

**A STUDY OF THE FACTORS THAT CONTRIBUTE TO POOR
PERFORMANCE IN CHEMISTRY IN FORM FOUR NATIONAL
EXAMINATION IN KATHIANI DIVISION IN MACHAKOS DISTRICT**

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DECLARATION

This research project is my original work and has not been presented for examination in any other university

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This research project has been presented for examination with my approval as University supervisor

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DEDICATION

To my beloved wife Judith Mary Mueni, my dear parents Theresia Kalia and Bernard Mutunga Muli.

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ABSTRACT

Chemistry is one of the subjects offered in the 8-4-4 system of education curriculum. As science, chemistry finds a lot importance in the education system in Kenya since it is a core subject in a number of careers such as medicine, pharmacy, engineering, biochemistry, chemistry teachers among other careers. Therefore, students who may want to pursue these careers or other related careers need to have sound knowledge and concepts in chemistry.

Chemistry is a very important subject that finds a lot of application in daily life. Chemistry knowledge is useful in many areas of our lives. For example, chemistry plays an important an important role in the food production and preservation. A range of fertilizers such as ammonium fertilizers have been produced using chemistry knowledge. As a result, the food production especially rice, sugarcane and maize yields have shot up, thus alleviating poverty. Pesticides and fungicides, which are products of chemical knowledge, have been produced and used to limit pests in farms and in storage places. Moreover, chemistry has contributed to better health. For example, production of simple chemicals like chlorine, which kills micro-organisms, thus, making it safe to drink. Chemistry helps to enhance social life in a number of ways, such as production of plastic, synthetic clothes, polymer tapes, cosmetics hair oils, conditioners, etc. Chemistry plays an important role in large-scale industries, e.g. in production of perfumes and cosmetics, in soap, shampoo and detergent industries, in sugar industry, in salt making industry, in petroleum refining plants, in beer and wine making industries, in cement making industries, in paper making industries, etc.

In as much it is appreciated the chemistry is such an important subject, is not encouraging to note that the performance of chemistry at the national examinations i.e. Kenya Certificate of Secondary Education (K.C.S.E) level of examination in Kathiani Division is poor. The factors contributing to this poor performance need to be established. This study attempted to find the factors that contribute to poor performance in chemistry at the K.C.S.E level in Kathiani Division in Machakos District.

The study tried to establish whether factors such as students' attitude towards chemistry and the entry behavior of learners contributed to poor performance. The other factors studied included how teaching/learning methods and adequacy of learning resources and facilities of chemistry may contribute to poor performance. The study was also aimed at establishing if the poor performance in chemistry at the K.C.S.E level in Kathiani Division is gender dependent. The findings of this study would be of great help to teachers, students, school principals and parents/guardians.

The research design used in this study was the cross-sectional schools design. The population consisted of three representative secondary schools from the Kathiani Division. From each of the selected sample secondary schools, ten students were selected from the form class and two chemistry teachers. This gave a total population of thirty students and six teachers.

In this research study, the method used to select the sample secondary schools was the convenient method of sampling due to time and financial implications. The research tools used in this study were questionnaires, in-depth interview schedule, and direct observations. The questionnaires were used to collect data from students and teachers. Direct observations of records from the selected secondary schools and the District

Education Office were used. Observations of the teachers as they taught observation of chemistry resources and materials were also done. The interviews for the students and teachers were conducted in the selected sample schools. The teachers were interviewed in the laboratory while the students were interviewed in the class rooms.

The data collected was recorded and tabulated for analysis. Descriptive statistics were used to analyze the obtained data. The responses from the questionnaires were marked and their percentage worked out for comparison purposes. The responses on the learners' attitude towards chemistry were tabulated in a table and then analyzed. The data obtained for the students' entry behavior and their preferred career choices were also tabulated and commended on. Moreover, the adequacy of the learning facilities such as text books and laboratories were analyzed. The teaching methods as well as the teachers' qualification as possible causes of poor performance were also analyzed.

This research study established that the many students have great interest towards chemistry as a science subject. This study came up with some possible causes of poor performance in chemistry at the K.C.S.E level examination in Kathiani Division. These included; that majority of the students agree that chemistry is difficult subject while others were undecided; there is correlation between students' entry behavior in Science at Kenya Certificate of Primary Education (K.C.P.E) and their secondary school examinations.

Moreover, majority of the sample students do like to pursue careers that require chemistry as a major subject and that poor performance is not gender depended.

The research found that the teaching methods were a major contributor of poor performance in chemistry at the K.C.S.E level in chemistry in Kathiani Division. It was also established that majority of the students would prefer to learn through class experiment method. The research findings showed that the laboratories in Kathiani Division were not adequately equipped. For this reason, the chemistry teachers were not able to use practical approach in the teaching and learning of chemistry. The teachers' experience was shown to be a possible cause of poor performance in chemistry. However, teachers' qualification had no significant correlation to poor performance in chemistry.

This research came up with a number of recommendations, such the use of practical approach as a medium of passing chemistry instructions. Moreover, school Principals should collaborate with donors so as to equip the laboratories as well as sending their chemistry teachers for in-service courses. The school Principals should critically examine the entry behavior of students when during admission.

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ABBREVIATIONS

K.N.E.C – Kenya National Examinations Council

K.C.S.E – Kenya Certificate of Secondary Education

K.C.P.E - Kenya Certificate of Primary Education

SMASSE – Strengthening Mathematics and Sciences in Secondary schools

D.E.O – District Education Office

M. Ed – Master of Education

B. Ed - Bachelor of Education

PGDE – Post Graduate Diploma in Education

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

There has been a general poor performance in chemistry at the K.C.S.E level in Kathiani division for some last three years as shown in table 1 which was extracted from the examination result records from the headquarters of Machakos district. The causes of this poor performance need to be known. This research study aimed at identifying the factors that cause the poor performance and suggests the necessary recommendations to improve this poor performance.

