SCHOOL-BASED FACTORS INFLUENCING IMPLEMENTATION OF ENVIRONMENTAL EDUCATION IN SECONDARY SCHOOL EDUCATION IN MOLO DISTRICT, NAKURU COUNTY, KENYA

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DECLARATION

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

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DEDICATION

This study is dedicated to my wife Joyce Wanjiru and our children Mathias Mwangi, Brian Ndung’u and Daniel Muigai for their great love and support.

The study is also dedicated to my mother Beatrice Njeri who taught me the virtues of hard work.
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# ABBREVIATIONS AND ACRONYMS

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>DN</td>
<td>Daily Nation Newspaper</td>
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<td>EE</td>
<td>Environmental Education</td>
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<td>ESD</td>
<td>Education for Sustainable Development</td>
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<td>EVT</td>
<td>Expectancy Value Theory</td>
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<td>GOK</td>
<td>Government of Kenya</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>ICC</td>
<td>International Climate Challenge</td>
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<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
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<td>KIE</td>
<td>Kenya Institute of Education</td>
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<td>KICD</td>
<td>Kenya Institute of Curriculum Development</td>
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<td>KNEC</td>
<td>Kenya National Examinations Council</td>
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<td>MOE</td>
<td>Ministry of Education</td>
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<td>MOEST</td>
<td>Ministry of Education Science and Technology</td>
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<td>NEAP</td>
<td>National Environment Action Plan</td>
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<td>NEMA</td>
<td>National Environment Management Authority</td>
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<td>NEPAD</td>
<td>New Partnership for Africa Development</td>
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<td>SD</td>
<td>Sustainable Development</td>
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<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>UN</td>
<td>United Nations</td>
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<td>UNEP</td>
<td>United Nations Environmental Programme</td>
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ABSTRACT

Despite education being among the most effective means of mitigating the effects of environmental degradation there has been very little investigation into the effectiveness of the various programs put in place for teaching Environmental Education in secondary schools' curriculum. The purpose of this study therefore, was an attempt to investigate school-based factors that influence implementation of environmental education in Secondary schools in Molo District, Nakuru County. The study sought to identify the status of the physical resources used in teaching environmental education, to find out the approaches used in teaching environmental education, to determine teachers’ levels of training and preparedness in handling the curriculum, establish levels of interaction between students and teachers for pro-environmental behavior change and difficult areas of communication in environmental education. In this study the independent variables were constructs derived from Expectancy Value Theory which provided a platform in assessing the motivation for the implementation of Environmental Education in secondary schools. That is, motivation underlying the teachers and the students’ behaviors in the implementation of Environmental Education. The study employed descriptive design since the purpose was to identify the state of affairs in regard to the implementation of Environmental Education. The study involved collecting statistical information from the respondents on their attitudes, opinions and habits in relation to the implementation of Environmental Education without manipulating any variable. The population of the study consisted of 7776 students, 219 teachers and 29 principals. The study employed a purposive sampling technique to select 15 principals and 45 Environmental Education teachers while a simple random sampling was used to select 600 students. A total of 474 students, 30 teachers and 7 head teachers participated in the study. This gave a sample size of 511 respondents out of 660 sample size giving a return rate of 77%. Data collection was strictly confidential and done through questionnaires for students and teachers, and interviews schedules with head teachers. The instruments were piloted in 3 schools that were not involved in the main study and gave reliability coefficients of 0.8027 and 0.7993 for teachers and students questionnaires respectively. Quantitative data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 17.0 and presented in the form of graphs and frequency distribution tables, while qualitative data was analyzed thematically with data from interview schedules reported in quotes and narratives. The main findings of the study included that Environmental Education is taught as part of other subjects such as Geography, Agriculture and Biology. The main resources used in teaching Environmental Education are text books and charts with little use of information technology. Teachers handling Environmental Education rarely receive special training in Environmental Education though they are trained in subjects that offer Environmental Education. Further, the approaches used by teachers to handle Environmental Education are mainly teacher-centered. Also the desire to cover the syllabus and performance in the exams are the main motivation in teaching Environmental Education than environmental concern. Apart from class work, teachers use co-curricular activities such as tree planting and wildlife clubs to deliver Environmental Education content. Challenges that hinder delivery of Environmental Education include lack of relevant resources such as computer and internet. Further, there is no clear policy that guides delivery of Environmental Education in schools. It is recommended that the schools invest in information technology in the teaching of the curriculum and organize in-service training for teachers handling Environmental Education.
CHAPTER ONE

1.0 Introduction

This section explains the historical perspective of the Environmental Education globally and in Kenya. It also describes the statement of the problem, purpose of the study, objectives of the study, research questions and significance of the study. Further the section will deal with assumptions of the study, limitation and delimitation of the study, the theoretical framework and the conceptual framework.

1.1 Background to the study

In an attempt to address environmental challenges that results from human interaction with the biophysical surroundings, education for sustainability has become an imperative in many countries. It has taken many forms that include integration of the environmental Socio-scientific issues in the curriculum to teaching of Environmental Education as an independent subject (Shiundu & Omulando, 1992). In this regard, Environmental Education (EE), as a component of sustainable development was brought into focus in 1972 at Stockholm Sweden Conference, to address environmental pollution that results from human interaction with the physical environment (ibid).

