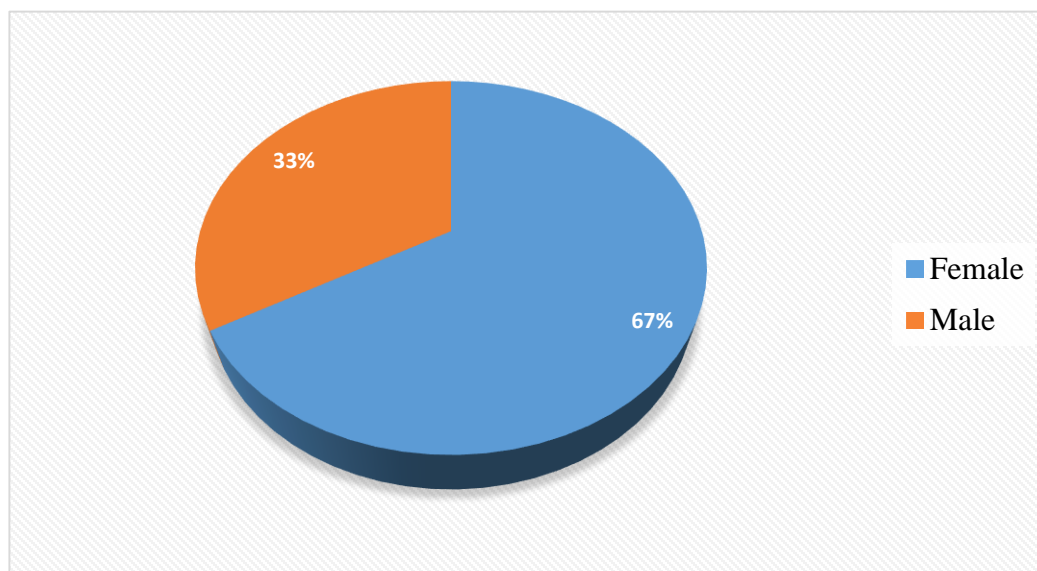
Table 4.4 shows that most principals (50%) had been principals in their current school for a considerable number of years mostly between 6-10 years hence were in a position to explore teaching and learning methods and assessment methods in chemistry used in the school over the years and how they influence performance in chemistry at KCSE in their schools.

4.3.2 Demographic information of Chemistry teachers

The demographic information of chemistry teachers was based on gender, age, highest qualification and the duration they had served as chemistry teachers in that school.

To establish the gender of chemistry teachers, the researcher asked them to indicate their gender and the results are as shown in figure 4.4

Fig 4.2 Distribution of chemistry teachers by gender



The results in Figure 4.2 revealed that 67% of the chemistry teachers were males. This shows that there were more male chemistry teachers than females. This distribution is acceptable as it is in line with the two thirds rule which could create an opportunity to address the issues facing both the boy and the girl child in the sub county and in objective number three on students attitude towards chemistry, the literature reviewed indicated that the teacher can be a cause for negative attitude hence if teaching staff consists of males only, the girls may form the attitude that chemistry is for boys leading to poor performance in chemistry in KCSE.

The researcher sought to establish the age of chemistry teachers. The teachers were asked to indicate their age. The results are shown in table 4.5

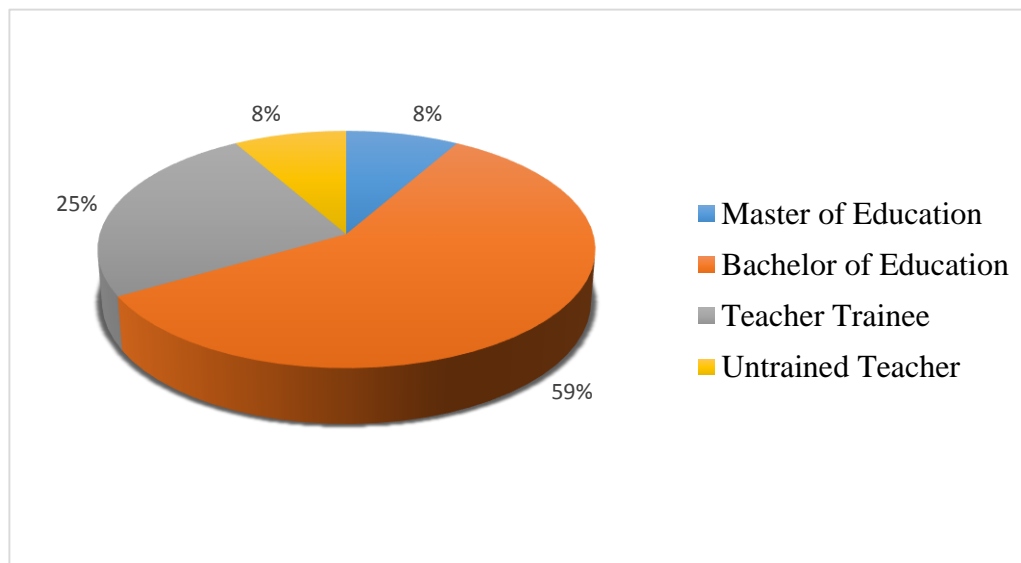
Table 4.5 Distribution of chemistry teachers by age

Age bracket	Frequency (f)	Percentage (%)
< 30 years	14	58
31 – 40 years	6	25
Over 41 years	4	17
Total	24	100

The data in figure 4.5 shows that 58% of the chemistry teachers were aged below 30 years, 25% were aged between 31-40 years and 17% were 41 years and above. This means that the teaching staff in public secondary schools consists of young teachers most likely fresh graduates who either have been posted by TSC or employed by B.O.M. alternatively these are teacher trainees on long vacation or on school based programs. This might be one reason why the performance in chemistry is poor due to very young teachers with high turnover. The second objective on teaching methods under the literature reviewed indicated that chemistry is a practical subject and since majority of these these teachers are young, they lack experience on choosing suitable teaching methods for various topics and also such teachers may have inadequate pedagogical skills or may be busy with their educational activities making them to have inadequate lesson preparation and use of lecture method. The findings concur with the literature reviewed.

The researcher sought to find out the level of education of the chemistry teachers and the results are shown in figure 4.3

Figure 4. 3 Distribution of chemistry teachers by level of education



The results in figure 4.3 show that 59% of the chemistry teachers had Bachelors' Degree in education while 25% were teacher trainees either on long vacation from various universities or attending school based degree courses in various universities and the last budge of 8% is of untrained teachers who have done KCSE and are waiting to join universities or colleges in future. The 59% graduates may be doing good job in terms of choosing teaching methods and administering recommended assessment methods to ensure students learn, retain content and can attempt questions competently in KCSE but their efforts could be watered down by the teacher trainees and untrained teachers who might cause the students to develop negative attitude. This gap can be filled by the government addressing the issue of teacher shortage in many public schools.

