DETERMINANTS OF STUDENTS PERFORMANCE IN CHEMISTRY IN PUBLIC SECONDARY SCHOOLS IN MAKINDU DIVISION, MAKINDU SUB-COUNTY

FELISTER MUENI MUTUKU

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE POST GRADUATE DIPLOMA IN EDUCATION OF UNIVERSITY OF NAIROBI, KENYA.

November, 2014.

DECLARATION

This project is my original work and has not been presented to any institution for examination.

Signature_____ Date_____

Felister Mueni Mutuku

E40/P/7005/06

This project work has been submitted to the University with my approval as University supervisor.

Signature _____ Date _____

Dr. Lewis Muli Ngesu

Senior Lecturer

Chairman

Department of Educational Foundation

University of Nairobi.

DEDICATION

I wish to dedicate this work to students, teachers, parents and all education stakeholders in Makindu Division. I also wish to dedicate it to my dear family for the support and encouragement they accorded me during the trying times as I endeavored make meaning of this work.

ACKNOWLEDGEMENT

I wish to acknowledge the following people without whose contribution this work would not have made the light of the day. I am greatly indebted to Dr. Lewis Muli Ngesu, my supervisor for the timely guidance, support and mentorship without which the long road trodden would have been almost impossible to surmount.

My heart also wishes to acknowledge the students, teachers, school administrators and any other person(s) who in one way or the other contributed to the preparation and finalization of this work. May almighty God bless you all.

TABLES OF CONTENTS

Content **Page**

LIST OF TABLES

Content **Page**

LIST OF FIGURES

Content **Page**

ABBREVIATIONS AND ACRONYMS

DEO- District Education Officer

DQASO- District quality assurance and standards officer

GIST- Girls in Science and Technology

HOD- Head of Department

ICT – Information Communication and Technology

KCSE- Kenya Certificate of Secondary Education

KNEC- Kenya National Examination Council

MOE- Ministry of Education

MOEST-Ministry of Education Science and Technology

SEPU- School Equipment Production Unit

SMASSE- Strengthening Mathematics and Science in Secondary Education

UNDP- United Nation Development Programme

UNESCO- United Nations Education Social and Cultural Organization

ABSTRACT

The purpose of the study was to investigate factors influencing student's performance in Chemistry in Makindu Division in the Kenya certificate of secondary education (KCSE). A sample of 216 form three students from 4 secondary schools were randomly selected using both simple and stratified random sampling to participate in the descriptive study. The students were provided with questionnaires while their chemistry teacher and the District Quality Assurance and Standards Offices [DQASO] were orally interviewed. Descriptive, explanative and explorative statistics using ordinal scales based on measurements such as frequencies and percentages were used. These measurements were generated manually using coding of responses as derived from questionnaires. Results showed that student background characteristics; attitude related factors particularly Chemistry teacher's negative perception of their learners abilities; in adequate use of resource in the teaching and learning process and negative socio-cultural factors as well as inappropriate learning environment were the major causes of the students' persistent poor performance in Chemistry. It is recommended that the Ministry of Education through its various agents should, among other things, enhance supervision of curriculum implementation in schools. The study also recommends that the school managements, in conjunction with other stakeholders, should enhance teacher motivation and provide more and better teaching and learning facilities to enable a more conducive environment for learning. Finally, Chemistry teachers must enhance their teaching approaches by adopting a more practical approach to the teaching and learning practices that would motivate the students to perform better in the subject.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study.

Education remains the only major avenue for upward social mobility (Amutabi, 2003). In developing countries, Kenya included, most of the people still live below the poverty line. For such persons, the educational return remains as the major change agent for their livelihood (UNDP, 1994). However in exam-oriented systems of education, the quality of performance in the examination is the main determinant of those who would move up the social ladder and enjoy the limited opportunities available.

In Kenya like in many other examinations-oriented education systems, there exists a highly competitive national examination at the end of secondary school (Khatete, 1995). Those who perform well in the Kenya Certificate of Secondary Education (KCSE) examinations, with a mean grade of C and above, are selected to proceed for training in the government's institutions of higher learning and middle level colleges on government subsidy (KNEC, 2010& MOE, 2009). On completing training, such persons are better placed to be absorbed in the highly competitive national and international job market. Performance of students particularly at the KCSE level therefore concerns all interested parties, especially the government of Kenya, the parents and the students themselves.

The cut-throat competition is even more manifested in the science subjects such as Chemistry due to its perceived significant contribution to industrial and technological development particularly in attaining the Millennium Development Goals (MDGs) and Kenya's Vision 2030. The development of a cadre of scientists and technicians involved

in the selection and adaptation of important technologies would potentially improve the anticipated developments in Agriculture, health and industries in line with the MDGs and Kenya's development plans. Failure in science subjects, Chemistry included, may therefore affect upward social mobility for many a households with poor performers.

The significant role of science in the attainment of the MDGs and Kenya's development has prompted the Government of Kenya to make it compulsory for each student to specialize in at least two out of the three science subjects (Chemistry, Biology and Physics) offered at the secondary school level. This notwithstanding, performance in these science subjects has continued to decline each year. The poor performances in sciences include Chemistry, which is one of the most "popular" science subjects that have continued to register high student enrolment in secondary schools. The perceived popularity of Chemistry, it was hoped, would translate into better performance. However, the performance has continued on a downward trend (KNEC, 2010). Available statistics show that in the last decade, students' achievement in Chemistry has remained low nationally and at the district level in Makindu Division (KNEC, 1999; KNEC, 2010). Table 1.1 provides information on national performance of KCSE candidates in selected subjects for the period from 2006 to 2009.

Table 1.1: National KCSE results analysis by percentage in selected subjects 2006 – 2010

Year	Math	Chem	Bio	Phy	Agric	Geo	Eng
2006	19.04	**24.91**	27.45	40.32	43.15	41.72	39.76
2007	19.73	**25.39**	41.95	41.31	37.28	46.31	39.70
2008	21.29	**22.74**	30.32	36.71	48.52	37.01	33.78
2009	21.13	**19.12**	27.15	31.31	43.09	37.87	39.21

Source: KNEC (2010**)**

Table 1.1 indicates that Chemistry had the lowest mean percentage rating in 2009 and the second to last mean rating for the period ranging from 2006 to 2008. A similar trend in performance is observed for Chemistry in the case of Makindu Division as is seen in Table 1.2.

Table 1.2: Makindu Division KCSE results analysis of selected subjects 2002-2009{Mean rating out of 12}

Year	Math	**Chem**	Bio	Phy	Agric	Geo	Eng
2002	1.85	**2.53**	3.17	3.28	4.47	3.23	3.23
2003	2.022	**2.869**	3.580	3.461	4.709	3.806	3.469
2004	2.076	**3.108**	3.764	4.225	4.876	4.076	3.396
2005	1.904	**2.968**	4.030	3.747	4.491	3.904	4.159
2006	2.097	**3.609**	4.328	4.403	4.720	4.262	4.410
2007	2.301	**3.666**	5.232	4.447	4.421	4.029	4.324
2008	2.265	**3.374**	4.827	4.213	4.532	3.936	4.273
2009	2.176	**2.579**	4.538	2.883	4.325	4.167	4.292

Source: Makindu District Education Office, 2010

Table 1.2 shows that the performance in Chemistry for Makindu District was below the other subjects except for Mathematics in the period of 2002 to 2009. Studies have proposed various determinants of performance in sciences in general and Chemistry in particular. According to available research findings these factors include; poor teaching methodologies (Friedman, 2000), poor capital investment in terms of provision of science resources (Agusiobo, 1998), low teacher morale, substandard internal evaluation, poor administration and leadership, inadequate supervision and inspection of schools (Chiriswa, 2002), lack of support from parents, insecure working relationship between

head teachers and their staff and indiscipline among others. In an attempt to check poor performance, the Government of Kenya through the Ministry of Education in collaboration with other stakeholders adopted a number of interventions. The measures included curriculum review and rationalization to reduce the load both on students and teachers, on-the-job training of science teachers through SMASSE (Strengthening of Mathematics and Science in Secondary Education) to enhance subject mastery levels and strengthening of inspectorate department to improve curriculum implementation and supervision (KESSP, 2005).

Even after such interventions, available data indicate that students' performance in Chemistry in Makindu Division is still poor. From Table 1.2 performance in Chemistry in Makindu Division mean score which was 2.53 in 2002 rose to 3.666 in 2007 before dropping to 2.579 in 2009

(Makindu D. E. O's Office, 2010). This means that the interventions undertaken so far have not achieved the desired outcome. It is therefore probable that such interventions may not have been based on results of empirical and systematic studies on the determinants of poor performances in Chemistry in Makindu Division (Ngugi & Nyakweba, 2005). This study therefore sought to investigate the factors influencing continued poor performance in Chemistry in Makindu Division with a view of identifying appropriate interventions to improve the performance.

1.2 Statement of the problem.

Performance in sciences especially in Chemistry has continued to be a major concern for the Government of Kenya and other education stakeholders. The trend in performance has been more pronounced in rural areas such as Makindu Division. The performance have led to low mean grades for most students and thus jeopardised their chances for upward social mobility. At the national level, the poor performances has led to low uptake of careers in science and technology. In an effort to reverse the trend, the government adopted a number of interventions targeting pupils, teachers and the overall teaching and learning environment. Despite these interventions, the performance in Chemistry in Makindu Division continues with lower mean grades than the national averages grades being recorded year after year.