Table 1: Performance in Chemistry at K.C.S.E of three sample schools

YEAR 2007

SCHOOL	Mean	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
KIKOMBI SEC	4.567	0	0	0	1	0	3	2	7	10	5	3	2
KATHIANI BOYS	4.756	0	0	0	0	2	5	6	10	15	8	6	0
KATHIANI GIRLS	6.786	0	0	4	3	2	8	20	12	19	7	0	0

YEAR 2006

SCHOOL	Mean	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
KIKOMBI SEC	3.546	0	0	1	0	3	8	5	11	7	9	2	0
KATHIANI BOYS	3.683	0	0	0	2	0	6	9	8	5	7	4	0
KATHIANI GIRLS	5.455	0	0	2	2	0	9	12	28	13	3	7	0

YEAR 2005

SCHOOL	Mean	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
KIKOMBI SEC	3.200	0	0	1	0	1	2	8	6	10	2	1	1
KATHIANI BOYS	4.321	0	0	0	1	4	2	8	7	11	6	3	0
KATHIANI GIRLS	4.443	0	0	0	1	3	7	5	10	24	12	0	0

Source D.E.Os office: Examination Department

From the sample schools the performance is below C- (minus). This is a reflection of poor performance in the secondary schools in Kathiani division.

Chemistry is one of the three science subject studied in Kenya secondary school curriculum. Chemistry simply means the study of chemical composition and properties of matter (Chemistry F1, KLB, 2005). The study of chemistry is divided into three broad categories namely; Inorganic chemistry, Physical chemistry and Organic chemistry. Organic chemistry deals with the study of compounds which contain carbon in which the carbon atoms join with other carbon atoms to form long chains. This study excludes carbon (IV) oxide, carbon (ii) oxide, hydrogen carbonates and carbonates which fall under inorganic chemistry (Chemistry FIII, LSC, 2007).

Chemistry is a key subject in passing of Kenya Certificate Secondary Education (K.C.S.E) in Kenya secondary school national examinations for a candidate to be admitted to do courses like Medicine, Surgery, Pharmacy, Nursing, Biochemistry, and Engineering among others, he/she must at least score a mean grade of A- (minus) and above.

Other science subjects rely heavily on the clarity of chemistry concepts. In deed, there are a quite number of items that are better understood in Physics, Biology and Agriculture only when one has sound knowledge in Chemistry.

Unfortunately, chemistry is one of the worst performed science subjects in most Kenyan secondary schools. The poor performance has been attributed to many factors. At Kathiani division of Machakos district, the performance is very discouraging. Most students score below grade C (plain) in the K.C.S.E. It is important to note that poor performance implies that the intended instructional objectives are not achieved; hence chemistry teachers need to evaluate their teaching methods.

A very important aspect in the teaching and learning of chemistry is the teacher. Teaching and learning of chemistry centrally depends on the teacher. As Twoli (2006) says, becoming a successful teacher is largely a do-it-yourself job (i.e. the teacher). Of course a method's lecturer, teaching practice experiences and cooperating teacher and advice can and will help in many important ways and at crucial points in the process. However, no one person or combination of persons can obviously make you (i.e. the teacher) a very good teacher. As he notes, a 'bad' teacher teaches the truth; a 'good' teacher teaches how to find the truth. Thus, the learner becomes very important in the

teaching learning process. This is an aspect that needs to be investigated so as to establish the causes of poor performance in chemistry in Kathiani Division at the K.C.S.E level of examination.

1.2 Statement of the Problem

The performance of students at the K.C.S.E level examinations in chemistry in Kathiani division of Machakos district has been very poor the some three consecutive years, i.e. 2007, 2006, and 2005. This is quite evident from the results given out by the Kenya National Examinations Council (K.N.E.C) for Kathiani Division. Poor performance for a subject like Chemistry which is a core subject in many fields such as medicine, pharmacy, biochemistry, engineering etc, has far reaching consequences that has vision of becoming an industrialized country in the near future. As Asiachi (1988) says, education is means of individual development.

As Twoli (2006), in modern times, the teaching of chemistry does not limit itself merely to the study of facts, principles and theories. It is expected to deal with the science-society-technology interfaces; with values and needs of the society, including moral and political implications. Thus, the reasons behind the poor performance in chemistry at K.C.S.E level in Kathiani Division need to be investigated.

The central problem of this study was to investigate the factors that contribute to the poor performance in Chemistry at the K.C.S.E level. The research came up with recommendations necessary to be put in place to improve the poor performance.

1.3 Purpose of the Study

The research study investigated the factors that contribute to the poor performance in chemistry at the K.C.S.E level of examination. The research study came up with recommendations needed to improve the poor performance of chemistry at the K.C.S.E level of examinations.

1.4 Objectives of the Study

The objectives of this study were to:

1. Find out if the Teaching/Learning methods contribute to the poor performance in chemistry at the K.C.S.E level of examinations.

2. Find out whether the Attitude of students towards chemistry contributes to the poor performance at the K.C.S.E level.
3. Find out whether the Entry behaviors of learners contribute to the poor performance in chemistry at the K.C.S.E level of examination.
4. Find out whether Learning Resources and Facilities of chemistry contribute to the poor performance at the KC.S.E examinations.
5. Find out if the poor performance in chemistry at the KC.S.E level examination in Kathiani Division is Gender Dependent.

1.5 Research Questions

1. Does the Teaching/Learning Methods contribute to the poor performance in chemistry at the K.C.S.E level in Kathiani division?
2. Does the Attitude of students towards chemistry as a science subject contribute to the poor performance at the K.C.S.E level in Kathiani division?
3. Does the Entry behavior of learners contribute to the poor performance in chemistry at the K.C.S.E level of examination in Kathiani division?
4. Does the Learning Resources and Facilities of chemistry contribute to the poor performance at the KC.S.E examinations in Kathiani division?
5. Does Gender Dependent contribute to the poor performance in chemistry at the KC.S.E level examination in Kathiani division?