The study sought to establish the length of service of the chemistry teachers, the researcher asked them to indicate the duration they had been teachers. Their responses are shown in table 4.6

Table 4.6 Chemistry teachers' duration of service in the teaching profession

Years of service	frequency (f)	percentage (%)
Below 1	4	16.7
1 – 5	10	41.7
6 – 10	4	16.7
11- 15	2	8.3
16 – 20	2	8.3
Above 20	2	8.3
Total	24	100

The results in Table 4.6 show that 41.7% of the chemistry teachers had a service of between 1-5 years. And those with a service length of under 1 year are 16.7%, this means that most chemistry teachers in Mbooni East Sub County are either newly employed or in colleges and universities hence may not have adequate experience and pedagogical skills to effectively choose teaching methods and assessment methods deliver for students to perform well in chemistry. This can cause students to develop negative attitude towards chemistry hence poor performance. A total of 58.4% being young in the profession could translate to serious oversight on understanding the effective teaching methods and assessment methods in chemistry hence influencing performance negatively.

To establish the length of stay of the chemistry teachers in their current school, the researcher posed an item to indicate the duration they had been teachers in current school and their responses are shown in table 4.7

Table 4.7 Chemistry teachers' duration of service in the current school

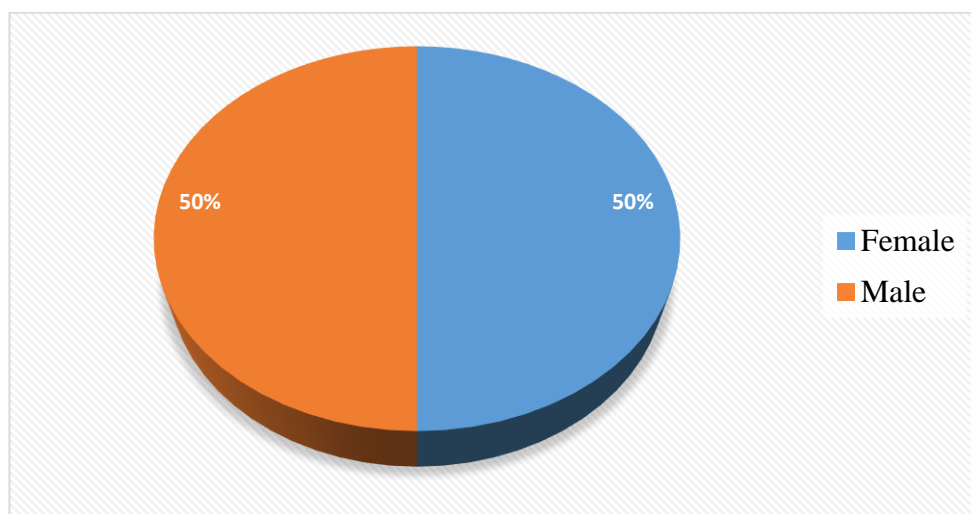
Years of service	frequency (f)	percentage (%)
Below 1 year	3	12.5
1 – 5 years	12	50
6 – 10 years	7	29.2
11 – 15 years	2	8.3
Total	24	100

The findings in table 4.7 shows that, 50% of the chemistry teachers had been in the current school for between 1 and 5 years, 29.2% for 6- 10 years and 8.3% for between 11-15 years. This shows that the chemistry teachers had been in the current school for considerable number of years and hence were in a position to understand the students in their schools better in terms of attitude towards chemistry, whether it is positive or negative, selection of teaching methods and assessment methods depending on the attitude of students and entry grade in science since in literature review, Mwangi and Nyagah (2013) pointed out that those with low grades in science have poor back ground hence the need to focus on value addition.

4.3.3 Demographic information of form three chemistry students

The demographic information of form 3 students was based on gender and the length of stay in the current school. The study sought to establish the gender of form three students who participated in the study and their responses are shown in Figure 4.4

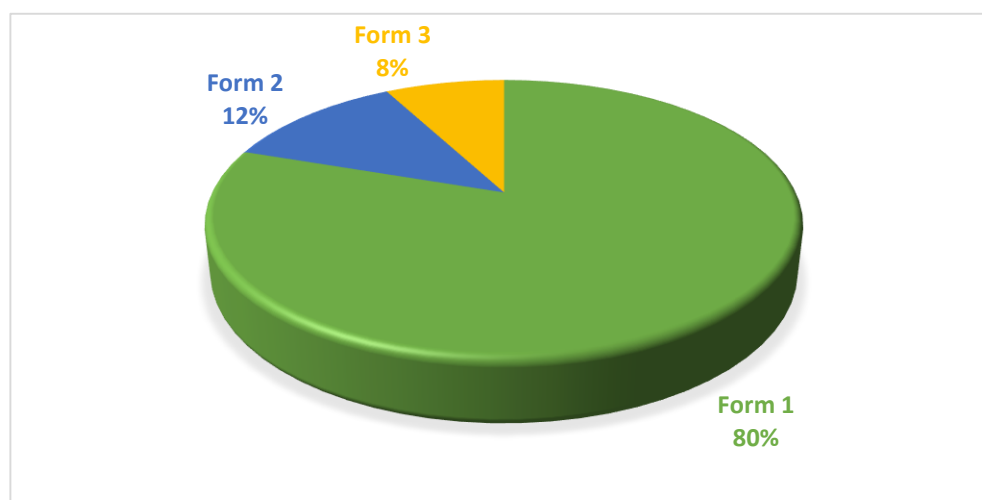
Figure 4.4 Distribution of students by gender



The results in Figure 4.4 Show that there was an even distribution of male and female form three students who participated in the study, 50% Females and 50% Males. This distribution has the implication that students attitude, especially of female students may not be negative by thinking that chemistry is for boys. In the literature review, Ogembo, Otunga and Nthenya (2015) in a study they carried out in Kwale found out that among the factors that relate to students attitude is gender. The distribution in figure 4.4 can cause positive attitude towards chemistry hence improved performance.

The research sought to find out whether the form three chemistry students who participated in the study started their secondary level of schooling in form one in the current school. The results are as shown in figure 4.5

Figure 4.5 Distribution of form three students by level of enrolment



The data in Figure 4.5 shows that majority (80%) of form three students who participated in the study were admitted in form one. This implies that, majority of the form three students who participated in the study had stayed in the current school long enough and were in a position to understand how school factors influence students' performance in chemistry in KCSE in public secondary schools in Mbooni East Sub County

4.4 Science entry grade and students performance in Chemistry

One of the objectives of the study was to establish the extent to which students' entry grade in science in KCPE influences performance in chemistry in KCSE in public secondary schools. The researcher posed items to principals, chemistry teachers and

form three chemistry students to establish the same. The respondents were asked to indicate whether entry grade in science influences students' performance in chemistry in KCSE and the results are as tabulated in table 4.8

Table 4.8 Influence of entry grade in science on performance in chemistry.