The continued declining performance in Chemistry have been attributed to a number of factors including student's attitude towards Chemistry, teacher's attitude towards students' abilities, inadequate teaching and learning resources, and poor teaching methodologies. However, it is not clear which of these factors are responsible for the desimal performance of Chemistry in Makindu Division. The study therefore sought to identify the factors which are responsible for students poor performance in Chemistry in Makindu Division.

1.2.1 Purpose of the study

The aim of this study was to contribute to an improved Chemistry teaching and learning environment at secondary school level. The purpose of the study was to determine factors

stated which contributed to poor achievement in Chemistry and suggest possible interventions for enhancing good performance.

1.3 Objectives of the study

The objectives of the study were to:

i. Establish the effects of students background characteristics on performance in Chemistry
ii. Explore the effect of use of resources in students performance in Chemistry.
iii. Identify intervention strategies that can help improve learner's performance in Chemistry.

1.4 Research questions

The study sought to answer the following questions:

i. What are the effects of student's background characteristics on performance in Chemistry?
ii. What extent does use of resources influence students performance in Chemistry?
iii. What intervention measures can be put in place to help improve learner's performance in Chemistry?

1.5 Research assumptions

During this study it was assumed that:

i. The teachers interviewed had been teaching Chemistry in the specific schools for a reasonable period of time to be able to be conversant with the dynamics of their learning environments.

ii. The syllabus coverage was uniform for all the schools.

iii. The students who participated in this study learn under similar conditions as those whose

iv. KCSE results were analyzed in the period ranging from 2002 to 2009.

v. The respondents were honest in answering all questions.

1.6 Significance of the study

The study drew its importance from the fact that achieving the aims of the country's industrialization could be jeopardized if a large proportion of the anticipated participants did not have adequate access to the appropriate kind of Chemistry education and training (Eshiwani, 1983; Orodho, 1996). A poorly educated workforce directly hampers a nation's productivity and economic competitiveness (Stevenson & Stigler, 1992). The findings were expected to practically contribute towards improvement of teaching and learning strategies of Chemistry not only for schools under study, but for the entire county and possibly be extrapolated to cover the entire nation. Theoretically, the study was expected to contribute to the advancement of science knowledge for social and economic development. The findings of this study would also be beneficial to:

a) Classroom teachers- It would help them in selecting methods that would improve the quality of teaching and learning.
b) School administrators- They would benefit from suggestions on how to ensure an enabling learning environment for students and teachers to enhance performance in Chemistry.
c) Students- Would benefit from suggestions on particular characteristics and study habits that enhance performance in Chemistry.
d) Teacher trainers-Would get useful information on how teacher's attitudes contribute to performance in Chemistry and how it could be enhanced.
e) Policy formulators- Would gather useful information which would shed light on why the interventions so far implemented have not so far yielded required outcome. This would enable policy implementers adopt only those strategies that promotes good performance in Chemistry.

1.7 Scope and limitations of study

1.7.1 Scope of the study

This study sought to identify some factors responsible for student's poor performance in Chemistry in Makindu Division. It involved Form three Chemistry students, their Chemistry teachers, and the District Quality Assurance and Standards Officer (DQASO) of the District.

1.72. Limitations of study

The study focused on the secondary schools in Makindu Division only in Makindu Sub-county, Makueni County and only form 3 students were subjected to the study. The teachers were not willing to give information because of fear of reprimand by government. To overcome this limitation, the respondents were assured of confidentiality. Time was also another limiting factor.

1.8 Operational definition of terms

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

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

Chemistry: Refers to the branch of science that deals with the study of matter.

Chemistry achievement: 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.

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. **Curriculum**: Refers to all the experiences a learner goes through in a learning institution. The experiences include time-tabled content (subject) and co-curricular activities.

Learning environment: Refers to all the surroundings and conditions under which students study.

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

Poor achievement: Refers to a score of below 40% obtained in Chemistry by a student at KCSE level.

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

CHAPTER TWO:

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter on literature review focuses on factors that affect performance of Chemistry and the interventions so far undertaken by the Government of Kenya. A lot has been written on factors that determine performance of Sciences and Mathematics with the aim of improving their performance. This review considers the following as probable factors that could determine a student's performance in Chemistry: Attitude and performance, Students characteristics, Teacher characteristics, Teaching strategies, Resource availability and use, Learning environment, Assessment, Government interventions.

2.2 Attitude and performance

Attitude is important in understanding human behavior. To define what exactly an attitude is, many attempts have been made in literature. Generally it is defined as 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 (Barros &Elia, 1997). The word is defined within the framework of social psychology as a subjective or mental preparation for action. It defines the outward and visible postures and human beliefs. Attitudes determine what each individual will see, hear, think and do. They are rooted in experience and do not become automatic routine conduct. Attitudes can be positive (values) or negative (prejudice). Attitude towards science denotes interest or feeling towards studying science. It is the students' disposition towards „like'or „dislike'in

science. Attitude in science means the scientific approach assumed by an individual for solving problems, assessing ideas and making decisions in the sciences (Olatunde, 2009). Teachers have a decisive role in any educational system and their competencies do not automatically ensure positive attitudes towards the teaching process. To put it simply, teacher attitudes are important because they affect the student. Teacher attitudes play a significant role in shaping the classroom environment which has an impact on a student's self efficacy which in turn influences a student's behaviour. All of these factors which can be loosely categorized as environment, personal factors, and behaviour interact and play off each other in a cyclical way.

Papanastasiou (2001) reported that those who have positive attitude toward science tend to perform better in the subject. The affective behaviours in the classroom are strongly related to achievement, and science attitudes are learned. 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' achievement. Teachers are, invariably, role models whose behaviours are easily mimicked by students. What teachers like or dislike, appreciate or disapprove and how they feel about their learning or studies could have a significant effect on their students. By extension, how teachers teach, how they behave and how they interact with students can be more paramount than what they teach (KibweziSMASSE, 2004).

Student beliefs and attitudes have the potential to either facilitate or inhibit learning. Burstein (1992) in a comparative study of factors influencing Mathematics achievement

found out that there is a direct link between students' attitudes towards Mathematics and student outcomes.

In relation to science subjects, Halladyna and Shanghnessy (1982) concluded that a number of factors have been identified as related to students' attitude. Such factors include; teaching methods, teacher□s attitude, influence of parents, gender, age, cognitive styles of pupils, 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. Olatunde (2009) 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. This means that 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. Akimide(1992), has confirmed that students' attitude toward science are sine qua non for higher achievement in science.

Student's attitude toward the learning of Chemistry (a science subject) is a factor that has long attracted the attention of researchers.

Attitude as an affective construct has been described as the basis for both "intellectual preparedness" and motivation in learning. This study therefore attempted to investigate the attendant contribution of student's attitude towards Chemistry and the Chemistry teacher's perception of their learners' ability in Chemistry as a contributor towards poor performance in Chemistry in Makindu Division.

2.3 Students' characteristics and achievement

The purpose and programs of the educational system must be designed to meet the needs of each individual child (Eshiwani, 1983). The student characteristics include: entry behavior, study time, peer group influence and aspiration. They vary from one individual student to the next. According to Kibwezi SMASSE (2004) baseline findings, there is a general feeling among students that Mathematics and Sciences (Chemistry included) are difficult subjects. This feeling was found to be greater in girls than boys. The feelings were found to be due to; socio cultural attitudes, teachers' attitude or predisposition towards the students, school culture, teaching methodology and performance. This study intends to further this work and determine to what extent the stated issues might be contributing to poor performance in Chemistry.

The role of education in our society is to train children to be creative and self-reliant. This is basically through achieving education (Chemistry education included) objectives. Africa lags behind the rest of the world in science and technology development: an indication of the relative failure of science education in Africa (UNESCO, 1986). For Kenya to develop industrially improvements are necessary in the provisions for science education and in particular Chemistry education at all levels in the country.

When motivational factors such as interest, attitude and aspiration are inculcated in the learners, they tend to spend more time studying the particular subject. This translates into higher achievement in sciences. If the educational goal is to encourage the development of higher conceptual level with its associated adaptive capacity and flexibility, then this study will provide a guide for working towards the long-term goal.

2.4 Teacher characteristics and achievement

Teachers play an important role in determining the climate of their classroom. According to Kibwezi SMASSE (2004), teachers are the most important agents that can influence change in students' attitude towards Mathematics and Sciences. They are in contact with the students most of the time. Through such contacts, they communicate their view point and expectations to students and the students are likely to faithfully believe them. In the discussion about students' performance, teachers are especially likely targets of criticism. According to Tsuma (1998), science educators should ensure that learners get involved in the teaching and learning process always. This is due to the fact that the study of Chemistry is a process of acquiring and generating knowledge and thought process based on accurate observation, thorough investigation, experimentation, logic, proof, explanation and validation. Gregg (1968) summed up the study of Chemistry as a direct result of one or more careful and unbiased experimental observation. Therefore every teacher has the task of creating teaching/learning environment that culminates into a rapport for meaningful and in-depth understanding of principles and concepts (Kibwezi SMASSE, 2006). This would enhanceStudent's attitude to Chemistry.

Teachers make important decisions daily. Such decisions include selecting lesson content, text and materials, mode of presentation, learning activities and evaluation methods to construct classroom curriculum. The number of Chemistry teachers in employment in schools in Makindu Division, their level of education, years of service and other requisite teacher characteristics formed part of this study. Of particular interest for this study included the level of preparedness of the teachers in teaching Chemistry in

the rural schools from an urban training background, their attitude in tackling the challenges the rural schools offers mostly with poor infrastructure and average or at times below average students.