1.6 Basic Assumptions of the Study

The following assumptions were made:

1. That the concerned respondents gave true information.
2. That the records used were accurate.

1.7 Significance of the Study

The findings of this study will be of benefit to students in Kathiani division, Chemistry teachers, Principals of secondary schools and Parents/Guardians in Kathiani division.

They will benefit by putting more efforts more emphasis on chemistry as a science subject due to its attached importance. The teachers will benefit through adopting the recommendations of this study, hence make their students perform better in chemistry. The research study will provide advisory insights to the prospective secondary school Principals in Kathiani division on corrective measures to be taken. The research study will also provide a way for further research in the future.

1.8 Limitations of the Study

This research study was carried out in only three secondary schools of the Kathiani division. The sample population was of thirty students and six teachers. Thus the following were constraints to the study:-

- (i) Time factor- This was problem since the researcher was a full time classroom teacher and Head of Department, thus there was no enough time to carry out an elaborate and extensive research.
- (ii) Money factor- resources of money were a problem because the researcher was funding himself. Moreover he had to meet other financial needs. The researcher was a teacher of a private secondary school.
- (iii) Lack of reference- The researcher faced the problem of lack of enough and reliable reference because of poor accessibility of the library and books not being accessible
- (iv) Misleading response- This problem could have influenced the findings of the research.

1.9 Definitions of Significant Terms in the Study

The following terms are given operational meaning for the purpose of this study:

Facilities: refers to the equipment/infrastructure/building for learning chemistry e.g. laboratory.

Resources: item/material/model/apparatus used in learning of chemistry.

Gender: sexual classification i.e. male and female gender.

Insight: an act of understanding or ability to see in true the happenings or things.

1.10 Organization of the Study

The study is organized into five chapters. Chapter one describes a general introduction which comprised of the background of the study, statement of the problem, the purpose of the study, research questions, significance of the study, limitations of the study, assumptions of the study, operational definitions of significant terms and the organization of the study.

Chapter two focuses on review of literature on the factors contributing to poor performance at the K.C.S.E level of examinations. Chapter three deals with research methodology which include research design, target population, sampling technique and sample size, research instrumentation, data collection procedure and technique.

Chapter four deals with data analysis and discussion of the findings. Chapter five consists of summary of the findings, conclusions, recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Several educational researchers have attributed many factors to poor performance in chemistry as a science subject. In this chapter, some of these factors will be discussed in general broad categories, and then narrowed down to specific factors. These factors can be categorized into teacher related factors and student related factors.

2.2 Review of Literature

There are a number of general factors contributing to poor performance in Chemistry at the K.C.S.E Level. The student related factors include students' attitudes and motivation and students, entry behavior. Psychologists define attitude as the relatively enduring orientation that individuals develop towards various issues which people encounter in life. Thus, attitude influence behavior and interest manifestation in committing oneself towards an action to obtain the desired objective.

Geoffrey (1993) noted that students will be motivated if learning is interesting, appealing to curiosity or first fun. He came up with suggestions on how a teacher can increase students' interest. These suggestions include:-

- Show interest yourself.
- Show relevance of what you are doing.
- Make sure students are active.
- Give the subject a human interest in application.

Motives and emotions are often defined as those things which provide impetus (energy) behind our behavior; they are those things which make an organism active. In other words, motives are the drives and needs behind behavior (Munavi, 1988). It is difficult for a teacher to promote motivation equally to all students due to mixed abilities. Fast learners will be easily motivated that slow learners. Thus, when a teacher is dealing with learners of mixed abilities, the teacher needs to vary his motivation style. This will enhance interest between the two groups involved during learning.

Students' entry behavior refers to the marks considered when admitting students in form one. The entry behavior also refers to student's cognitive, affective and psychomotor

abilities. The entry behavior is significant in predicting the students' performance at the end of the course.

A nation newspaper editorial (1995) argues that, how a student is brought to the school is more important than what happens afterwards in school. If a student enters in form one with very low marks, very little can be done to improve the student's performance. On the other hand, students who enter in form one with high marks are likely to score well at the end of the course. Learners with high cognitive, affective and psychomotor abilities are easier in getting the learning skills and concepts offered by teachers in secondary schools. These skills can be developed through learning hence translating to better performance at the K.C.S.E level. Ayot and Patel (1987) observe that to teach successively and effectively, a teacher is required to check the learner entry behavior.

The other factors contributing to poor performance are teacher related factors. These include teaching methods and learning resources in chemistry. There are various methods that a teacher can use to achieve instructional objectives in chemistry. Some of the most common methods include; Class experiment, Teacher demonstration and Lecture method. In lecture method, the teacher is the only active participant and the pupils are passive listeners. The longer the lecture period, the less the pupils are able to retain the learnt skills and concepts. This is shown by the following data; when pupils are lectured and then tested on their retention.

Time (minutes)	% Score (Average)
15	41
30	25
45	22

From the data, the longer the lecture the more the mental fatigue leading to loss of concentration. This shows that the lecture method is not the best to pass chemistry instruction because chemistry is a practical subject.

More exposure of students to practical work helps them understand and retain the theoretical concepts in practical work. Cessae (1963) argued that most learners will find demonstrations useful because they confirm their expectations. SMASSE Workshop Conference (1998) at Mombasa confirmed that demonstrations as a teaching technique provides students with concrete experiences of real life.

Wachanga (2005) noted that when students perform class experiments, they gain manipulative and observation skills. Due to this, the students learn, get trained and retain the learned skills.