Category of respondent	Yes		No	
	f	%	f	%
Principals	5	41.7	7	58.3
Chemistry teachers	16	66.7	8	33.3
Chemistry Students	125	65.1	67	34.9

The results on table 4.8 show that 41.7% of the principals, 66.7% of the chemistry teachers and 65.1% of chemistry students indicated that entry grade in science in KCPE influenced performance in chemistry in KCSE. This has some weight in that chemistry teachers and chemistry students' responses are well above average concurring with literature reviewed that those students who score low science marks in KCPE are likely to perform poorly in chemistry in KCSE since they were not equipped well with basic scientific skills (Mwangi and Nyagah, 2013)

The principals' responses are approaching 50%. That means, on average principals contradict findings of literature review that low grades in science in KCPE influence performance in chemistry in KCSE. The principals indicated that new concepts are learned in chemistry which may be understood by students differently. The principals

views support the study carried out in Yobe State University, Damatura where Babalola (2015) pointed out that there was no relationship between performance in ‘A’ Level chemistry and entrygrade in ‘O’ Level chemistry. The opinion of the chemistry teachers and students has more weight as found out in literature review that low grades in science in KCPE translate to poor performance in chemistry in KCSE according to Mwangi and Nyagah (2013).

4.4.1 Chemistry teachers’ responses on actual entry grades between KCPE science grade and KCSE chemistry grade.

The study sought to find out whether those who scored high marks in KCPE science grade also score well in chemistry in KCSE. To asses this, the researcher asked chemistry teachers to enter KCPE science grades for year 2010 and KCSE chemistry grades for year 2014 of the same candidates. The results are shown in table 4.9

Table 4.9 Chemistry teachers’ responses to KCPE science grade 2010 and KCSE chemistry grade of 2014 candidates

Examination Grades	KCPE 2010		KCSE 2014	
	f	%	f	%
A	–	–	–	–
B	5	20.8	4	16.6
C	9	37.6	10	41.7
D	5	20.8	–	–
E	5	20.8	10	41.7

The results on table 4.9 show that, the students whose grades for KCPE 2010 and KCSE 2014 were entered, 20.8% had B in KCPE science and only 16.6% scored B in KCSE chemistry while 37.6% had C in KCPE science and 41.7% scored C in KCSE chemistry. This meant that to an extent, entry grade in science influences performance in chemistry in KCSE since those students with C grade and below in science in KCPE also score poor grades (grade E) in chemistry in KCSE while those with average grades in KCPE science tended to score better in KCSE chemistry. This findings are in line with literature reviewed according to Mwangi and Nyagah (2013) that revealed poor performance in chemistry is linked to entry grade in science in KCPE and that pupils in Primary schools should be prepared in a better manner to face future science subjects with an open mind.

4.4.2 Students' responses on entry grade in science and performance in chemistry

The researcher also sought to know the grades scored by the form 3 students in KCPE and the grades they scored in end of term 1 in chemistry year 2016. They were asked to indicate the same and the results were obtained are as tabulated in table 4.10

Table 4.10 Students' responses on entry grade and performance in end term chemistry

TYPE OF TEST RANGE IN SCORES	KCPE		END OF TERM 1 TEST	
	f	%	f	%
0 – 34	–	–	21	10.9
35 – 49	12	6.3	75	39.1
50 – 64	111	57.8	64	33.3
65 – 79	64	33.3	30	15.6
80 – 84	2	1	1	0.5
85 – 100	3	1.6	1	0.5
TOTAL	192	100	192	100

The results on table 4.10 show that no form 3 had entered in form 1 with 0 – 34 marks but when they did end of term 1 year 2016 test, 10.9% scored 0 – 34 marks portraying that other factors influencing performance in chemistry come in to play. These factors are likely to be the teaching methods used and the assessment methods since consistent low scores in chemistry result to negative attitude (Brenner, 2004). Those who had scored 50 – 64 marks in science in KCPE were 57.8% and this group reduced to 33.3% in end term test in chemistry. This indicated that entry grade in science has influence on performance in chemistry (Mwangi and Nyagah, 2013).

4.5 Teaching and learning methods influence on performance in chemistry

The second objective of the study was to determine how teaching and learning methods influence students' performance in chemistry in in KCSE in public secondary schools. To establish how teaching and learning methods influence performance in

chemistry, the researcher posed items to the respondents that sought to establish the same. The principals, chemistry teachers and chemistry students responded to the items and their responses were tabulated

Principals' responses to teaching and learning methods on influence on chemistry performance

The study sought to determine how teaching and learning methods used in the schools influenced performance in chemistry. The principals' responses to the given scale and the findings are as shown in table 4.11

Table 4.11 Principals' responses on teaching and learning methods

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Teachers involve Students giving tasks	2	16.7	10	83.3	–	–	–	–	–	–
Teachers carry out demonstrations	2	16.7	10	83.3	–	–	–	–	–	–
Students are given project work	2	16.7	5	41.7	2	16.7	3	25.0	–	–
Students are organized into groups	4	33.3	8	66.7	–	–	–	–	–	–
Teachers use lecture methods	2	16.7	3	25	–	–	3	25	4	33.3
Teachers use simulations and video clips	–	–	8	66.7	–	–	4	33.3	–	–
Students do assignments in groups	4	33.3	6	50	–	–	2	16.7	–	–

Table 4.11 shows that 16.7% strongly agreed and 83.3% of the principals indicated that teachers in their schools involve students in their chemistry classes by giving tasks when teaching. Asked whether teachers use lecture method, 16.7% strongly agreed and 25% of the principals agreed that teachers use lecture method. This method is unpopular since the students are passive and may not remember much of the content taught (Wachanga, 2005). One student even wrote, “I feel drowsy when teachers lecture” This may be one cause of the poor performance witnessed in chemistry in KCSE. The 33.3% of teachers who use learner centered teaching methods like practicals, group tasks and demonstrations improve students understanding and interest as 65% of students wrote, “I enjoy practical lessons in Chemistry because I get to know how it is applied in real life situation.” Zadra (2000) argues that correct use of appropriate teaching methods is critical to the successful teaching and learning of Chemistry substances theoretically. But to master chemical reactions, they need to mix the chemicals and observe the subsequent reactions. This argument confirms the results in the table 4.11 that use of lecture method has contributed to dismal performance in chemistry in KCSE.

Chemistry teachers’ responses on teaching and learning methods and performance in chemistry

The researcher asked chemistry teachers to rate the various teaching and learning methods they used when teaching chemistry in their schools. The responses are shown in table 4.12

Table 4.12 Chemistry teachers' responses to influence of teaching and learning methods on performance

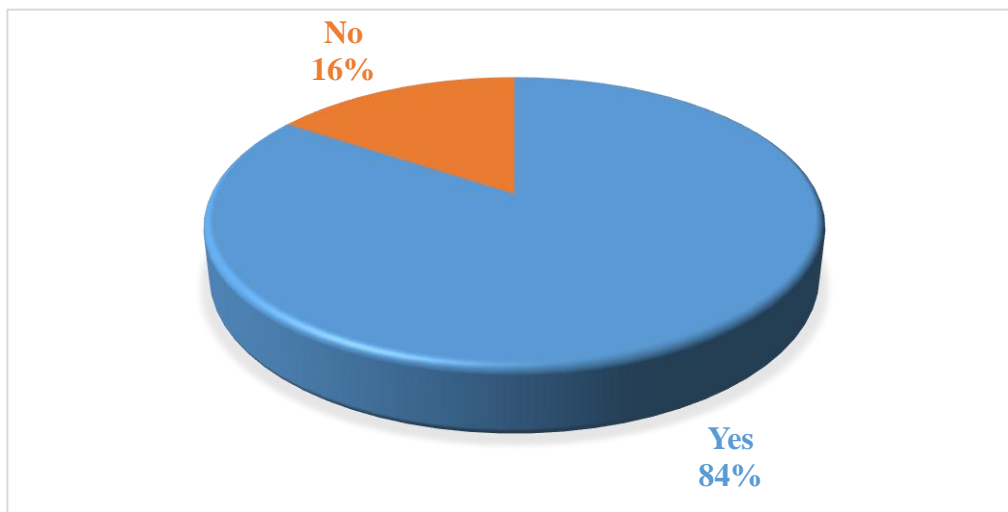
Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Lecture method Improves performance	–	–	7	29.2	–	–	19	41.7	7	29.2
Learner centered Method is best	19	79.2	5	20.8	–	–	–	–	–	–
Teacher demonstration promotes alertness	19	79.2	5	20.8	–	–	–	–	–	–
Small scale experiments promote understanding	17	70.8	7	29.2	–	–	–	–	–	–
Project work improves Performance	13	54.2	8	33.3	3	12.5	–	–	–	–