2.5 Teaching strategy

Teaching, at its simplest, 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 KCSE.

There are some features about science (Chemistry) that have implication on how it should be taught (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.

It is important for the teacher to always remember that students do not come to class “empty headed. Therefore, when planning for teaching, the teacher must develop strategies 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 science (Chemistry) which translates to high achievement. However, he notes that the school teaching and learning practices in Kenya are examination-oriented at all levels of schooling, secondary level included.

The net result of education is a trained mind and education is what is left after all that has been learnt in school has been forgotten (Harlen, 1999).The quantity of practical work that students are exposed to, the teaching approaches that the teachers adopt especially in the candidate class and other general teacher's classroom approaches of the day-to-day teaching of Chemistry in Makindu Division, was an important aspect of investigation in this study.

2.6 Resource availability, use and achievement

Science deals with the phenomena of nature. These phenomena cannot be studied effectively through abstract or theoretical discussions only. Currently, in all systems of education, Mathematics and Science teaching is set to involve practical work (Kibwezi SMASSE, 2005). Resources play an important role in enhancing the teaching /learning process by modifying the teaching and learning situation. The use of the resources involves a broad range of the human senses at the same time in the learning process. This facilitates learning and helps in conveying the intended purpose. According to Gregg (1968), every bit of chemical knowledge is a direct result of one or more careful and unbiased experimental observations. Most of these observations are made by using at least one or more of the five senses. Students' performance in practical work is

determined by proper use of laboratory tools (glassware, and equipment) and the correct execution of procedural techniques (filtration, titration, preparation of solutions) (Kibwezi SMASSE, 2005).

Performance in the practical examination is vital since KNEC has a rule that for a candidate to have a good pass in science, Chemistry included, a pass in practical paper is compulsory. The extent to which students access learning resources particularly those that aid in application of chemical concepts in practical lessons goes a long way in determining students' overall performance in Chemistry.

According to Nderitu (2009), most if not all schools have a rule that students are responsible for apparatus under their use. Should any break during use, they are to pay for the broken apparatus. Considering that most of the apparatus used in Chemistry are glass wares most of which are expensive, many students shy away from experiments due to this rule. He therefore recommends a reversal of this rule for meaningful learning and hence performance. This study attempted to establish the prevalence of this practice in schools in Makindu Division and if it had any effect on students' quality manipulation of the Chemistry practical learning resources.

Determining the quantity and extent of use of resources for teaching and learning of Chemistry in selected schools of Makindu Division formed a crucial segment of this study. Rughubir (1979) suggested that learners should be made aware that scientific principles apply in everyday things and are not confined to the special apparatus, usually imported from abroad, and only found in the laboratories.

2.7 Learning environment and achievement

The type of classroom interaction determines not only the effectiveness of the learning situation, but also the attitudes, interest and in part, even the personality of the child. Gammage (1971) argues that in the context of classroom interaction, personality, as it is, affects learning. The child's reaction to success, failure, praise and blame- relative to the interaction with the teacher, become crucial since they relate not only to the pupil's social and emotional behaviour in the classroom but also to motivation. The teacher must therefore be careful about what happens in the first few encounters with the pupils as it is likely to establish the classroom environment of the particular class. The learning environment or atmosphere found inside the classroom is of extreme importance in moulding the character of the students and determining the efficiency with which learning takes place.

Classroom teacher-student interaction is important since it either enhances or inhibits effective learning that translates into higher or lower achievement. Bandura (1997) states that it is necessary to consider what the child responds to in the environment as well as the nature of interaction with the environment that leads to change. The effectiveness of teaching strategies largely depends on the match between the levels of concepts being encountered and the development level of the child (Barbara & San, 2006).

The interaction of the teacher and the student, which is one of the most important aspects of the education process, still may be one of the most neglected aspects of the teaching and learning process implying the need for constant investigations (Abuseji, 2007). According to SMASSE report findings of 2000, heads of secondary schools must take a

more responsible role both in administrative and academic activities in the schools they head. Hellinger and Heck (1995) states that in many ways, the school head is the most important and influential individual in any school. Teacher's efforts which make a difference in the students' achievement are influenced by the school administration. Could this be a factor contributing to the poor performance of Makindu Division Chemistry students?

2.8 Assessment and achievement

Generally, assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004). Questions such as; what does a student thinks 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 academic yield (high performance). Perhaps consistent poor performance in Chemistry de-motivates students thus enabling the vicious circle of poor performance in Chemistry.

The study attempted to evaluate the correlation between students' previous performance and their attitude to Chemistry.

2.9 Government interventions

Kenya has always placed education as a priority at all levels, promoting education as a key indicator for social and economic development (Amutabi, 2003). The Government, communities, and development partners and other stakeholders continue to make substantial investments to support education programmes within the sector (Ngigi&Macharia, 2006).Teaching of Chemistry and the performance of students particularly at the KCSE level have been the concern of all the interested parties, particularly the government and parents. This is so because effective science teaching is the avenue to attainment of scientific and technological success. During the last four decades, Kenya's secondary school students' Chemistry achievement has remained low (KNEC, 1999) necessitating several curriculum reviews.

The first post-colonial Chemistry curriculum was developed soon after attaining independence in 1963. This curriculum was teacher and book centered and therefore inappropriate since it neglected students' abilities, interests and potential (Gachathi, 1976; Kimiti, 1984). Later curricula attempted to ensure appropriate teaching methods but were not implemented successfully for lack of qualified Chemistry teachers (Kimiti, 1984; Mullei, 1987). They include the 1967 UNESCO Chemistry Pilot Project, the 1970 School Science Project and the Kenya National Examinations Council Chemistry Syllabus (1973). With the introduction of the 8-4-4 education system in 1985, the study

of Chemistry became compulsory in Forms 1 and Form 2 but many schools offered it from Form 1 to Form 4. The Chemistry syllabus encouraged small group teaching and teaching through experiments and projects and although curriculum developers wanted Chemistry taught through these learner-based approaches, its teaching in secondary schools remained largely expository (Mullei, 1987; KIE, 1992; Kiboss, 1997).

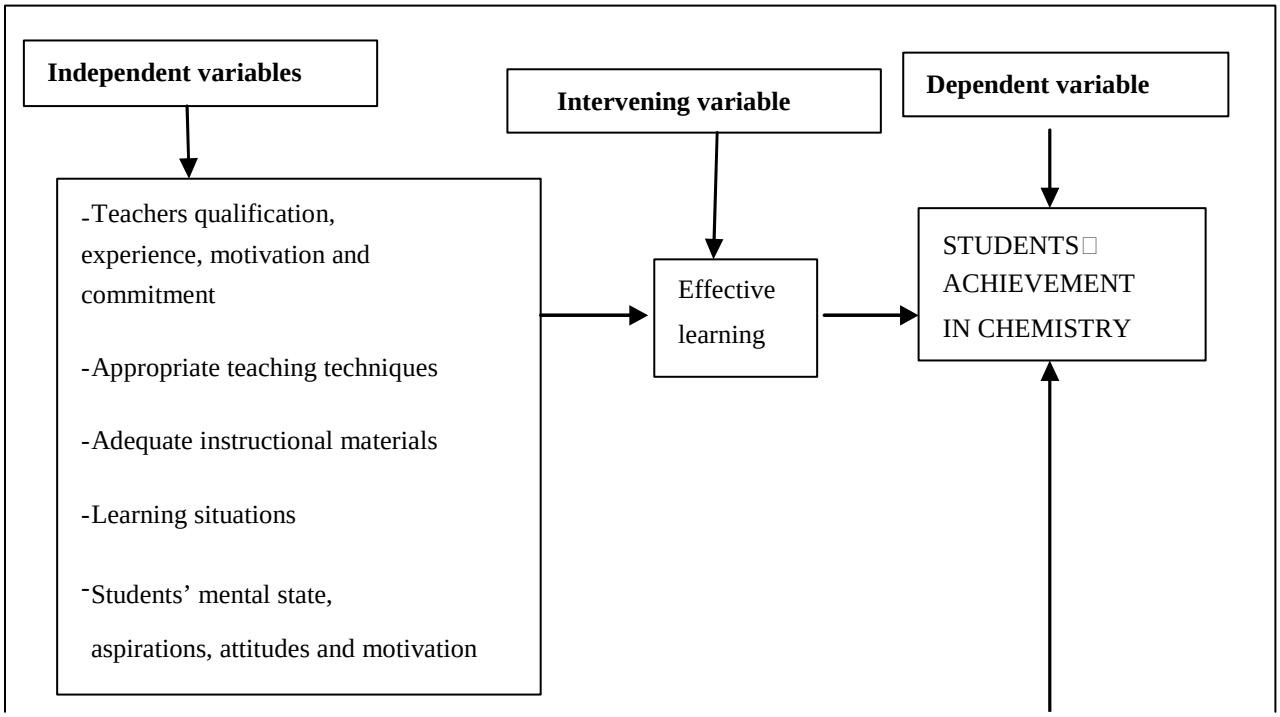
When all these interventions failed to yield meaningful improvement in achievement of the Sciences and Mathematics, SMASSE (Strengthening of Mathematics and Science in Secondary Education) Project was launched in 1998. SMASSE, a Kenya – Japan initiative has contributed immensely in the research and hence attempt in remedying the poor performance in Mathematics and Sciences in the country. The project was born out of the need to improve performance in the crucial mathematics and science subjects that had been hitherto unimpressive. It was launched in July 1998 on a pilot basis in 9 Districts: Kisii, Gucha, Kakamega, Kajiado, Makueni, Muranga, Maragua, Butere – Mumias and Lugari. In October 2000 its scope of coverage was extended under an in-country training programme to include an additional six districts of Meru South, Kilifi, Taita-Taveta, Baringo, Kiambu and Garissa (Ngugi&Nyakweba, 2005 as cited in Oduor, 2009). The purpose of the project was to strengthen the quality of Mathematics and Science education at secondary schools, through training teachers. After a successful completion of the pilot phase of the project, SMASSE was in July 2003 expanded to cover the entire country (Ngugi&Nyakweba, 2005).