Learning resources in Chemistry refers to teaching and learning apparatus and equipments. Adequate resources and facilities enable a teacher to use a variety of methods of instructions. The teacher is also able to match the particular method with the learners' ability and interests. A Chinese proverb says; 'Hear and forget, see and remember, do and understand'. This means that when the learners learn through observation and use of learning resources, they understand and retain the learnt information.

According to SMASSE Workshop Conference (1998) at Mombasa, most students are not exposed to the laboratory facilities and apparatus and more so their use until the final exam. Such students do not do well in both theoretical and practical exams because theoretical concepts are better understood through practical approach. Bandura (1997) emphasized the use of practicals in learning of science subjects by saying that it motivates students' interests. Thus carrying out of practicals enables students learn more effectively.

However, learning by practical approach can only be made possible by provision and use of sufficient resources and materials for learning. To provide these resources and facilities in secondary schools requires a lot of financial support either from parents, government or donations from international bodies. Sometimes these funds are not enough or even available, hence the affected schools end up without enough learning resources.

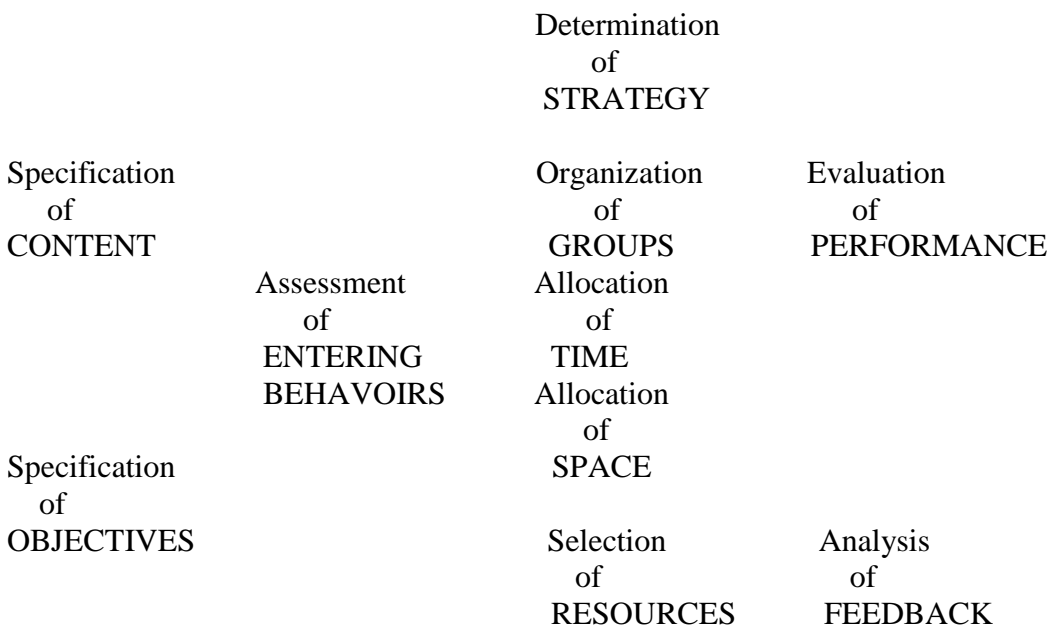
As Munavi (1992) notes learning is a relatively permanent change in behavior potentiality which occurs as a result of reinforced practice. This implies that the teacher has to check time and again whether the learner has learned something. This is done through evaluation. Evaluation is a process of judging the worth of something often in terms of its costs, adequacy or effectiveness (Bali S.K et.al, 1988). This is an aspect that many teachers neglect. More often many teachers do not evaluate their students in practical, yet this contributes to 50% of what the student scores in the final K.C.S.E examinations. Barasa & Ngugi (1990) say that the purpose of education is teaching;

teachers do the teaching while students do the learning; the administration must enhance the aspect of teaching learning process in any given school.

2.3 Theoretical/Conceptual Framework

For good results in chemistry at the K.C.S.E level of examination to be recorded, there a number of groups of people have to be involved. These include the school Principal, the chemistry teacher, the cooperating teachers, the learners, parents or guardians and the community at a large. Therefore, it is important to use a theory that incorporates all these parties so as to establish the causes of the poor performance in chemistry. Here the theory used is the systems theory. The system here is the school while the different groups involved here are the subsystems. As Mukwa and Otieno-Jowi (1988) say, the systems approach enables the teacher to become a decision-maker; the decisions made affect the teacher who has made them as well as other teachers.

The systems approach helps all the groups involved in the teaching-learning process to get feedback. The knowledge gained from feedback helps the teacher to revise and improve on the methods used for teaching or the subject content of a specific course. According to this general systems approach, the teacher should be able to give the learner the chance to learn individually, regardless of group size, at reasonable rate appropriate to his or ability (Mukwa & Otieno-Jowi, 1988). A model of the systematic approach to instruction developed by V. Gerlach and D. Ely is illustrated in the figure below.



Following this model, the teacher specifies what the learners should be able to do at certain points along the instructional continuum. Moreover, a teacher should be able to monitor the entering behavior of the students; in other words, he or she should know what each student brings with him to his course. It is advised that a course should be planned to meet the level of an average student.

As a teacher, one should determine his or her instructional strategies and techniques. The specified objectives determine the organization of students into groups. The plan for use of time depends of the strategies and techniques as well as the subject content, objectives, space availability, administrative patterns, and the abilities and interests of the students.

Since performance is the focal point of learning, all the stated objectives designed and planning done become significant at the time when performance is evaluated. None of a teacher's plans and objectives can be realized if a feedback system is not built into them. If feedback is to be useful, objectives must include the conditions under which the behavior should occur and a criterion in terms of level of acceptable performance. Feedback must be given immediately after a response is made since if it is delayed, it has less effect.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section will cover research methodology. It will be organized under the following headings: Research design, target population, sample and sampling procedures, research instruments, data collection procedures and data analysis techniques.