The findings in table 4.12 show that majority (41.7%) disagreed and 29.2% strongly disagreed that lecture method improves performance. Although teachers are aware that lecture method does not improve performance, they use it any way as Mwangi and Nyagah (2013) in the study in Kiambu County put it, “science teachers use lecture and demonstration methods even where class experiments are possible.” This contributes to poor performance in chemistry.

Chemistry students' responses on teaching and learning methods and performance in chemistry

The researcher asked the students whether their teachers vary teaching and learning methods in chemistry sessions. They were also required to briefly explain the answer they gave. Their responses are shown in figure 4.6

Figure 4.6 Students' response on teachers varying teaching and learning methods



The findings in Figure 4.6 show that majority (84%) indicated that their teachers varied teaching and learning methods when teaching them. A small number (16%) indicated that their teachers do not vary teaching and learning methods. Asked to explain they indicated that their teachers mostly use lecture methods, dictate notes and do not give them a chance to balance equations in class while teaching. They come across the apparatus only during external practical examinations. This situation made them to accept the reality of scoring low marks hence persistent poor performance. This situation is confirmed by Wachanga (2005) who indicated that the teacher is the only active participant and the pupils are passive listeners meaning that their minds are also passive.

The researcher asked the students to rate how teaching and learning methods influence their performance in chemistry. The responses are shown in table 4.13

Table 4.13 Students responses on influence of teaching and learning methods on performance in chemistry

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
We understand better when teachers talk and dictate notes	27	14.1	43	22.4	19	9.9	48	25	55	28.6
Teachers organize Group activities	46	24	52	27.1	16	8.3	38	19.8	40	20.8
Teachers carry out demonstrations	79	41.1	75	39.1	23	12	10	5.2	5	2.6
Small scale experiments promote understanding	97	50.5	57	29.7	9	4.7	19	9.9	10	5.2
Project work improves Performance	107	55.7	64	33.3	11	5.7	5	2.6	5	2.6

The results in table 4.13 shows that 53.6% of the students indicated that they do not understand when lecture method is used and notes are dictated. Since this is what is commonly done by most teachers, students do not understand chemistry concepts well hence poor performance in chemistry. Wachanga (2005) indicated that exposure of students to practical work helps them understand and retain the theoretical concepts since they gain manipulative and observation skills.

4.6 Students' attitude and performance in chemistry

The third objective of the study was to determine how students' attitude towards chemistry influences performance in chemistry in KCSE in public secondary schools in Mbooni East Sub County. To establish how students' attitude influences performance in chemistry, the researcher posed items to the principals, chemistry

teachers and form 3 chemistry students that sought to establish the same. Table 4.14 shows tabulation of principals' responses to students' attitude towards chemistry.

Table 4.14 Principals' responses on students' attitude towards chemistry.

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Only bright students select chemistry	–	–	1	8.3	–	–	9	75	2	16.7
Students say chemistry is difficult	2	16.7	9	75	–	–	1	8.3	–	–
Students choose Chemistry for career	2	16.7	7	58.3	1	8.3	2	16.7	–	–
Students like chemistry for applicability	2	16.7	3	25	–	–	6	50	1	8.3
Students seek assistance from teachers	–	–	11	91.7	1	8.3	–	–	–	–
Students choose chemistry due to lack of alternative	5	41.7	–	–	2	16.7	2	16.7	3	25
Students more time Studying chemistry	4	33.3	5	41.7	–	–	1	8.3	2	16.7

The findings in table 4.14 show that 75% of the principals indicated that chemistry is not chosen by bright students only. This is so because in most schools, chemistry is made compulsory to be paired with biology or physics thus whether the students like it or do not like it, they just do chemistry. The implication is that, some students perform poorly and do not even put efforts to improve since the subject was imposed on them. Asked whether students say that chemistry is difficult, majority of the principals (83.3%) affirmed that chemistry is said to be a difficult subject by students. The students wrote, "I like subjects which just need memorizing." And 45% said Chemistry is a broad subject and difficult to understand. This is negative attitude

which makes the students perform poorly in chemistry. This negative attitude brings about low morale hence poor performance.

The negative attitude is also shown by the fact that students seek assistance from chemistry teachers. According to Bassey, Umoren and Udida (2008), students' academic performance in chemistry is a function of their attitude. Negative attitude for whatever reason will bring down performance. Principals and chemistry teachers have a role to play in changing the attitude of chemistry students by choosing teaching and learning methods that promote understanding in chemistry and showing concern to all students regardless of entry grade in science and performance in class as a student indicated, "...I like Chemistry because our teacher helps us where we need help or clarification. I work hard not to disappoint him."

The researcher asked chemistry teachers to rate the attitude of students towards chemistry and their responses are tabulated in table 4.15

Table 4.15 Chemistry teachers' responses on students' attitude towards chemistry.

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Chemistry is for bright students	3	12.5	19	79.2	2	8.3	–	–	–	–
Students say chemistry is difficult	4	16.7	9	37.5	5	20.8	–	–	6	25
Students choose Chemistry for career	5	20.8	9	37.5	4	16.7	6	25	–	–
Students know chemistry is applicable in life	4	16.7	15	62.5	–	–	5	20.8	–	–
Students seek assistance from teachers	5	20.8	16	66.7	–	–	3	12.5	–	–
Students choose chemistry due to lack of alternative	4	16.7	8	33.3	3	12.5	6	25	3	12.5
Students spend more time Studying chemistry	–	–	3	12.5	–	–	18	75	3	12.5

The results in table 4.15 show that 79.2% of chemistry teachers indicated that chemistry is for bright students. This implies that not every student should do chemistry therefore negative attitude amongst teachers as regards chemistry. Ogembo, Otunga and Nthenya in their study in Kwale county found that is due to a number of factors that included teachers attitude towards the students, gender, age and career interest as 62.5% of students put it, “I want to be an engineer, so I need Chemistry.” This is an encouraging revelation, as Chemistry is increasingly becoming a gateway to a number of key careers in the world of work.