These findings therefore were used in the SMASSE in servicing of Mathematics and science teachers at the various INSET seminars throughout the republic. Might this roll out without first undertaking a thorough investigation of the unique challenges of teaching and learning of Chemistry in Makindu Division aswell as the rest of the county be a reason as to why the roll out of the programme in the County and other areas of the republic has been met with negligible success? It is on the basis of this assumption that the study sought to investigate the factors that could be uniquely contributing to the persistent poor performance in Chemistry in Makindu Division with a view to fill the gap.

2.10 Theoretical Framework

The knowledge that humans have acquired regarding behaviour modification permits some measure of prediction and control over performance and learning (Bandura, 1997). Theories of mental state by Fisher R, (2003) provide descriptive information about the limits of effective learning. These important factors and their interaction contribute to the students' learning process. They provide a basis for realizing the learning situations, instructional resources, students' characteristics, teaching strategies and the kind of information a teacher requires when faced with a decision about which instructional strategies (amount and kind of experience to provide to the students) to use at a given time (Brenner, 2004). The mind is compared to a „white paper upon which the teacher leaves imprints or records which are designated by terms such as sensations or impressions and which affect a student's learning and therefore performance in any school subject.

Figure 2.1 provides information of the interaction of the variables (elements) as depicted in the theoretical frame work.



2.11 Summary of literature review.

From the foregoing review, it is evident that appropriate effort has been expended by various researchers to address the poor performance in sciences in general and Chemistry in particular. The efforts have attempted to isolate various factors that contribute to low achievement in Chemistry at the national level. In the course of the review it was realized that the factors considered tended to be more related to low achievement of the Sciences in general and not Chemistry in particular. The factors therefore may not apply to achievement in Chemistry in Makindu Division. This is more so when it is considered that no empirical and systematic studies on factors that affect achievement in Chemistry in Makindu Division have so far been done. The researcher therefore sought to determine which factors among those advanced in the review are responsible for the persistent poor achievement of students in Chemistry in Makindu Division. An appropriate research methodology including instruments for data collection was therefore prepared for this task.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the study design, study location, target population, sampling procedure, and instruments used in data collection, the pilot study, procedure used for data collection and methods employed in data analysis.

3.2 Research design

The study employed descriptive cross-sectional survey design. The design was used since it enabled the researcher collect data across the sampled population using the same instruments at the same time. The survey design also enabled the researcher obtain information concerning the determinant factors for performance and assess the opinions of Principals, Chemistry teachers and students on how these factors contribute to performance in Chemistry (Best & Kahn, 1992; Gay, 1992). Descriptive technique gives a vivid descriptive account of the factors identified and how they contribute to achievement in Chemistry (Robson, 2002; Mugenda&Mugenda, 2003). It is also designed to show the relationship between the factors and performance and attempts to advance an explanation for poor performance in Chemistry based on the data to be collected.

3.3 Location of the study

The study was conducted in Makindu Division of Makindu District in Makueni County.

Makindu Division was selected location due to the immense challenges that its students face since it is in the arid and semi-arid (ASAL) area of the republic. The experiences that its students face could provide an insight to various stakeholders in coming up with an all-inclusive policy on educational practice particularly as regards this research, the factors of performance that are responsible for poor performance of students in Chemistry.

3.4 Target population

The study targeted 4 secondary schools with a candidate class (registering candidates for KCSE).The research was subjected to students from each school, 4 Chemistry teachers and one DQASO all from Makindu Division. Form three students were involved in the study due to their longer exposure to the Chemistry curriculum and the fact that they had chosen to specialize in the subject. They therefore could be relied on to give more accurate information required for this study in the absence of form fours who were busy preparing for examinations and could not get time to participate in the study.

3.5 Sampling techniques and sample size

3.5.1 Sampling techniques

Form three students from stratified sampled public secondary schools were considered for this study because they were found better placed to provide more concrete information required for the study.

3.5.2 Sample size

The study involved an interactive survey of 4 schools out of the 8 schools selected through stratified random sampling. The 4 schools were randomly selected from the pool of 8 schools and from each students were randomly selected to answer the questionnaire. From the 4 schools 196 students were selected from public while 20 were from private schools forming a total of 216.In schools with more than one Chemistry teacher teaching the Form 3 classes, the longest serving teacher was requested to participate in the study. The area education officer was also interviewed.

3.6 Research instruments

Two instruments were used in this study to obtain information from the respondents. The instruments include:

3.6.1Questionnaires

A list of structured questions was given to the respondents to answer. They were developed to address the specific objectives of the study. Questionnaires were found appropriate in enabling the researcher gather a large amount of data from many subjects economically (Orodho, 2009). There was one category of questionnaire for students .The questionnaire was developed based on the research objectives.

3.6.2 Interview schedule

A list of pre-recorded questions that the interviewer asks the interviewee and the answers recorded on the schedule. There were two interview schedules intended for use in this study; one for chemistry teachers and the other for area education officer.

3.6.3 Reliability of the instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. To test for reliability, a pilot study was carried out at kalulini Secondary School. The pilot study results indicated that the instruments used in the study were reliable to 0.7 coefficient according to split half method of assessing reliability.

3.7 Data collection

The researcher collected data by use of the two instruments earlier discussed .This was done in three phases: Phase one involved the researcher visiting participating schools in order to be introduced, familiarize, and seek respondents' permission to be involved in the study.

In phase two, the researcher administered the questionnaires to the students. The researcher assured the respondents of the confidentiality of the given information. The researcher equally interviewed the chemistry teachers. The third and final phase entailed the researcher interviewing the area field officer (DQASO) to obtain factors considered by the field officer to be contributing to poor performance of Chemistry in Makindu

Division. The researcher also sought any intervention measures which the field officer had put in place to remedy the situation.

3.8 Data analysis

Data Analysis and presentation

Descriptive, explanative and explorative statistics using ordinal scales based on measurements such as frequencies and percentages were used. These measurements were generated manually using coding of responses as derived from questionnaires.

CHAPTER FOUR:

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The chapter presents an analysis of the data collected from a sample of 216 students from 4 secondary schools, 4 Chemistry teachers and 1 District Quality Assurance and Standards Officer.

4.2 Background characteristics of the students

4.2.1 School category.

Respondents were drawn from three different school categories: Boys' only, girls' only and mixed schools.A summary of the finding is represented in Table 4.1.

Table 4.1: School category

Category of School	Frequency	%
Boys only	13	6.2
Girls only	52	24.5
Mixed	151	69.3
Total	216	100

Table 4.1 provides information on sampled students' distribution based on school category. Of the total sampled respondents, 13 (6.2%) were drawn from boys' only, 52(24.5%) from girls' only and 151 (69.3%) from mixed schools category. This therefore explains why the population of the sample representing boys from boys' only schools is the least followed by girls and lastly the sample representing mixed schools is the largest.

4.2.2. Type of primary school

A summary of the study finding that classifies students based on the type of primary school they attended is represented in Table 4.2.

Table 4.2: Type of primary school attended

Type of primary school attended	Frequency	Percentage
Public	196	90.7
Private	20	9.3
Total	216	100

In Table 4.2 data collected indicates that 196 (90.7%) of the respondents had public primary school background while 20 (9.3%) had a private school background. This therefore shows that majority of respondents had public school background.

4.2.3 Gender

Table 4.3 gives a summary of information on gender distribution of the respondents.

Table 4.3: Gender distribution

Type of school	Boys		Girls		Total	
	Frequency	%	Frequency	%	frequency	
Boys Only	13	6.2	0	0.0	13	6.2
Girls Only	0	0.0	53	24.5	53	24.5
Mixed	98	45	52	24.3	150	69.3
Total	111	51.2	105	48.8	216	100

From Table 4.3 which gives information on the respondents' gender distribution, results from data analysis shows that the respondents comprised 111 (51.2%) boys and 105 (48.8%) girls.

Of the boys, 13 (6.2%) were drawn from boys' only schools while 98 (45%) were from mixed school category. Likewise 53 (24.5%) of the female respondents were from girls' only schools while 52 (24.3%) were drawn from mixed school category.

4.2.4. Kenya Certificate of Primary Education [KCPE] Science grade

Table 4.4 gives a summary of an analysis of the respondents KCPE science grade as an entry behaviour for not only Chemistry but also for the other science subjects as well.

Table 4.4: KCPE Science score

Grade	Boys		Girls		Total	
	f	%	f	%	f	%
A	15	7.1	9	4.1	24	11.2
B	62	28.8	45	20.7	107	49.6
C	32	14.7	47	21.8	79	36.5
D	1	0.4	4	2.1	5	2.5
E	1	0.2	0	0	1	0.2
Total	111	51.2	105	48.7	216	100.0

Data collected indicated that 24 (11.2%) respondents had scored an A, 107 (49.6%) scored a B, and 79 (36.5%) scored a C while the remaining 6 (2.7%) scored either a D or an E in primary science in KCPE. This means that 97.3% of the respondents indicated to have passed primary science by scoring a C and above thereby having good entry behaviour and hence had a good foundation to pursue Chemistry- a science subject. Of the respondents who scored A, 15 (7.1%) were boys while 9 (4.1%) were girls, 62 (28.8%) boys and 45 (20.7%) girls scored B while 32 (14.7%) boys and 47 (21.8%) girls scored C. An analysis based on gender shows that boys had slightly better science entry behaviour than girls which could be an earlier indication of effects of stereotypes.