3.2 Research Design

The cross-sectional schools survey design was used in the research study to collect the data. This is because the method enabled to probe deeply and analyze intensively the key factors that affected the performance in chemistry at the K.C.S.E level on the sample of students from the selected secondary schools in Kathiani division. From the study, generalization was made on the entire population.

3.3 Target Population

The target population consisted of thirty form four candidates of the year 2008 and six chemistry teachers. The target population was spread in the selected secondary schools in Kathiani division. The target population was a representative of the whole population of the whole Kathiani division.

3.4 Sample Size and Sampling Procedures

A sample of three secondary schools in the Kathiani division was done. The selection was done through convenient random sampling technique. From each of these secondary schools, a sample of ten students and two chemistry teachers was done by simple random sampling technique.

3.5 Research Instruments

3.5.1 Questionnaire

Two sets of questionnaire were used in this to elicit information. The first type of questionnaire was for students. It was in two parts. Part A contained questions aimed at eliciting demographic information about the student. Part B consisted of questions that

were designed to elicit accurate responses on the factors contributing to poor performance in chemistry. Such responses were used to establish the causes of poor performance in chemistry.

The second questionnaire was for chemistry teachers in the selected schools. This questionnaire was in two parts. Part A contained questions that required the teachers to state the extent to which teacher related factors contribute to poor performance in chemistry.

3.5.2 In-depth Interview Schedule

The researcher made use of in-depth interview with the thirty respondents students and the six chemistry teachers in the selected secondary schools in the division. This was to supplement the information given in the questionnaires. Interviews were organized and conducted in the selected schools. This enabled the researcher to get the views on the causes of poor performance and to suggest ways of improving the poor performance in chemistry at the K.C.S.E level in Kathiani division.

3.5.3 Direct Observation

This involved direct observation of the teachers as they taught, observation of the laboratory facilities and resources and direct observation of other chemistry facilities such as text books and the students' study habits.

A direct observation of mark records was also done. This involved the use respondent students' entry marks and their performance for the previous two terms and the K.C.S.E result analysis for the year 2005, 2006, and 2007. The entry marks to join secondary schools for the respondent students were obtained from the mark records of admission in the respective schools. The respondent performances for the previous two terms were obtained from the chemistry teachers from each of the sampled schools in the Kathiani division. The K.C.S.E result analysis was obtained from the D.E.Os office, examination department.

3.6 Data Collection Procedure

Questionnaires were administered to the sample students and chemistry teachers. The questionnaires were left with the respondents for a few days and the collected later. Students' entry marks were obtained from the Principals' office from the respective sample secondary schools. Their performances in the previous two terms were obtained from their chemistry teachers mark book. The performance of the candidates of the year 2005, 2006 and 2007 of the K.C.S.E level of examination were obtained from the District Educational Office (D.E.O), examinations department.

3.7 Data Analysis Technique

Descriptive and quantitative data analysis techniques were used by the researcher. The responses from the questionnaires were marked and their respective percentages worked out for comparison purposes.

CHAPTER FOUR

DATA ANALYSIS

4.1 Introduction

Raw data collected in the field of research study is not meaningful to many people just the way it appears. The researcher had to compile the data and analyze it in order to represent it in a meaningful and understandable format. The researcher employed various methods. These included the following:

1. Calculating percentages
2. representative tables
3. Correlation method

In Kathiani division, there are different types of secondary schools in terms of whether they are mixed (boys and girls), boys only or girls only schools. Therefore in order to come up with good representative sample secondary schools in the research study, the researcher had to make good selection. The table below shows the representative secondary schools in the research study.

Table 2: Sample Schools

SCHOOLS NATURE	KATHIANI BOYS	KATHIANI GIRLS	KIKOMBI SECONDARY
Boys School	*		
Girls School		*	
Mixed School			*

From the table of sample schools, the schools are a true representative of secondary schools in Kathiani Division. Kathiani Division is made up of various types of secondary schools, out of which there are boys' schools, girls' schools and mixed secondary schools.

Another area to be considered in the research was the category of the secondary schools. In Kenya secondary education system, secondary schools can be classified as National schools, Provincial Schools, District Schools and the Harambee schools. In this research, the researcher categorized the sample secondary schools as shown in the table 3 below.

Table 3: Categories of Schools in the Division

SCHOOLS LEVELS	KATHIANI BOYS	KATHIANI GIRLS	KIKOMBI SECONDARY
National			
Provincial	*		
District		*	
Harambee			*

From the above table of the categories of schools in the division, it is clear that they are a representative of secondary schools in Kathiani Division. This is because Kathiani Division is made up of Provincial secondary schools, District secondary schools and Harambee secondary schools. The highest level secondary school in Kathiani Division is Kathiani Boys secondary school which is a Provincial school.

4.2 Learners Attitude Towards Chemistry

The researcher employed the Licker-5-point attitude to analyze the students' attitude towards chemistry from the sample population in the sampled secondary schools. The question the students were answering was whether they view chemistry as a difficult subject. The table given below shows tabulation result of the responses which the respondents gave during the research study.

Table 4: Learners Attitude towards Chemistry: Is Chemistry a difficult Subject?

SCALE LEVEL	KATHIANI BOYS	KATHIANI GIRLS	KIKOMBI SECONDARY	TOTAL %
Strongly Agree	2	3	3	26.7%
Agree	4	2	3	30.0%
Undecided	2	3	2	23.3%
Disagree	2	1	1	13.3%
Strongly Disagree	0	1	1	6.7%
Totals	10	10	10	100%

From the table 4 above, 26.7% of sample students agreed that chemistry is a very difficult subject, 30.0% agreed that chemistry is difficult, 23.3% of the sample students were undecided on whether chemistry is difficult or not while 13.3% disagreed that chemistry is a difficult subject. It's only 6.7% of the sample students who strongly disagreed that chemistry is difficult subject.