The researcher asked the form 3 chemistry students to respond to statements about their attitude towards chemistry. The responses are tabulated in table 4.16

Table 4.16 Chemistry students' responses on their attitude towards chemistry.

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Chemistry is useful in my future life	109	56.8	52	27.1	3	1.6	13	6.8	15	7.8
I do not like chemistry	21	10.9	25	13	19	9.9	64	33.3	63	32.8
I enjoy chemistry theory lessons	59	30.7	94	49	9	4.7	17	8.9	10	5.2
Chemistry is a difficult subject	23	12	59	30.7	9	4.7	56	29.2	45	23.4
I study chemistry on my own	37	19.3	96	50	13	6.8	27	14.1	19	9.9
I like my chemistry teacher	70	36.5	91	47.4	9	4.7	7	3.6	15	7.8
teacher influenced to choose chemistry	31	16.1	37	19.3	21	10.9	55	28.6	48	25

The findings in table 4.16 show that 56.8% of the students strongly agreed that chemistry is useful in their life and also 66.1% indicate that they like chemistry. Bassey (2008) who found out in their study on secondary school students' attitude and performance in chemistry in Akwa Ibom state - Nigeria that there is a significant positive relationship between students' attitude towards chemistry and their performance in chemistry. These responses contradict their performance and the fact that they would opt to do another subject given the chance. An element of negative attitude is being portrayed and confirms why the students do not perform well in chemistry.

4.7 Assessment methods and performance in chemistry

To establish how assessment methods influence students' performance in KCSE in public secondary schools, the researcher posed items to the respondents in this fourth objective to establish the same. The asked principals and chemistry teachers whether they have an examination policy and whether they administer tests other than those in examination policy. Their responses are tabulated in table 4.17

Table 4.17 Responses on whether examination policy influences performance

Category of respondents	Yes		No	
	f	%	f	%
Principals	12	100	0	0
Chemistry teachers	24	100	0	0

The results on table 4.17 show that all the principals (100%) and all the chemistry teachers (100%) indicated that they have examination policy which means that the assessment methods are controlled for every subject. The mode of assessment is the recommended since they explained that it is mandatory to give practical tests, written assignments and oral questions among others. The performance should be good but is a contradiction of the performance in the field which is low. This may mean that examination policy has negligible influence on performance in chemistry. The scores students get on sitting an examination may have a greater influence as the students give up when they consistently score low grades. (Orado, 2009)

To establish the various assessment methods used in the schools and how they influence performance in chemistry, the researcher posed items to the principals. Table 4.18 shows the tabulation of principals' responses to the items.

Table 4.18 Principals' responses on methods of assessment

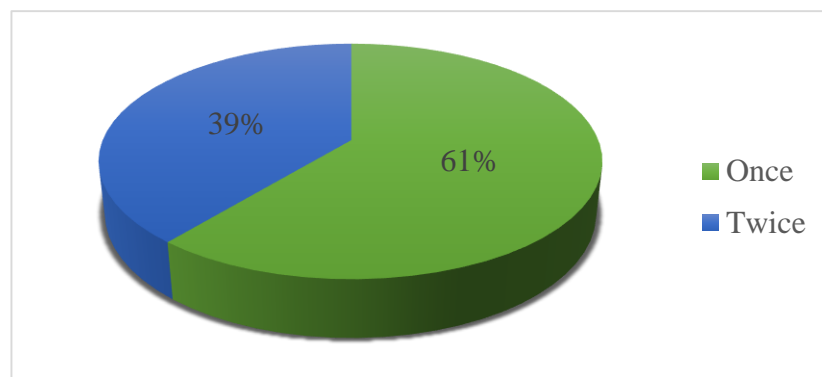
Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Teachers ask oral questions	8	66.7	4	33.3	–	–	–	–	–	–
Students are given individual tasks	2	16.7	8	66.7	2	16.7	–	–	–	–
Students are given tasks in groups	2	16.7	7	58.3	1	8.3	2	16.7	–	–
Students are given project work	–	–	7	58.3	3	25	2	16.7	–	–
Teachers organize field trips	–	–	1	8.3	–	–	7	58.3	4	33.3
Students are given practical tests	3	25	9	75	–	–	–	–	–	–
Students are given written assignments	9	75	3	25	–	–	–	–	–	–

The findings on table 4.18 show that 66.7% of the teachers ask oral questions while teaching which enhances performance. The response for students being given individual tasks, 83.4% of the principals indicated that students are given individual tasks to perform by the teachers therefore this assessment method is used. Asked whether students are given group tasks, 75% of the principals confirmed it was done. 58.3% indicated that students are given project work which enhanced their level of understanding. According to Ayot (1986) the types of assessment profoundly influence the content of the curriculum, how it is taught and ultimately performance. Assessment includes informal classroom processes such as observing pupils tackling

a task, questioning them about their work, looking at the records of their previous work or listening in on their discussions. More formal processes include testing and setting assignment for marking and the national system of tests and examinations. Generally, assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004). Questions such as; what does a student think about a situation or a topic, why is a student's performance of certain skilled task deteriorating among others are of vital importance to a classroom teacher. Principals indicated that the teachers are involved in these practices raising concern why performance is not improving.

Asked whether teachers attend workshops on setting test items, all them indicated that their teachers attend. The response on number of times of attendance of such workshops per year is tabulated in figure 4.7

Figure 4.7 Principals' responses on attendance of workshops for setting test items



The findings in figure 4.7 show that teachers in all schools attend item setting workshop. 42% of the principals' indicated that their teachers attend once per year

while 58% attend twice every year this meant that the teachers prepare quality test items for assessment. According to literature reviewed, use of quality test items in assessment influences performance since all levels of knowledge are tested. Influence of quality test items on performance might be overshadowed by other school factors since no factor can improve performance independently. The researcher asked chemistry teachers to rate the assessment methods used in their schools. Their responses are tabulated in table 4.19

Table 4.19 Chemistry teachers' responses on assessment methods and their influence on performance in chemistry

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
I ask oral questions	19	79.2	5	20.8	–	–	–	–	–	–
I give students individual tasks	14	58.3	8	33.3	–	–	2	8.3	–	–
Groups perform tasks as I observe	5	20.8	17	70.8	2	8.3	–	–	–	–
Students do project work	3	12.5	7	29.2	3	12.5	11	45.8	–	–
I organize field trips	–	–	7	29.2	5	20.8	7	29.2	5	20.8
Students do practical tests	16	66.7	6	8.3	–	–	–	–	2	8.3
I give students written assignments	20	83.3	4	16.7	–	–	–	–	–	–

The findings in table 4.19 indicate that the most commonly used assessment methods are oral questions, group tasks and written assignments. These methods according to

literature reviewed may not test comprehension, analysis and synthesis hence the students do not get and retain chemistry concepts of that nature hence do not perform well when such questions are asked in KCSE. Project work in chemistry is not commonly given to students since majority of the teachers indicated they do not give project work in chemistry. This means that the concepts assessed by doing project work may be missing in students hence poor performance in chemistry in KCSE. Asked whether they organize field trips, 50% of the teachers indicated that they do not organize field trips in chemistry. This assessment method is not commonly used and it is very essential for students to associate chemistry with career and create positive attitude towards chemistry which will influence performance positively. This could be one of the causes of poor performance due to negative attitude.