4.2.5 School category and performance

Table 4.5: Effect of School category on performance

			Trend of performance					
			Declined Significantly	Declined Slightly	Remained	Improved slightly	Improved Significantly	Total
school category	Girls only	Count	3	1	15	19	5	52
		% within school category	5.1%	20.3%	28.8%	36.4%	9.3%	100.0%
		% of Total	1.2%	5.0%	7.1%	8.9%	2.3%	24.5%
	Boys only	Count	1	3	3	5	1	13
		% within school category	6.7%	26.7%	16.7%	40.0%	10.0%	100.0%
		% of Total	.4%	1.7%	1.0%	2.5%	.6%	6.2%
	Mixed	Count	17	29	41	51	13	151
		% within school category	11.1%	19.2%	27.2%	33.8%	8.7%	100.0%
		% of Total	7.7%	13.3%	18.9%	23.4%	6.0%	69.3%
Total		Count	21	43	57	76	19	216
		% within school	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%
		category % of Total	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%

Results of the analysis shown in Table 4.5 shows that respondents from boys' only schools registered a higher proportion of those reporting significant improvement (10.0%) compared to those from girls' only schools (9.3%) and mixed schools (8.7%). Similar trends were witnessed with those who reported slight improvement (boys'

only=40%; girls' only=36.4% and mixed schools=33.8%) as well as those whose performance slightly declined (boys' only=26.7%; girls' only=20.3% and mixed schools=19.2%). However, respondents from girls' only schools reported a higher proportion of those whose trend in performance did not change (28.8%) compared to those from mixed schools (27.2%) and boys' only schools (16.7%) while respondents from mixed schools reported higher proportion of those whose trend in performances declined significantly. This implies that poor performance is more prevalent in mixed and girls only schools. This could be explained by the misconception that science subjects are male oriented disciplines and the unique challenges that students face in studying in such schools.

4.2.6 Type of primary school and performance

The effect of type of school on students' performance in Chemistry was as is summarized in Table 4.6.

Table 4.6: Effects of respondents' type of primary on performance in Chemistry

		Trend of performance					
		Declined Significantly	Declined Slightly	Remained	Improved Slightly	Improved Significantly	Total
Type of primary	Public	Count	18	38	52	70	18	196
		% within type of primary	9.4%	19.2%	26.8%	35.2%	9.4%	100.0%
		% of Total	8.5%	17.4%	24.3%	32.0%	8.5%	90.7%
	Private	Count	2	5	6	6	1	20
		% within type of primary	8.9%	26.7%	28.9%	31.1%	4.4%	100.0%
		% of Total	.8%	2.5%	2.7%	2.9%	.4%	9.3%
Total		Count	20	43	58	76	19	216
		% within type of primary	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%
		% of Total	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%

Results of the analysis contained in Table 4.6 shows that students with public primary school background had a higher proportion of those reporting significant improvement (9.4%) as compared to those with private school background (4.4%). Similar trends were observed for those reporting slight improvement (public=35.2%; private=31.1%) and significant decline (public=9.4%; private=8.9%). Students with private schools' background however had comparatively higher proportions of those reporting no change in trend in performance (private= 28.9%; public=26.8%) and those reporting slight

decline (private=26.7%; public=19.2%). This shows that there is no major variation between performance and type of school that the respondent attended in primary.

Gender and trend in performance.

The effects of respondents' gender on performance were as is contained in Table 4.7.

Table **4.7: Effects of respondent's gender on performance**

			Trend of performance					
			Declined Significantly	Declined Slightly	Remained	Improved Slightly	Improved Significantly	Total
Gender	Boy	Count	13	22	26	41	9	111
		% within gender	11.7%	19.8%	23.5%	36.4%	8.5%	100.0%
		% of Total	6.0%	10.2%	12.0%	18.7%	4.4%	51.2%
	Girl	Count	7	21	32	35	10	105
		% within gender	6.8%	20.0%	30.6%	33.2%	9.4%	100.0%
		% of Total	3.3%	9.8%	14.9	16.2%	4.6%	48.8%
Total		Count	20	43	58	75	20	216
		% within gender	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%
		% of Total	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%

From the data contained in Table 4.7, girls reported a higher proportion of those reporting significant improvement in performance (9.4%) compared to boys (8.5%), those reporting no change in performance (girls=30.6%; boys=23.5%) and those whose performance declined slightly (girls=20.0%; boys=19.8%). Boys on the other hand

reported higher proportion of slight improvement in performance (36.4%) compared to girls (33.2%) as well as significant decline in performance (boys=11.7%; girls=6.8%).

4.2.7 Respondents' KCPE science results and performance

The effects of respondents' KCPE science grade on performance in Chemistry were computed and the results were as is seen in Table 4.8

Table 4.8: Effects of respondents' KCPE science background on performance

			Trend of performance					
			Declined Significantly	Declined Slightly	Remained	Improved Slightly	Improved Significantly	Total
KCPE science grade	A	Count	2	4	3	10	5	24
		% within KCPE science grade	9.3%	16.7%	13.0%	38.9%	22.2%	100.0%
		% of Total	1.0%	1.9%	1.5%	4.4%	2.5%	11.2%
	B	Count	12	27	25	34	9	107
		% within KCPE science grade	10.9%	24.7%	23.8%	32.2%	8.4%	100.0%
		% of Total	5.4%	12.2%	11.8%	16.0%	4.1%	49.6%
	C	Count	5	12	26	31	5	79
		% within KCPE science grade	6.8%	15.3%	33.5%	38.1%	6.3%	100.0%
		% of Total	2.5%	5.6%	12.2%	13.9%	2.3%	36.5%
	D	Count	1	0	3	1	0	5
		% within KCPE science grade	16.7%	8.3%	58.3%	16.7%	.0%	100.0%
		% of Total	.4%	.2%	1.5%	.4%	.0%	2.5%
	E	Count	0	0	0	1	0	1
		% within KCPE science grade	.0%	.0%	.0%	100.0%	.0%	100.0%
		% of Total	.0%	.0%	.0%	.2%	.0%	.2%
Total		Count	20	43	58	76	19	216
		% within KCPE science grade	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%
		% of Total	9.3%	19.9%	27.0%	34.9%	8.9%	100.0%

Results of the analysis contained in Table 4.8 shows that respondents who scored A in primary science reported a higher proportion of those who improved significantly (22.2%) compared to those who scored other grades (B=8.4%; C=6.3%). A similar trend was observed with those who improved slightly (A=38.9%; C=38.1%; B=32.2% and D=16.7%). The reverse was reported with the number of respondents who did not record any change in trend of performance in which those who scored D in KCPE science registered the highest proportion

(D=58.3%; C=33.5%; B=23.8% and A=13.0%). For those who declined slightly, respondents who scored B registered the highest proportion (B=24.7%; A=16.7%; C=15.3% and 8.3%) while respondents who scored D in KCPE science registered the highest proportion of those who declined significantly (D=16.7%; B=10.9%; A=9.3% and C=6.8%).

The findings imply that the students' poor science background in science is the cause of the Makindu division Chemistry students' persistent poor performance in the subject. This finding is in agreement with other findings such as that of Usman and Memeh (2007) who stated that poor achievement in Chemistry was explained by several factors including students' background problems. According to Afolabi (2005), primary education is no doubt the foundation stage of the career in the education. The experience gathered from the primary level will always influence the student's academic performance in the secondary schools especially at the early stage of the secondary school life.

4.3 Students attitude towards Chemistry.

Five items were used in the questionnaire to assess Makindu Division students' attitude towards

Chemistry. To achieve this objective, the study sought to inquire whether students considered Chemistry as an important subject or not, whether or not they enjoyed both the theory and practical lessons of the subject and lastly their perception of the subject as being difficult. The summary of the analysis is represented in Table 4.9.

Table 4.9: Scores on students' attitude towards Chemistry.

STATEMENT	N	SD (%)	D (%)	NS (%)	A (%)	SA (%)
Chemistry is useful in my future life.	216	1.9	3.1	9.3	32.2	53.5
I do not like Chemistry.	216	42.1	28.4	15.4	10.2	3.9
I enjoy Chemistry theory lessons.	216	6.0	9.4	12.1	41.5	31.0
I enjoy Chemistry practical lessons.	216	3.3	3.9	6.0	40.0	46.7
Chemistry is a difficult subject.	216	23.2	24.7	16.6	19.7	15.8

Table 4.9 gives a summary of the analysis of students' attitudes towards Chemistry. This means that about 85.7% considered Chemistry as important to their future life. A total of 70.5% therefore attested to liking Chemistry. On whether the subject is difficult, cumulatively therefore, 47.9% did not consider the subject difficult while 35.5 considered Chemistry as a difficult subject with the remaining 19.7% being non-committal.

Concerning classroom practice the feelings of the students towards both theory and practical Chemistry lessons were sought. It can be deduced that the respondents enjoyed taking both theory and practical lessons as per the table above.

In summary this therefore means that there is a significant positive relationship between students' attitude towards chemistry and their performance.