To find out how much the students know about the usefulness of chemistry, the following results were obtained and their percentage calculated as shown from the later interview questions administered to the sample students.

Table 5: Usefulness of Chemistry

CHEMISTRY AS A SUBJECT HELPS TO	RESPONSES					
	NO		YES		NOT SURE	
	NUMBER	%	NUMBER	%	NUMBER	%
Answer questions about life	6	20.0	20	66.7	4	13.3
Acquire scientific attitudes	3	10.0	26	86.7	1	3.3
Develop favorable habits	9	30.0	16	53.3	5	16.7
Gain basics of future career	2	6.7	27	90.0	1	3.3

The table 5 above clearly shows that 66.7% of the student sample agreed that chemistry as a subject helps them to answer questions about life. This indicates that many students were aware that chemistry helps them improve the general health standards of individuals in everyday. Moreover, this is also shown by 53.3% of students who agreed that chemistry as a subject leads to the development of favorable habits. Majority of the students agreed that chemistry as a subject helps them to acquire scientific attitudes and to gain the basics of future career. This was shown by the 86.7% and 90.0% respectively. The results above indicate a minimal correlation between students' attitude towards chemistry and motivation of performance.

In this research study, the researcher asked the respondents to indicate their career choices when they leave secondary school. Table 6 below shows how the students responded to the questions.

Table 6: Students' Career Choices

CAREER	NUMBER	% (PERCENTAGE)
Medicine (Doctor)	10	33.3
Lawyer	8	26.7
Teacher	7	23.3
Engineer	2	6.7
Pharmacist	1	3.3
Biochemist	0	0.0
Others	2	6.7

The table shows majority of students like to take medicine as their career as indicated by the 33.3%. However, by adding the percentages of students who would like to pursue a career that does not require chemistry as a core subject, such law and teaching, it is seen that many students would like to enter into these careers. To a certain degree, this can tell why many students have a negative attitude towards chemistry. There is a correlation of this attitude and the poor performance in chemistry.

4.3 Students' Entry Behavior

The researcher also analyzed student performance at K.C.P.E in science and the relationship between K.C.P.E marks and Chemistry marks in the previous term so as to establish whether they lead to poor performance in chemistry at the K.C.S.E level of examinations.

As noted earlier in this research study, the entry behavior of a student is a very important aspect in predicting how the student will perform at national examinations. Therefore, the researcher found it necessary to know the entry behavior of the respondent students.

Table 7.1 below shows tabulated data of entry behavior of respondent students in Science subject at the K.C.P.E level of examination.

Table 7.1: Students' Performance in Science at K.C.P.E

MARKS	NUMBER	PERCENTAGE %
90-100%	0	0.0
80-89%	1	3.3
60-79%	18	60.0
50-59%	6	20.0
40-49%	5	16.7
Below 40%	0	100

Table 7.1 above shows that majority of the students in the sample schools scored between 60% and 80% in their K.C.P.E science examination. Thus, the entry behavior of most students is above average. This implies that the students should be expected to perform above average in chemistry at K.C.S.E level of examination. However, the relationship is not as expected because the performance in chemistry in Form Four as shown by the results from the Kenya National Examinations Council (K.N.E.C) is below average.

The table 7.2 below shows the relationship between the entry marks in Science at K.C.P.E examination and the marks the students scored in the previous term in Chemistry (i.e. second term 2008) during the research study.

Table 7.2: Relationship between Science Marks at K.C.P.E and Chemistry Marks

ENTRY MARKS IN SCIENCE IN K.C.P.E (%)	CHEMISTRY MARKS IN PREVIOUS TERM (%)
86	70
43	52
68	60
72	63
64	50
45	32
56	70
58	42
60	54
50	56

Table 7.2 above shows that the higher the entry marks in Science, the higher the score in Chemistry the previous exam except for about two cases in which they scored low in Science in K.C.P.E but got higher score in Chemistry in the previous exam.

Table 7.3 below which is an extension of table 7.2 is used to calculate the correlation coefficient (r) from the entry behavior of the respondent sample students in Science in K.C.P.E and the marks in Chemistry from the previous term (3rd term 2008) in the research study.

Table 7.3: Correlation Coefficient between Entry Mark in Science in K.C.P.E and Chemistry Marks in Previous Term

SCIENCE MARKS IN K.C.P.E, (x)	CHEMISTRY MARKS IN PREVIOUS TERM, % (y)	X SQUARE	Y SQUARE	XY
86	70	665.64	228.00	389.56
43	52	295.84	95.84	49.88
68	60	60.84	26.01	-39.78
72	63	139.24	65.61	95.58
64	50	14.44	24.01	-18.62
45	32	231.04	524.41	248.08
56	70	17.64	228.01	-63.42
58	42	4.84	166.41	28.38
60	54	6.04	0.81	-6.18
50	56	104.04	1.21	-11.22
X=60.2 N=10	Y=54.9 N=10	1533.66	1560.33	778.28

Correlation coefficient, $r = 0.503$

A correlation coefficient of 0.503 shows that there was a relationship between the entry marks in Science in K.C.P.E and what the student got in Chemistry in the previous term, (i.e. 3rd term 2008).

4.4 Teaching Methods

In this research, the researcher investigated the methods employed by teachers in passing chemistry instructions. This was done through the interviews in which the researcher asked the students and teachers, the number of times class experiment, lecture and teacher demonstration methods of instruction were used.

Table 8.1 given below shows the tabulated percentage of the responses from the teachers and students respectively.