When students were asked to rate the assessment methods used by their teachers, they responded to the items presented by the researcher and their responses are shown in table 4.20

Table 4.20 Students responses to assessment methods and performance in chemistry

Statement	SA		A		UD		D		SD	
	f	%	f	%	f	%	f	%	f	%
Oral questions are asked	99	51.6	81	42.2	9	4.7	2	1	1	0.5
We do individual tasks as teachers observe us	69	35.9	71	37	8	4.2	26	13.5	18	9.4
Groups perform tasks as teachers observe	61	31.8	72	37.5	21	10.9	25	13	13	6.8
We do project work	30	15.8	31	16.1	15	7.8	57	29.7	59	30.7
Field trips are organized	13	6.8	13	6.8	11	5.7	42	21.9	113	58.9
We do practical tests	25	13	83	43.2	3	1.6	53	27.6	28	14.6
We are given written assignments	80	41.7	72	37.5	9	4.7	22	11.5	9	4.7

The findings in table 4.20 show that the most commonly used assessment methods are oral questions (93.8%), individual tasks (72.9%) and written assignments (79.2%). The methods are commonly used since they take a short time for feedback to be obtained but the limitation is that they do not give students opportunity to experience and develop higher order thinking skills.

The KNEC Report (2014) cited that students in KCSE chemistry examination have weaknesses of comprehension, analysis and synthesis skills in concepts of chemistry that require such skills. This can be attributed to the fact that assessment methods like project work, field trips and practical are not commonly used.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 introduction

This chapter comprises of summary of the study, conclusions, recommendations and suggestion for further study.

5.2 Summary of the study

The study sought to investigate the influence of school factors on performance in chemistry in KCSE in Mbooni East Sub County, Makueni County, Kenya. The researcher singled out four school factors influencing students' performance in chemistry in Kenya Certificate of Secondary Education.

The study was guided by four research objectives, namely:-

To establish the extent to which students' entry grade in science in KCPE influence performance in Chemistry in KCSE in public secondary schools, to determine how teaching and learning methods influence students' performance in Chemistry in KCSE in public secondary schools, to determine how students' attitude towards Chemistry influences performance in Chemistry in KCSE in public secondary schools and to determine the extent to which assessment methods in chemistry influence students' performance in the subject in KCSE in public secondary schools.

The study employed descriptive survey design. The study targeted 38 public secondary schools in Mbooni East Sub County. For this study, the target population consisted of 38 principals, 76 Chemistry teachers and 1920 form 3 students in the 38 public secondary schools. The sample for the study comprised of 12 principals, 24 chemistry

teachers and 192 form 3 chemistry students. Data was collected by use of questionnaires. Pre-testing was done to gauge the clarity and relevance of instrument items. The instruments were also validated and tested for reliability.

The study used Statistical Package for Social Sciences (SPSS) IBM version 20 to analyze data. The data was analyzed both qualitatively and quantitatively. Quantitative data was edited to eliminate inconsistencies, summarized and coded for easy classification in order to facilitate tabulation and interpretation. Descriptive statistics was used in describing the sample data in such a way as to portray the typical respondent and to reveal the general response pattern. Qualitative data analysis was done by describing the distribution of single variables. The analyzed data was then presented through tabular representation of frequency tables and pie charts.

5.2.1 Entry grade in science and performance in chemistry

Findings on the influence of entry grade on science in KCPE and chemistry in KCSE revealed that majority of the principals (66.7%), the chemistry teachers and chemistry students (65.1%) indicated that entry grade in science in KCPE influenced performance in chemistry in KCSE. This was shown by the fact that, those students with very low marks in science in KCPE scored poor grades in chemistry in KCSE while those with average grades in KCPE science grade scored better grades in KCSE chemistry. This was as a result of the science grades of KCPE 2010 and how the same students scored in KCSE chemistry examination 2014 results.

5.2.2 Teaching and learning methods and performance in chemistry

The findings on teaching and learning methods revealed that majority of the principals (83.3%) indicated that teachers in their schools involve students in their chemistry classes by giving tasks when teaching, but they also use lecture method so as to cover the syllabus in the time. A small proportion of the teachers (16%) constantly use lecture method which negatively influences students' performance since 53.6% of the students indicated that they do not understand when lecture method is used.

5.2.3 Students' attitude and performance in chemistry

Findings on how students' attitude towards chemistry influences performance as revealed by most respondents was that, students attitude towards chemistry is negative since majority of the principals (83.3%) indicated that chemistry is perceived as a difficult subject hence most of the students do not like chemistry and they do it because they have no other option. Chemistry is compulsory in most schools. This should not be the situation because students should be allowed to choose at least two sciences but teachers argue that biology does not blend well with physics in career choices.

5.2.4 Assessment methods and performance in chemistry

Findings on the extent to which assessment methods in chemistry influence students' performance was revealed by most principals (58.3%) and teachers (50%) who indicated that project work is not used as assessment method and field trips are not organized. This means that students do not closely associate chemistry with everyday life situations and applicability in the society and therefore they do not mind what they score in chemistry in KCSE resulting in poor performance.

5.3 Conclusions

Based on the findings of the study, it was concluded that entry grade in science in KCPE influences performance in chemistry in that those who score low grades in science in KCPE also score very low grades in chemistry in KCSE hence poor performance. This implies that poor entry grades in science indicate poor preparation and basics in science at higher level.

From the findings for teaching and learning methods and influence on performance in chemistry, it was noted that teachers involve students in teaching and learning by giving individual tasks, group tasks and performing demonstration of experiments but few teachers use project work as a teaching method and a good number of the teachers use lecture method. Most students indicated they do not understand chemistry when lecture method is used since they are very passive. Since teachers use lecture method, performance in chemistry is poor.

On students' attitude and performance in chemistry, the study established that students have negative attitude towards chemistry since majority perceive chemistry as a difficult subject and the students taking chemistry in preparation for KCSE do not like chemistry and could drop it given another option.

For the objective on assessment methods and performance in chemistry in KCSE, the study established that majority of the schools do not organize field trips in chemistry and many teachers do not use project work as an assessment method. Therefore based on the findings of the study, the school factor identified by the researcher and researched on positively and negatively influence performance in chemistry in KCSE

and could result in poor performance or improved performance if recommendations are implemented.

5.4 Recommendations

Based on findings of the study, it is recommended that,

- i) The teaching of science in primary schools be strengthened through close and regular supervision by quality assurance officers in Mbooni East Sub County so that pupils gain a good base in science in preparation for transition to secondary schools where specialization in science subjects begins to avoid wastage when candidates score low grades in chemistry which is a crucial career subject.
- ii) The efforts of the government through the Ministry of Education to in-service teachers in chemistry through SMASE be increased and spread out to cater for teachers of different lengths of service and ages to ensure the teaching methods that add value to learning are grasped by teachers.
- iii) Schools in Mbooni East sub county to strengthen career counseling and guidance so as to create positive attitude in students in students towards chemistry
- iv) The government through Kenya National Examination Council to consider introducing projects in KCSE in future as part of assessment for chemistry in secondary schools.