4.3.1 Students account of Chemistry teachers' perception of learners' ability in Chemistry.

This item was intended to give the students' conception of their teachers' attitude towards their ability in Chemistry as a determinant of the teachers' attitude towards their students' performance in the subject. Consequently respondents were required to score for level of class participation, teachers' friendliness and the amount of group tasks given by the subject teacher among other issues. The summary of this analysis is represented in Table 4.10

Table 4.10: Students' perception of Chemistry teachers' attitude towards students' ability in Chemistry.

STATEMENT	N	SD (%)	D (%)	NS (%)	A (%)	SA (%)
Our Chemistry teacher allows us to participate in the learning of Chemistry.	216	3.7	6.0	4.4	35.1	50.8
Our Chemistry teacher is friendly and supportive.	216	5.4	3.5	5.2	32.6	53.2
Our Chemistry teacher usually promptly marks and returns the practical work done before the next one.	216	14.3	18.7	17.8	26.3	22.8
Our Chemistry teacher usually gives us assignments and marks them promptly.	216	16.0	14.5	8.9	34.2	26.3
Our Chemistry teacher usually insists that we do correction and remarks them.	216	13.5	16.2	10.2	33.8	26.3
Our chemistry teacher gives us group tasks which he/she ensures is done.	216	18.0	22.6	9.8	29.3	20.3
My chemistry teacher believes that I can perform well in Chemistry.	216	5.4	7.5	9.4	29.7	48.0

Table 4.10 gives a summary of students' perception of their teachers' attitude towards students' performance in Chemistry. Of the 216 respondents, (3.7%) strongly disagreed to being allowed by their Chemistry teacher to participate in the learning of Chemistry, (6.0%) disagreed while (4.4%) were non-committal. Of the remaining respondents, (35.1%) agreed to being allowed while (50.8%) strongly agreed. Likewise (5.4%) respondents strongly disagreed with the idea that their Chemistry teacher was friendly and supportive, (3.5%) disagreed while 25 (5.2%) were non-committal. On the other hand, (32.6%) agreed with the statement and (53.2%) respondents strongly agreed.

Concerning practical work, (49.1%) of the respondents agreed that their Chemistry teacher promptly marks and returns practical work done, (33.0%) disagreed while

(17.8%) were not sure. About assignments, (60.5%) scored for being given regular assignments which the teacher promptly marks and returns to them, (30.5%) disagreed while (8.9%) were non-committal. Majority of the respondents, (60.1%) also reported that their teacher always insist they do correction which are then remarked, (29.7%) disagreed while (10.2%) were non-committal. In terms of group work, (49.6%) of the respondents said that their Chemistry teacher gives them supervised group tasks, (40.6%) disagreed while (9.8%) were not sure. Lastly (77.7%) of the respondents said that they felt their teacher believed that they could perform well in Chemistry, (12.9%) disagreed with the same idea while (9.4%) were not sure.

4.4 Use of resources available for teaching and students' performance in Chemistry.

This study sought to investigate availability and use of resources as a factor influencing student's performance in Chemistry in Makindu Division. The overall analysis was based on students account.

4.4.1 Students' account of resource availability and use

A summary of the analysis of students account on availability and use of resources for teaching and learning of Chemistry is presented in Tables 4.11

Table 4.11: Resources and facility use

Statement	N	Yes (%)	No (%)
We have a Chemistry club in the school.	216	16.8	83.2
I am a member of the Chemistry club.	216	7.3	92.7
There are computers in your school.	216	77.4	22.6
Computers are being used to teach ours Chemistry cla	215	24.2	75.8

Statement	N	SD (%)	D (%)	NS (%)	A (%)	SA (%)
Our school has an up to date separate Chemistry laboratory.	216	31.5	19.5	9.3	14.7	24.9
Our school has a supportive laboratory technician.	216	6.2	7.5	5.4	38.4	42.5
The apparatus and chemicals are adequate enough for our use.	216	15.6	12.9	17.0	29.0	25.5
We have adequate Chemistry text books.	216	19.5	17.8	11.2	25.9	25.5
Resource persons especially Chemistry specialists are periodically invited to come and speak to us.	216	21.5	26.8	15.6	10.6	5.6
We have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.	216	24.5	21.6	12.2	23.7	18.0
Our Chemistry teacher always uses charts, models and other teaching aids during Chemistry lesson.	216	28.8	24.3	9.3	24.1	13.5

Statement	N	Always (%)	Often (%)	Occasionally (%)	Rarely (%)	Rarely (%)
Group Practicals	216	24.4	17.9	16.7	27.1	14.4
Individually	216	4.8	11.4	11.4	26.2	46.2
Teacher Demonstration	216	39.7	26.4	16.8	12.9	4.2

Tables 4.11 give a summary of an analysis of resource and facilities availability and use. Starting with Chemistry club, (16.8%) of the respondents said they were aware of a Chemistry club being available in their school with only (7.3%) being members of the club. The picture is much better with the presence of laboratories in schools as a facility since (99.8%) of the respondents alluded to taking their practicals in a laboratory. However it is (39.6%) of the respondents who confirmed that the said laboratory was

specific for Chemistry, (51.0%) suggested that it was being shared with other subjects while 9.3% () of the respondents were not sure. In terms of facilities, (54.5%) of the respondents classified their laboratory as being adequately equipped, (28.5%) as not adequately equipped while (17.0%) were not sure. Majority of the respondents, (80.9%) to be precise registered the presence of a supportive laboratory technician in their school with the rest either being non-committal saying that their school did not have a supportive laboratory technician.

In terms of use of the laboratory facility, (40.7%) respondents said they had a Chemistry practical once per week, (29.3%) said they had a practical at least once per month, (20.1%) once per term with a significant (9.9%) respondents recording doing no Chemistry practical at all or at least once per year. Since there are various types of practicals, the study endeavoured to determine the most common type of practical that the students were exposed to in Chemistry. Of the three types (group practical, individual practical and teacher demonstration) advanced to the students, teacher demonstration recorded the highest tally of (66.1%) followed by group practical at (41.9%) while individual practical though being the most recommended scored the least in terms of its administration to students with a tally of (16.2%).

4.5 Results from interview

Interviews were conducted from 4 Chemistry teachers from each of the participating schools and the area District Quality Assurance and standard officer. The interviews were administered as a way of counter-checking the information given in the students'

questionnaires and to get a richer view on all the factors they considered as major contributors to students' poor performance in Chemistry within their areas of jurisdiction. The interviewer took notes in the course of the interview.

4.5.1 Chemistry teacher's interview

On the question of students' performance, 75% of the teachers said performance was average while the other 25% felt it was poor. Each of the respondent teacher submitted their school's past KCSE Chemistry results analysis for the period 2006 to 2010 to corroborate this observation and is shown in Table 4.12.

Table 4.12: KCSE Chemistry mean score of sampled schools

School	2006	2007	2008	2009	2010
Makindu Boys	5.25	5.33	2.91	3.87	3.66
Moi Girls	4.08	6.20	3.55	3.14	4.44
Nthia Mixed sec.	2.71	3.95	2.58	2.41	3.11
Yimwaa Mixed sec.	2.91	2.80	2.63	2.75	2.74

The students admitted to the sampled schools were of varied entry behaviour. While 25% of the teachers indicated that their students were of above average entry behaviour, the other 75% classified their students' entry behaviour as average or below average. This means that the students sampled were of mixed abilities. The students were therefore expected to post varied results in terms of performance in all the subjects and in

Chemistry in particular. The results obtained from the schools, however failed to manifest this trend.

All the teachers indicated that there existed a cordial relationship between them and their respective school administration and a good professional working relationship between themselves and their students. This therefore resulted in a conducive teaching and learning environment in which the students, teachers and the administrators interacted freely and consulted fairly well. They further said that their students were able to consult them freely.

In relation to SMASSE, 75% of the teachers interviewed indicated they had attended all the sessions of the INSET seminar. While some said the training had improved their approach to the teaching and learning process by making it more practical-oriented, others felt that the training was not relevant to the classroom practice particularly due to its focus on principles; that though seems to be relevant to classroom practice is irrelevant in the assessment of educational outcome.

Most of the teachers (75%) also felt that improvisation, one of the key issues advocated for by SMASSE is not easily applicable in Chemistry which required the use of glassware and chemicals. They alleged that glass wares and chemicals could not be easily improvised. They further said that improvisation did not really contribute to good performance as the KNEC syllabus did not recognize improvisation and rarely tested such innovations.

Several challenges were listed as being faced in teaching Chemistry in rural settings such as

Makindu. The challenges include:

1. Negative attitude of the society towards education
2. Poor entry behaviour of students
3. Poor mathematical background
4. Poor students' attitude towards learning in general and Chemistry in particular
5. Inadequate teaching and learning resources.
6. Language barrier: many students find it difficult to master the scientific language used in Chemistry

The teachers suggested counseling of students to have positive attitude towards Chemistry, provision of more teaching and learning resources and facilities to supplement the existing ones, increasing manpower to lighten the existing teacher workload and increased community support in school activities as issues that if implemented would help improve performance in Chemistry.

4.5.2 DQASO interview.

One DQASOs of Makindu District was interviewed for this study. He was interviewed on educational standards within his area of jurisdiction .The officer stated that performance in sciences in general and Chemistry in particular had been poor over the years. He said that the district had registered very few quality grades in Chemistry leading to overall low mean grades. The officer however agreed that the poor performance could not be directly attributed to quality of Chemistry teachers in their districts since he said there were

schools which relied on Form four school leavers but posted better results than others with qualified and experienced teachers. He mainly attributed the poor results registered to mainly attitude factors of both teachers and students.