Table 8.1: Teaching Methods used

INSTRUCTIONAL METHODS	TEACHERS' RESPONSE (%)	STUDENTS' RESPONSE (%)
Class Experiment	10	5
Lecture Method	75	80
Teacher Demonstration	15	15

From table 8.1, it is seen that the teacher response on the method used to pass chemistry instructions differs slightly with the students' response. The teacher response shows that they employ class experiment and teacher demonstration methods in experiments by 10% and 15% respectively. However, the response of students shows that they learn using class experiment and teacher demonstration type of experiments by 5% and 15% respectively. Nevertheless, the table shows that the most common method of passing chemistry instruction is by use of lecture method. As noted earlier, when lecture method is used, students are unable to understand concepts well and do not get trained by the use of this method. As a result, this has contributed to poor performance in chemistry in secondary schools in Kathiani Division.

Table 8.2 shows the students' response on the method they prefer in learning chemistry.

Table 8.2: Students' Response on the Method they prefer in Learning Chemistry

INSTRUCTIONAL METHOD	NUMBER	PERCENTAGE (%)
Class Experiment	24	80.0
Teacher's Demonstration	4	13.3
Lecture Method	2	6.7

From table 8.2, it can be seen that majority of the students preferred to be taught using class experiment method of instruction. However, teachers use lecture method more often than class experiment. This implies that the students are not motivated in terms of classroom instruction methods. This is clearly reflected in the poor results of students at the K.C.S.E level of examination.

4.5 Learning Resources in Chemistry

The table 9 below shows the teachers' and students' responses about the resources used in the teaching and learning of chemistry. The question was whether the chemistry textbooks and laboratory materials and apparatus were adequate or in-adequate.

Table 9: Teachers' and Students' Feeling about Adequacy of Resources

FACILTIES	TEACHERS' RESPONSES, %		STUDENTS' RESPONSES, %		
	Adequate	In-adequate	Adequate	In-adequate	No Idea
Chemistry Text books	55	45	20	50	20
Laboratory Materials and facilities	30	70	0	20	80

Table 9 above shows that the teachers' feeling about chemistry text books in their schools is 55% adequate and 45% in-adequate. However, on the part of laboratory materials and apparatus, the teachers' feelings are that they area in-adequate, shown by 70%. This implies that most secondary schools in Kathiani Division do not have laboratory materials and apparatus. Due to this factor, many teachers may not be in a position to use practical approach as a method of passing chemistry instructions.

The table also shows that the students have no idea on how well equipped their laboratories are. However, the students feel that the chemistry textbooks in their schools are id-adequate. Because of this feeling, the learners may feel that they are in-adequate to compete with other students in other schools in the country who think that they have enough resources for enhancing learning. Consequently, this may contribute to the poor performance at the K.C.S.E level of examination.

4.6 Teachers Qualification

For a number of times, many parents and guardians may associate the academic failures of their children to the qualification of the instructor. In this research study, the researcher sought to get the relationship by asking the teacher to indicate their qualifications in the questionnaires. Table 10 below captures this information.

Table 10: Teachers Qualification

QUALIFICATION	NUMBER	PERCENTAGE (%)
M. Ed	0	0.0
B. Ed	3	50.0
PGDE	2	33.3
Diploma	1	16.7
Untrained	0	0.0
Total	6	100

Table 10 above shows that the teachers who handle chemistry in the sample schools in Kathiani Division are qualified professional teachers. There is no untrained teacher teaching chemistry in the sample schools. This implies that there is no correlation between the teacher qualification and the performance of students in chemistry at the K.C.SE level of examination.

Sometimes, the failure of the learners to do well in national examinations may be attributed to the experience of the instructor. To find out whether the poor performance in chemistry in secondary schools in Kathiani Division was correlated to the experience of the teacher, the researcher asked the teachers to state the number of years they have taught chemistry. The results were as shown in the table below.

Table 11: Experience of Chemistry Teachers

YEARS	NUMBER	PERCENTAGE (%)
1-3	4	66.6
4-6	1	16.7
7-9	1	16.7
Above 9	0	0.0

From the table above, is seen that most teachers have an experience of between 1-3 years. This implies the experience of the teachers in teaching chemistry could be a source of poor performance in chemistry at the K.C.S.E level of examination on Kathiani Division.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the researcher made some conclusions based on the findings of the results obtained from the respondents and analysis of the data. This researcher also came up with some recommendations that may be important in improving the performance of chemistry at the K.C.S.E level of examination in Kathiani Division.

5.2 Summary and Conclusion

The results obtained from this research showed a number of issues. The finding from this research has shown that majority of the students agree that chemistry is a difficult subject. This is shown by table 4 in which 26.7% and 30.0% strongly agree and agree respectively that chemistry is a difficult subject. From the same table, it is coming out that 23.3% of the sample students were undecided whether chemistry is a difficult subject. These results imply that students may show poor performance in chemistry at K.C.S.E level of examination since they regard chemistry as difficult subject or are undecided and thus may not be motivated to learn the subject.

The result obtained in this research showed that the performance in chemistry at the K.C.S.E level is not gender depended. This is because the comparison of performance between the boys' and girls' secondary schools in this study does not show any significant difference in the three years.

It was observed that learners are aware the study of chemistry is important to them in everyday life. This was shown by table 5 by the way the students responded to the usefulness of chemistry. However, the students' awareness of the importance of chemistry in everyday life is not reflected in their performance at the K.C.S.E level of examination in the Division. The findings of the study show a correlation between the students' entry behavior in science and their performance in chemistry in their secondary schools. This was shown by the findings given in tables 7.1, 7.2 and 7.3 with a correlation coefficient of 0.503.

It was also clear that the research found majority of learners did not want to enter into careers that require pre-requisite knowledge in chemistry. This was shown by results of

table 6 in which about 40% of the sample students were the only ones interested in careers in which chemistry is a major requirement. The other percentage i.e. about 60% wanted to join courses in which chemistry is not a major requirement.