5.5 Suggestions for further study

The study suggests that;

- i. Further study should be done on the influence of home based factors influencing performance in chemistry since this study is focused on the school factors.
- ii. A study on the influence of chemistry content in secondary syllabus on performance in chemistry.
- iii. A study should be conducted on students' entry behavior and how it influences performance in chemistry.

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APPENDICES

APPENDIX I: INTRODUCTION LETTER.

Benard Kyalo Makato
Department of Educational
Administration & Planning,
University of Nairobi
P.O BOX 92,
Kikuyu.

The Principal,

_____Secondary School,

Dear Sir/ Madam,

REF: REQUEST TO CARRY OUT RESEARCH IN YOUR SCHOOL

I am Benard Kyalo Makato, a Masters student at the University of Nairobi. I am conducting a research to investigate “School factors influencing students’ performance in Chemistry in KCSE in Mbooni East Sub County, Makueni County Kenya”. I kindly request you to allow me conduct research in your school. Information obtained will be purely for the purpose of this research and the identity of the respondents will be treated as strictly confidential.

Thank you for your cooperation and assistance.

Yours faithfully,

Benard Makato

APPENDIX II: PRINCIPALS' QUESTIONNAIRE.

Introduction.

The questionnaire is designed to help investigate the School factors influencing students' academic performance in Chemistry in public Secondary schools in Mbooni East Sub County. Kindly, you are requested to provide answers to these questions as honestly and precisely as possible. Responses to these questions will be treated as confidential. Please tick [√] where appropriate or fill in the required information on the spaces provided.

PART A: BACKGROUND INFORMATION

- 1. What is your gender? Male [] Female []
- 2. Indicate your age bracket. Below 40 years [] 41 - 50 years [] 51 - 60 year []
- 3. What is your professional qualification? PhD [] M.Ed. [] B.Ed.[] Dip/Ed []
- b) For how long have you been a principal?
1 – 5 years [] 6 – 10 years [] 11 – 15 years [] 16 and above []
- 4. How long have you served as a principal in this school?
Below 1 year [] 1– 5 years [] 6–10 years [] 11years and above

PART B: ENTRY GRADE IN SCIENCE AND PERFORMANCE IN CHEMISTRY

- 5. In your opinion, does entry grade in science influence performance in chemistry.
Yes [] No []

Kindly, explain your answer briefly.....
.....
.....

PART C: TEACHING AND LEARNING METHODS AND PERFORMANCE IN CHEMISTRY

6. The statements in the table have abbreviations, 1-Strongly agree (SA), 2-Agree (A), 3 Undecided (UD), 4-Disagree (D), 5- Strongly disagree (SD). Please, respond to all statements by ticking the one you consider most appropriate.

	STATEMENT	SA	A	UD	D	SD
a)	The teachers involve students by giving tasks when teaching					
b)	The teachers carry out demonstrations in class experiments					
c)	Students are given project work in Chemistry					
d)	Students are organized into groups to do small scale experiments guided by the Chemistry teacher					
e)	Chemistry teachers use lecture methods so as to cover syllabus shortest time possible					
f)	Chemistry teachers use simulations and video clips to teach difficult and abstract concepts.					
g)	Students do assignments in groups and present findings in class for harmonization					

PART D: STUDENTS' ATTITUDE AND PERFORMANCE IN CHEMISTRY

7. Against the statements in this section are abbreviations **SA –Strongly Agree, A – Agree, UD - Undecided, D- Disagree, and SD –Strongly Disagree**. Please respond to all of the statements by ticking against the box you feel is the most suitable as per your opinion.

	Statement	SA	A	UD	D	SD
a)	Only the bright students select chemistry					
b)	Students say that Chemistry is difficult					
c)	Students choose Chemistry since it has wide range of career choices					
d)	Students like Chemistry since it is applicable in daily life situations					
e)	Students go to Chemistry teachers with problems for assistance.					
f)	Most students choose Chemistry in my school because they have no alternative.					
g)	Students who spend more time studying Chemistry perform well in Chemistry.					

PART E: ASSESSMENT METHODS AND PERFORMANCE IN CHEMISTRY

8. Do you have an examination policy in your school?

Yes [] No []

Please, explain briefly

9. a) Do your Chemistry teachers administer tests to students other than the ones in the examination policy? Yes [] No []

b) If yes, please list the tests.....

10. Against the statements in this section are abbreviations **SA –Strongly Agree, A – Agree, UD - Undecided, D- Disagree, and SD –Strongly Disagree**. Please respond to all of the statements by ticking against the box you feel is the most suitable as per your opinion.

Type of assessment	SA	A	UD	D	SD
My teachers ask oral questions when teaching chemistry					
Students are given individual tasks and observed by the chemistry teachers as they do the task.					
Groups of students perform chemistry tasks as the teacher observes					
Students are given project work in chemistry					
Chemistry teachers organize field trips in chemistry					
Students are given practical tests					
Written assignments are given to students and teachers mark after students complete the exercise.					

11. a) Do your Chemistry teachers attend seminars or workshops on setting examination items? Yes [] No []

b) If yes, how many times per year? Once [] Twice [] Thrice []

Thank you for your participation.

APPENDIX III: QUESTIONNAIRE FOR CHEMISTRY TEACHERS

Introduction

This questionnaire is designed for the purpose of studying the School factors influencing students' performance in Chemistry in KCSE in secondary schools in Mbooni East Sub-County. The information provided will be treated with confidentiality and is only for academic purposes. Please fill this questionnaire by putting a tick [√] to indicate the correct answer or by filling in the required information in the spaces provided.

PART A: BACKGROUND INFORMATION

1. What is your gender? Male Female
2. Indicate your age bracket. Below 30 years 31-40 years above 40 years
3. What is your level of education? Doctorate Master Degree B ED.
Diploma Teacher trainees Untrained teacher
4. How long have you served as a teacher? Below 1 year 1 – 5 years 6 - 10 years
11 - 15 years 16-20 years above 20 years
5. How long have served as teacher in this school? Below 1 year 1 - 5 years
6-10 years 11- 15 years 16- 20 years above 20 years

PART B: STUDENTS' ENTRY GRADE IN SCIENCE AND PERFORMANCE IN CHEMISTRY

6. Do you think the student's entry grade in science influences performance in chemistry?
Yes No

Kindly, explain briefly.....

Kindly fill in the grades obtained by same candidates in KCPE science in the year 2010 and KCSE Chemistry grade obtained in Form 4 year 2014 for 16 students (8 boys and 8 girls)

	KCPE SCIENCE GRADE YEAR 2010	KCSE CHEMISTRY GRADE YEAR 2014
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

PART C: TEACHING AND LEARNING METHODS AND PERFORMANCE IN CHEMISTRY

7. For the statements in the table, please Tick (√) according to your level of agreement, by using the abbreviations against them for 1-Strongly agree (SA), 2-Agree (A), 3- Undecided (UD), 4-Disagree (D), 5- Strongly disagree (SD)

	Statement	SA	A	UD	D	SD
a	Lecture method improves performance in chemistry.					
b	Learner centered method is best for teaching and learning chemistry.					
c	Teacher demonstration promotes students alertness					
d	Giving students small scale experiments in groups promotes understanding in chemistry					
e	Project work in chemistry improves performance chemistry					

8. Kindly list the methods that you commonly use and give reasons for your choice.

.....