Generally he pointed out student attitude towards science and mathematics, inadequate teaching and learning facilities, chemicals and equipment as some of the concerns that were raised by Chemistry teachers as impacting negatively on performance in Chemistry. To check the negative trend of performance of students in Chemistry in their areas of jurisdiction, he had recommended the following measures during routine inspections to schools:

1. Exposing students to more practical work.
2. Adopt more practical approach to the teaching of the subject.
3. Organise symposia
4. Organise motivational talks by Chemistry professionals to address attitude.

4.6 Summary

This chapter outlined the views of various stakeholders including Chemistry students, Chemistry teachers, and the area field officer of Makindu District with regard to issues responsible for the persistent poor performance of students in Chemistry within the District. The analysis showed that background characteristics, teachers' negative attitude towards learners' ability in Chemistry and inappropriate learning environments were the main causes of persistent poor performance of Makindu Division Chemistry students.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In this chapter, an attempt is made to give a summary of the research findings, conclusions, recommendation and suggestion for further research. The main purpose of this study was to establish the key determinants of performance in Chemistry in Makindu division in an attempt to provide a way of remedying the persistent poor performance in the subject in the Division and the nation at large. The study investigated students' attitude towards chemistry and its effect on performance, students' perception of teachers' attitude towards their ability and its effects on performance, effects of students' background characteristics on performance, availability and use of teaching and learning resources and facilities and its effects on performance. Data for analysis was obtained through structured questionnaires for students and interview schedules for Chemistry teachers and the area District Quality Assurance and Standards officer.

5.2 Summary

From data analysis in chapter four, the study isolated some factors which were found to be contributing to the persistent poor performance of students in Chemistry in Makindu division. The contents of the analysis can be summarized as follows:

5.2.1 On Students' background characteristics

Most of the respondents (90.7%) were found to have had public primary school background, the population of the respondents was almost even (males= 51.2%; females=

48.8%) signifying a condition of near gender parity.

The factors found to affect students' performance in Chemistry in Makindu division under background characteristics include primary school science background.

5.2.2 On Students' attitude towards Chemistry

Majority of the students responded positively to the items which were used to test for students' attitude towards Chemistry in Makindu division. The results showed that the students generally had a positive attitude towards Chemistry.

Results from analysis showed that those who scored highest in the previous test had the highest score on the elements of attitude. This therefore could be interpreted to mean that positive attitude towards Chemistry affects performance in Chemistry positively.

5.2.3 On Teacher's attitude towards learners' ability in Chemistry

Makindu division students generally considered their teachers' perceptions of their abilities to be positive. Inferentially, students who scored highly on the elements of attitude in analysis showed significant improvement in performance in Chemistry. This means positive attitude towards the subject teacher has a positive influence on performance in the subject.

Makindu division Chemistry teachers' attitude towards their learners' ability on the other hand was found to be negative. The negative attitude towards their learner ability could be affecting the Chemistry teachers output and therefore the performance of the students negatively.

5.2.4 On Resource availability and use

Though there were adequate resources for teaching Chemistry, the score for use was low in Makindu division.Inferentially, use of resources and facilities was found to impact positively on students' performance in Chemistry particularly performance of average students since students who scored between 45% and 59% registered the highest scores on the elements of attitude scale.

5.2.5 On Teachers account of their teaching and learning practices and effectiveness of intervention strategies

The teachers reported using various teaching methods with demonstration and lecture method being the most commonly used teaching technique. End term and midterm tests were found to be the most commonly used modes of testing in Chemistry. The teachers also reported carrying out regular revision of the tests and work covered.

5.2.6 Results from interviews

There were two different interviews carried out - Chemistry teachers' interview and the area education officer interview. From Chemistry teachers' interview, the teachers reported and provided proof of poor performance in Chemistry in their schools. The results showed inconsistent trend in performance for the period between 2006 and 2010. The teachers also reported being demoralised due to several challenges they listed as facing in teaching Chemistry in their respective schools.

The teachers reported admitting to their schools a significant population of students with poor entry behaviour and the prevalence of negative peer influence among their students.

Most schools reported having qualified Chemistry teachers and an ever increasing student population due to the government subsidized education program which put pressure on the available facilities.

The area District Quality Assurance and Standards officer interviewed acknowledged the poor performance in Chemistry over the years. They singled out low number of quality grades registered by Form four candidates as a major cause for worry. With most schools in the area being district category, they singled out students' poor entry behaviour and teacher and students' attitude factors as the major causes of poor performance.

5.3 Conclusion

From the foregoing summary, it can be concluded that the performance of students in Chemistry in Makindu division can be attributed to students' background characteristics; attitude factors particularly the teachers' negative perception of their learners' abilities, inappropriate learning environment, inadequate use of resources in the teaching and learning process and negative socio-cultural effects.

5.4 Recommendations

From the observations made in the course of this study, the following stakeholders should consider putting in place the recommended steps to check the poor performance in Chemistry.

1. The Ministry of education either directly or through its agents should:

- Enhance primary school pupils' Chemistry background through inclusion of more introductory Chemistry concepts in the primary science syllabus.
- Enhance supervision of schools to help improve the students' general secondary school entry behaviour and particularly their background in English and Mathematics as they are important in explaining concepts in Chemistry.
- Increase the tuition fund to enable schools acquires more and better teaching and learning equipment and facilities.
- Release the allocated funds in good time to enable acquisition of teaching and learning materials and services be done in time for curriculum implementation.

2. The school management/administration should:

- Expand existing facilities like classrooms to lower the class population and hence enhance subject teacher class control.
- Provide more teaching and learning facilities to adequately cater for the large student population.
- Provide for innovative ways to help motivate Chemistry teachers like taking them for more capacity building courses and providing them with other incentives.
- Hire more teachers with the help of the government to help reduce teachers work load and enable the teachers have increased contact hours with their learners' hence meaningful teacher-student interaction.
- Organize more motivational talks by Chemistry professionals to help change negative attitude of students towards the subject.

- Work closely with the teachers and parents in counseling the students to help counter the existing negative peer influence

3. The Chemistry teachers should:

- Organise excursions to Chemistry-based industries and Chemistry symposia as a way of motivating the students to have positive attitude towards the subject.
- Adopt a more practical approach to the teaching and learning of the subject particularly improve in the use of charts and other instructional resources in the teaching of the subject.
- Expose their students to more practicals particularly group/individual student basedpracticals.
- Enhance their testing policy by giving the students more Chemistry tests and assignments apart from the school controlled midterm and end of term tests.

4. All stakeholders in concert should:

- Work for targeted intervention mechanism to improve performance in Chemistry in mixed and girls' only schools. This is the responsibility of all the stakeholders.
- Devise a system that would enable creation of more study time for learners in day school.

5.5 Suggestion for further research

The following areas are suggested for further study:

i. A comprehensive study of effects of students' primary school science background on Performance in Chemistry.

ii. A study of the impact of socio-cultural factors on performance of students in Chemistry.

REFERENCES

Abuseji, F.A. (2007). Student and teacher related variables as determinants of secondary student academic achievement in Chemistry. *JurnalPendidikan 32 jpend 32* (01).pmd.

Afolabi, A. O. (2005). Comparison of private and public schools products performance in Mathematics and English Language from educational technology perspective. *Ilorin Journal of Education.* PP. 1-5.

Agusiobo, B. C. (1998). Laboratory and resource utilization, funding and management by Integrated Science Teachers. *African Journal of Education 1 (1):* 29-36.

Akinmade, C. T. (1992). The swing away from science. The Nigerian Chapter. *Journal of the Science Teachers' Association of Nigeria, 24* (122), 126-129.

Amutabi, M. N. (2003). Political interference in the running of education in post-independence Kenya: A critical retrospection. *International Journal of Educational Development,* 23: 127–144.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

Barbara, A. E & San, P. (2006). Society challenges to Biology teacher. Wiley Periodicals. Inc. A. Wiley Company. Retrieved on January 15, 2011 from www.interscience.wiley.com/ journal

Barros, S.de S. &Elia, F.M. (1998). *Physics teacher's attitudes: how do they affect the reality of the classroom and models for change?* Connecting Research in Physics Education with Teacher Education. physics. ohio-state.edu//jossem/ICPE/TOC.html

Beck & Earl, M. (2002). *Key issues in secondary education. Continuum*: New York: MPG Book LTD, Cornwall.

Brenner, K. (2004). Challenge your teaching. *American Society for Cell Biology.* Retrieved. January 15, 2011from www.nature.com/nsmb/journal/v/full

Chiriswa, P. (2002). An investigation into the probable factors responsible for poor performance in Kenya Certificate of Secondary Education (KCSE) in Vihiga District of Western Province, Kenya. Unpublished masters thesis, Kenyatta University, Nairobi, Kenya.

Embeywa, H. (1985). Aspects of students'perception of scientific explanation. Unpublished master's thesis. University of Nairobi, Kenya.

Eshiwani, G.S. (1983). Factors affecting performance among primary and secondary school pupils in Western province of Kenya. Memo: Bureau of educational research, University of Nairobi.

Eshiwani G.S (1993). *Education in Kenya since independence*. Nairobi. East African Educational Publishers Ltd.

Fisher, R. (2003). *Teaching thinking. Philosophical enquiry in the classroom*. 2nd Edition. London: Continuum Publishers.