The research also established that the teaching methods were a major contributor of poor performance in chemistry at the K.C.S.E level of examination in Kathiani Division. This observation was shown by results in table 8.1 and 8.2. These tables showed that the teachers employed lecture method of instruction more often than the other better methods. As noted earlier on, chemistry is a practical subject in which its concepts are better taught and learnt using practical approach. However, this was not the case in Kathiani Division, hence the poor performance in chemistry at the K.C.S.E level of examination.

The research findings showed that the laboratories of secondary schools in Kathiani Division were not adequately equipped. This was shown by the results in table 9. It was apparent due to this factor that teachers of chemistry were not able to use practical method in the teaching and learning of chemistry. This problem brought a negative impact in the performance of chemistry at the K.C.S.E level of examination as shown by the data or results in table 1.

The research finding established that the teachers' teaching experience could have been one of the contributing factors to poor performance in chemistry at the K.C.S.E level of examination. However, the researcher was able to show that the teachers' qualification had no significant correlation on the poor performance in chemistry in the Kathiani Division.

5.3 Recommendations

The research came up with a number of recommendations to the respective individuals involved in the teaching and learning of chemistry in secondary schools in the Kathiani Division. Chemistry teachers need to use practical approach as a medium of passing chemistry instructions. This can be done by the use of class experiments and teacher demonstrations. The teachers should be able to use lecture method as least as possible and only when it is not possible to use the other methods. The researcher recommends to chemistry teachers to be doing class experiment as many times as possible.

The school principals should collaborate with the respective chemistry teachers in order to get advice on the appropriate text books to buy for teaching and learning of chemistry in secondary schools. This research would like to recommend to school principals to buy as many types of text books as possible in order to increase the scope of chemistry knowledge to learners. The school principals should collaborate with the respective chemistry teachers as they equip the laboratories. This is necessary because the chemistry teachers are the ones who know the materials needed to perform the important experiments in chemistry.

The researcher also recommends to school principals to be sending their chemistry teachers to short refresher course and in-service programmes. This will make the chemistry teachers to gain more experience on how to teach chemistry efficiently and make the students do well in their final examinations. The researcher recommends to school principals to be critically examining the student's entry behavior when they are admitting them to Form One.

Further research should be carried out to explain the poor performance in chemistry. This research can work out to see how factors such as teacher attitude towards chemistry, study habits of students and the level of education of parents and the performance of their children; can contribute to poor performance in chemistry.

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APPENDICES

APPENDIX A: LETTER OF TRANSMITTAL/COVER LETTER

Alphonse M. Mutunga.
University of Nairobi,
C.E.ES
P.O Box 92,
Kikuyu.
Email almumo@yahoo.com
18th August 2008.

Dear Respondent,

RE: RESEARCH PROJECT: QUESTIONNAIRE ON FACTORS CONTRIBUTING TO POOR K.C.S.E PERFORMANCE IN CHEMISTRY IN KATHIANI DIVISION IN MACHAKOS DISTRICT.

This research study is aimed at investigating the factors that contribute to poor performance in chemistry at the K.C.S.E level. You have been selected to give pertinent information by filling in the questionnaire attached as correctly and honestly as possible.

Your responses will be treated with utmost confidentiality. Do not write your name on the questionnaire.

I am grateful to you for accepting to participate in this important exercise.

Yours faithfully

ALPHONSE M. MUTUNGA
PGDE STUDENT.

APPENDIX B: QUESTIONNAIRE FOR STUDENTS

Instruction

Please respond to all items as instructed.

SECTION A

Please put a tick [] or write your responses in the spaces provided.

1. Name of your school
2. Please indicate your gender: Male: Female:
3. How did you perform at K.C.P.E exam?
 - I. Please indicate your total marks
 - II. Please indicate your marks in Science
4. How did you perform in Chemistry in the last two terms?
Below 50 Between 50-60 Above 60

SECTION B

1. Do you have chemistry text books?
Yes No
2. if yes, indicate the titles of the chemistry text books you have.
 - I.
 - II.
 - III.
 - IV.
3. Do you like chemistry? Yes No
Explain why
4. How do you find your chemistry teacher?
Interesting Moderate Not interesting
5. Do you like your chemistry teacher? Yes No
If no, explain why
6. Does your school have a laboratory? Yes No
7. How often do you carry out chemistry experiment?
 - A. Once per week

B. Once per month

C. Once per term

8. Please indicate your career choice

9. How often do you study chemistry in your personal study?

Please indicate the number of hours per week

APPENDIX C: QUESTIONNAIRE FRO TEACHERS

This information in this questionnaire will be treated with strict confidentiality. Please respond to all questions as instructed.

SECTION A

1. Name of your school
2. Please indicate your gender. Male Female
3. How long have you taught chemistry? 1-3 years 3-6 years
7-9 years Above 9 years
4. What is your academic qualification? M. Ed. B. Ed.

P.G.D.E Diploma Untrained

SECTION B

1. (a) Does your school have a laboratory? Yes No

(b) If yes, is it well equipped? Yes No

(c) If no, where do you conduct your chemistry practical?
.....
2. Please indicate the approximate number of times when you conduct;
(a) Teacher demonstration experiments
(b) Class demonstration experiments
3. How do your students perform in chemistry?
Above average Average Below average
4. (a) Is your school a mixed school? Yes No

(b) If yes, how does boys' and girls' performance compare in your class?
Boys better Girls better Both perform equally
5. What is the attitude of your students towards chemistry?

Very good Good Average Below average

6. What factors affect the teaching of chemistry in your school?

.....
.....
.....
.....

7. Suggest ways in which the teaching of chemistry can be improved.

.....
.....
.....
.....