PART D: STUDENTS' ATTITUDE AND PERFORMANCE IN CHEMISTRY

9. Against the statements in this section are abbreviations **SA –Strongly Agree, A – Agree, UD - Undecided, D- Disagree, and SD –Strongly Disagree**. Please respond to all of the statement by ticking against the box you feel is the most suitable as per your opinion.

	Statement	SA	A	UD	D	SD
a)	Students say that chemistry is for the bright only					
b)	Students tell me that Chemistry is difficult					
c)	Students like Chemistry because it has wide range of career choices					
d)	Students know that Chemistry is applicable in their daily life situations					
e)	My students come to me with Chemistry problems for assistance.					
f)	Most students choose Chemistry in my school because they have no alternative.					
g)	Students like spending more time studying Chemistry.					

PART E: ASSESSMENT METHODS AND PERFORMANCE IN CHEMISTRY

10. Do you have an examination policy in your school?

Yes [] No []

Please, explain briefly

11. a) Do you administer tests to students other than the ones in the examination policy?

Yes [] No []

b) If yes, please list the tests.....

12. Against the statements in this section are abbreviations **SA –Strongly Agree, A – Agree, UD - Undecided, D- Disagree, and SD –Strongly Disagree**. Please respond to all of the statements by ticking against the box you feel is the most suitable as per your opinion.

Type of assessment	SA	A	UD	D	SD
I ask oral questions when teaching chemistry					
I give individual tasks to students and observe as they do the task.					
Groups of students perform chemistry tasks as I observe					
Students do project work in chemistry					
I organize field trips in chemistry					
Students do practical tests regularly					
Written assignments are given to students and marked after the exercise is complete.					

Thank you for your participation.

APPENDIX IV: QUESTIONNAIRE FOR FORM THREE STUDENTS

Introduction

This questionnaire is designed for the purpose of studying the influence of School factors on students' performance in Chemistry in KCSE in Mbooni East Sub County. The information provided will be treated with confidentiality and is only for academic purposes. Please fill this questionnaire as accurately as possible by putting a tick to indicate the correct answer

PART A: BACKGROUND INFORMATION

1. What is your gender? Male Female
2. Did you start schooling from form one in this school? Yes No
If not, in which class did you join the school? Form two three

PART B: ENTRY GRADE IN SCIENCE AND PERFORMANCE IN CHEMISTRY

3. Do you think those who performed well in science in KCPE are doing better in chemistry? Yes No

Please, briefly explain.....

.....

4. Please indicate the mean score in science that you scored in KCPE against the mean score of chemistry in end of term 1 examination

Range in Mean score in Science in KCPE year 2013	Mean Score in Chemistry in end of term 1 year 2016
0 – 34	
35 – 49	
50 – 64	
65 – 79	
80 – 84	
85 and above	
Total	

PART C: TEACHING AND LEARNING METHODS AND PERFORMANCE IN CHEMISTRY

5. Do your teachers vary teaching and learning methods while in chemistry sessions?

Yes [] No []

Please explain briefly.....

.....

6. Please Tick (√) according to your level of agreement to indicate by using the abbreviations for 1-Strongly agree (SA), 2-Agree (A), 3- Undecided (UD), 4-Disagree (D), 5- Strongly disagree (SD) to express your opinion.

	Statement	SA	A	UD	D	SD
a)	We understand better when teachers talk and dictate notes in chemistry without involving us.					
b)	The teacher puts us in groups and gives us activities to do and present in class					
c)	Teacher carries out demonstration of complex experiments					
d)	Giving students small scale experiments in groups promotes understanding in chemistry					
e)	Project work in chemistry improves performance chemistry					

7. List the most common methods your teachers use when teaching.

.....

PART D: STUDENTS ATTITUDE TOWARDS CHEMISTRY AND PERFORMANCE

8. For the statements in this section, you are given the abbreviations, please tick (✓) the one you consider most appropriate according to your level of agreement. Strongly agree (SA), Agree (A), Undecided (UD), 4-Disagree (D) and Strongly disagree (SD)

	Statement	SA	A	UD	D	SD
a)	Chemistry is useful in my future life					
b)	I do not like Chemistry					
c)	I enjoy Chemistry theory lessons					
d)	I enjoy Chemistry practical lessons					
e)	Chemistry is a difficult subject					
f)	I often study Chemistry on my own					
g)	I like my Chemistry teacher					
h)	My Chemistry teacher influenced me to choose Chemistry					

PART E: ASSESSMENT METHODS AND PERFORMANCE IN CHEMISTRY

9. Against the statements in this section are abbreviations **SA –Strongly Agree, A – Agree, UD - Undecided, D- Disagree, and SD –Strongly Disagree**. Please respond to all of the statements by ticking against the box you feel is the most suitable as per your opinion.

Type of assessment	SA	A	UD	D	SD
Oral questions are asked when learning chemistry					
We are given individual tasks and our teacher observes as we do					
Tasks in chemistry are given in groups and our teacher observes as we do					
We do project work in chemistry					
Field trips in chemistry are organized in my school					
We do practical tests regularly					
Written assignments are given to us and marked after the exercise is complete.					

Thank you for your participation.

APPENDIX V: RESEARCH AUTHORIZATION FROM NACOSTI



**NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No.
NACOSTI/P/16/45621/11476

Date:

16th June, 2016

Benard Kyalo Makato
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *“School factors influencing students” performance in chemistry in Kenya Certificate of Secondary Education in Makueni County Kenya,* I am pleased to inform you that you have been authorized to undertake research in **Makueni County** for the period ending **13th June, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Makueni County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

**DR. STEPHEN K. KIBIRU, PhD.
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner
Makueni County.

The County Director of Education
Makueni County.

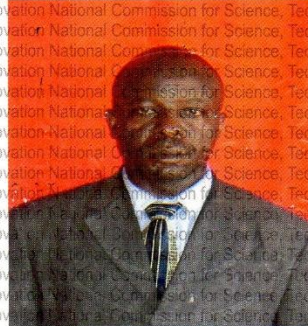
APPENDIX VI: RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT: Permit No : NACOSTI/P/16/45621/11476
MR. BENARD KYALO MAKATO Date Of Issue : 16th June, 2016
of UNIVERSITY OF NAIROBI, 0-90300 Fee Received :Ksh 1000
makueni,has been permitted to conduct

research in Makueni County

on the topic: SCHOOL FACTORS
INFLUENCING STUDENTS PERFORMANCE
IN CHEMISTRY IN KENYA CERTIFICATE
OF SECONDARY EDUCATION IN MAKUENI
COUNTY KENYA

for the period ending:
13th June, 2017



Blakat
Applicant's
Signature

Director General
National Commission for Science,
Technology & Innovation

CONDITIONS

- 1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice



REPUBLIC OF KENYA



National Commission for Science,
Technology and Innovation
RESEARCH CLEARANCE
PERMIT

Serial No. A 9586

CONDITIONS: see back page