Gachathi, P. (1976). *Report of the National Committee on Educational Objectives*. Republic of Kenya. Nairobi: Government Printer.

Gammage, P. (1971). *Teacher and pupil: Some socio-psychological aspects*. London: Routledge and Kegan Ltd.

Gregg, D.E. (1968). *Principles of Chemistry*. London: Routledge.

Halladyna, T. and Shaughnessy, J. (1982). Attitudes towardsscience: A qualitative synthesis. *Journal of Researchin Science Teaching*, 66 4: 547-563.

Harlen, W. (1999). Effective teaching of science: a review of research. SCRE.

Hussain, S. Ali, R. Khan, M. Ramzan, M. &Qadeer, Z. (2011). Attitude of secondary school teachers towards teaching profession. *International Journal of Academic Research.*

Hellinger, P. & Heck, R. (1995). *Exploring the principals' contribution to school effectiveness*. Boston: Allyn & Bacon.

Kenya National Examinations Council (2010). The performance of students in KCSE in selectedsubjects from 2006 to 2009. Nairobi, Kenya.

Khatete, D.W. (1995). Children□s understanding of decomposition and its importance in nature among some Kenyan children. Unpublished doctoral thesis, University of Leeds.

Kiboss, J.K. (1997). Relative effects of a computer-based instruction in physics on students' attitudes, motivation and understanding about measurement and perceptions of classroom environment. Unpublished Ph.D. thesis, University of Western Cape, Bellville.

Kibwezi SMASSE panel (2004). Gender issues in Mathematics and Science education. A paper presented in cycle 1 of Kibwezi district INSET- 2004.

Kibwezi SMASSE panel (2005). Resources utilisation for teaching/ learning of Mathematics and Science. A paper presented in cycle 2 of Kibwezi district INSET- 2005.

Kibwezi SMASSE panel (2006). Effective communication skills for classroom interaction. A paper presented in cycle 3 of Kibwezi district INSET- 2006.

Ministry of Education (2009). *Careers guide book for schools*. Nairobi, Government Printers.

Mugenda O. &Mugenda, A. (2003). *Research methods. Quantitative and qualitative approaches*. Nairobi: African Centre for Technology Studies Nairobi.

Mullei, V.M. (1987). Comparative analysis of attitudes towards inquiry and non-inquiry science teaching methods between pre-service and in-service secondary school science teachers. Unpublished Ph.D. thesis, Kenyatta University. Nairobi, Kenya.

Nderitu, M.K. (2009). Determinant factors that contribute to enrolment and performance of students in selected schools of Murang'a South District, Kenya. Unpublished master's thesis, Kenyatta University. Nairobi, Kenya.

Ngigi A. &Macharia D. Kenya Education Policy Overview Paper, May 2006. Pdf.

Ngugi. andNyakweba, K. (2005). Understanding SMASSE PROJECT; a paper presented in Uasin-Gishu district SMASSE INSET cycle 2.

Oduor H. N. (2009). The effects of strengthening of Mathematics and Sciences in Secondary Education (SMASSE) training on performance of students in Chemistry in Uasin-Gishu District, Kenya. Unpublished master□s thesis, Moi University. Nairobi, Kenya.

Olatunde, Y.P. (2009). Students'attitude towards Mathematics and academic achievement in some selected secondary schools in Southwestern Nigeria. *European Journal of Scientific Research,* 36: 336-341.

Orodho, J. A. (1996). Factors determining achievement in science subjects at secondary level in Kenya. Unpublished doctoral thesis, Kenyatta University. Nairobi, Kenya.

Orodho, J.A. (2009). *Elements of education and social science research methods*. Nairobi; Kenya, Kanezja Publishers.

Papanastasiou, E. C., (2001) Willingness to follow Math related careers among seniors in Math classes: The case of Cyprus. Manuscript submitted for publication. *Science Education International* 13(2) 20-21.

Rughubir, K.P. (1979). The laboratory-investigative approach to science instruction. *The Journal of Research in science Teaching*, Vol. 16, No. 1

Stevenson, W.A. & Stigler, W.J. (1992). *The learning gap. Why our schools are failing and what we learn from Japanese and Chinese Education*. New York: Touchstone Books.

Tsuma O.G.K. (1998). *Science education in the African context*. Nairobi: Jomo Kenyatta Foundation.

UNDP (1994). Human resource development. UN, Nairobi.

UNESCO World Education Report (1986). Teachers and teaching in a changing world.

Usman, K.O. &Memeh, I.M. (2007). Using guided scoring teaching strategy to improve students'achievement in Chemistry at secondary school level in Nigeria. *Journal of the science teachers association of Nigeria*, 42: 60-65.

Winn, W. (1993). *A constructivist critique of the assumptions of instructional design*. In T. M. Duffy, J. Lowyck, & D. H. Jonassen (Eds.), Designing environments for constructive learning (pp. 189-212). Berlin, Springer-Verlag.

APPENDICES

Appendix I: Questionnaire for students

Introduction

The statements below are intended to gather information on factors that might be contributing to performance of students in Chemistry in your school. Suggest to the best of your ability your opinion against each of the statements. Thanks for accepting to take part in this programme.

Section A: Background characteristics.

1. What is the name of your school? _____

2. What is the category of your school? Girls Only Boys Only ( ) Mixed ( )

3. Which type of primary school did you attend? [Tick only one]

   Public ☐ Private ☐

4. Are you a boy or a girl? (tick one) Boy ☐ Girl ☐

5. What was your grade in Science in KCPE? A B C D E ☐

Section B

For **MOST** statements in this section, the abbreviations **SA- Strongly Agree, A- Agree, NS- Not sure, D- Disagree, and SD- Strongly Disagree** appear. Please respond to all the statements by ticking the one you consider most appropriate.

STATEMENT	**SA**	**A**	**NS**	**D**	**SD**
7.Chemistry is useful in my future life.					
8.I do not like Chemistry.					
9.I enjoy Chemistry theory lessons.					
10.I enjoy Chemistry practical lessons.					

11.Chemistry is a difficult subject.					
12.Our Chemistry teacher usually promptly marks and returns the practical work done before the next one.					
13.Our Chemistry teacher usually gives us assignments and marks them promptly.					
14.Our Chemistry teacher usually insists that we do correction and remarks them.					
15.Our chemistry teacher gives us group tasks which he/she ensures is done.					
16.My chemistry teacher believes that I can perform well in Chemistry.					

17. We have a Chemistry club in the school. Yes ☐ No ☐

18. I am a member of the Chemistry club. Yes ☐ No ☐

19. Where do you perform your Chemistry practicals?

Classroom ☐ Science Room ☐ Laboratory ☐

20. Indicate the frequency with which you perform the following types of experiments:

	Always	Often	Occasionally	Rarely	Never
Group practicals					
Individually					
Teacher demonstration					

STATEMENT	SA	A	NS	D	SD
21. Our school has an up to date separate Chemistry laboratory.					
22. Our school has a supportive laboratory technician.					
23. The apparatus and chemicals are adequate enough for our use.					
24. We have adequate Chemistry text books.					
25. Resource persons especially Chemistry specialists are periodically invited to come and speak to us.					
26. We have adequate and supportive Chemistry teaching staff besides our Chemistry teacher.					
27. Our Chemistry teacher always uses charts, models and other teaching aids during Chemistry lesson.					

28. How often do you perform Chemistry practical in the Chemistry laboratory?

Once per week Once per month Once per term ☐

Once per year none ☐

Slightly Satisfied Not Satisfied ☐

29. Are you satisfied with your school's past performance in Chemistry in the KCSE exams? Very Satisfied Fairly satisfied Satisfied ☐

Slightly Satisfied Not Satisfied ☐

THANK YOU

END

Appendix II: Interview schedule for the Chemistry teacher

This interview aims at obtaining information on factors that contribute to students' performance in chemistry in your school. The information you provide will be highly confidential and will only be used for the purposes of this study. Your cooperation is highly appreciated.

1. In your opinion, how do you rate the performance of sciences in your school? [Probe: Chemistry]
2. What is the nature of students in your school i.e. based on entry behaviour, societal background, and peer influence e.t.c.?
3. What is your comment about the conditions under which students learn in your school? [Probe: your relationship with both the students and teachers]
4. What is your school doing to ensure learning takes place under favorable conditions?
5. Have you attended SMASSE training? [Probe: Has the training affected your approach to the teaching and learning process? Do you feel that the training is relevant?]
6. What are the challenges of teaching chemistry in the rural setting such as Makindu?
7. SMASSE advocates for improvisation. How easy is it to improvise chemistry materials/glassware?
8. In your opinion, what do you think should be done to improve students' performance in Chemistry?

Appendix III: Interview schedule for the DQASO

This interview aims at obtaining information on factors contributing to students' performance in chemistry in your district. All the information given is highly confidential and will only be used for the purposes of this study. Your cooperation is highly appreciated.

1. In your opinion, how do you rate the performance of Sciences in your district? [Probe: Chemistry]
2. Comment briefly on the previous Chemistry performances in your district.
3. Is there any intervention measure that has been organized by your district team?
4. In your opinion, how does the teachers' training and qualification influence students' performance? [Probe: competency of Science teachers and pedagogical practices in your district]
5. I)How can you comment on the nature of students in your district?

   ii) Why is it that students particularly in your area have not been performing well inSciences?
6. What are some of the concerns that teachers in your district have in regard to the teaching of Sciences? [Probe: in Chemistry]
7. In your opinion, what can be done to improve students' performance in Chemistry?

Thank you

End.