Harold and Trudi (2011) note that the conference recommended that;

i) The United Nations (UN) establish an international programme in EE

ii) An interdisciplinary approach in EE which takes place in school and out-of-school encompassing all levels of education and

iii) An EE programme directed towards the general public
This led to the establishment of the United Nations Environmental Programme (UNEP) which is now based in Nairobi Kenya and, to mark the opening of the Stockholm Conference, World Environment Day (WED) is celebrated each year on 5th June was established. The purpose of World Environment Day is to focus worldwide attention onto the importance of the environment and stimulate political attention and action. Each year UNEP formulates a global theme to guide activities for WED based on priority environmental issues (Daily Nation, 2012, June 7, p42). WED therefore, is aimed at stimulating worldwide environmental awareness, consciousness, change of attitude and political goodwill towards the environment. In schools students participate in a competition on essay writing relating to a given global theme.

According to Shiundu and Omulando (1992) a follow-up to Stockholm Conference, The Tbilisi Inter ‐ governmental Conference Environmental Education, was held in 1977. The conference defined the goals for EE as follows;

1. Foster awareness of, and concern about, economic, social and ecological inter ‐ dependence

2. Provide an opportunity for every person to acquire knowledge, values, attitudes, commitment and skills needed to protect and improve the environment, and

3. Create new patterns of behavior of all the people in the society as individuals and as groups towards the environment.

Thus, the Tbilisi Georgia (1977) Declaration defined Environmental Education as a learning process that increases people's knowledge and awareness about the environment and associated challenges, develop the necessary skills and expertise to address the challenges, foster attitudes, motivations, and commitments to make informed decisions (UNESCO, 1978).
In this regard therefore, a graduate of EE is expected to take a responsible action in the care and protection of the environment.

Further, according to Muthoni (2009) global climate change has become the worst threat facing humanity and the environment. It has become of much public interest around the world and has particularly taken toll in Kenya where it has manifested itself through rain shortages, consistent drought, water shortage, outbreak of vector borne diseases, melting of ice cap on Mt. Kenya and so on. In response to global climate change, the International Climate Challenge (ICC), an organization that deals with climate change issues, challenges young people in schools to be involved in solving identified environmental problems. Also in the Earth Summit, on Environment and Development held in Rio de Janeiro, Brazil in 1992 and 2012 follow-up conference 20 years later (Rio +20) a plan of action for sustainable development in the 21st century, popularly referred to as, Agenda 21 was formulated. Aquilina (2001) posits that this global initiative by the United Nations (UN) provides the policy framework for international action on the environment. Underlying Agenda 21 is the principle of ecologically sustainable development that is “a pattern of activities that meet the needs of the current generation without prejudicing the ability of future generations to meet their needs”. Ecologically sustainable development relates to those human activities that compromise a balance between economic, environmental and social forces.

The Agenda emphasizes education, including formal education, public awareness and training, as critical to promoting sustainable development and improving the capacity of people to address environment and development issues. Otieno (2010) argues that both formal and non-formal education is indispensable to changing peoples’ attitudes and enhancing their capacity to address the concerns of sustainable development. Education has therefore been
sighted as among the most effective means of inculcating in the youth positive attitudes and values towards environmental protection. Most countries have therefore made efforts to strengthen their education systems in order to address these environmental challenges such as loss of biodiversity, climate change and environmental degradation attributable to human interaction with the biophysical environment. This has also become to be known as Education for Sustainable Development (ESD).

As a response to the environmental challenges, Environmental Education (EE) is one of the efforts the Kenyan government adopted following the 1977 Tbilisi Conference. Otieno (2010) notes that the Kenyan government commitment to Agenda 21, Chapter 36 on Education and Sustainable Development, is demonstrated by the adoption of the National Environment Action Plan (NEAP). Further, NEMA (2008) contends that efforts made by the government to address the problem of environmental degradation include; setting of the Law for Enhancing Motivation on Environmental Conservation and Promoting Environmental Education established in July 2003 and enforced in October 2004, to promote environmental education in schools and community workplaces and enhance public awareness and education about the different issues of environmental protection and the conservation of natural water bodies.

The Ministry of Education (2010) notes that virtually all learning and work related activities have an impact on the immediate environment. Some challenges posed by environmental degradation have far reaching social and economic consequences which can be addressed in the education system. According to UNESCO (2011/12) report, Kenyan educational goals seek among others to promote and foster positive attitudes towards environmental development and conservation. Learners are therefore encouraged to appreciate the value of
environmental care, protection and conservation through the inculcation of appropriate knowledge, skills; and attitudes.

On education reforms in Kenya, Kivuva (2001) and Wangai (2002) note that a deliberate attempt to address the contemporary needs of the society was made in 2000. This was done through the revision of syllabus in order to include emerging issues such as health, environmental and civic education, gender and the anticipated industrial transformation of the nation. The integrated curriculum launched in the year 2000 was implemented from the year 2003 (KIE, 2006). The Kenya Institute of Education (KIE) developed the syllabus and resource materials for the integrated environmental education in the various subjects’ syllabi for both schools and colleges. The syllabus and the instructional materials were designed to guide teachers incorporate this new education into the formal and co-curricular school activities. This was merely a take-off point since the already burdensome curriculum could not allow Environmental Education to be taught as an independent subject.

1.2 Statement of the Problem

The ultimate aim of education is to shape human behavior (Harold & Trudi, 2011). It is for this reason that societies all over the world develop education systems that besides addressing the societal needs are also aimed at developing citizens who will behave in a desirable way. Environmental Education seeks to address environmental problems where individuals and social groups are empowered with knowledge and skills for identifying and solving these problems. In Kenya there has been a marked increase on knowledge-based interventions to environmental challenges yet environmental degradation has continued unabated and Molo District has not been left out. Both facilitating and inhibiting factors to EE need to be identified including those that relate to the curriculum, pedagogy, resources and the schools’
atmosphere. Further, despite the good intentions of teaching environmental education in the Kenyan Schools and colleges, and the approach adopted of infusing it into other subjects, very little has gone into analyzing the effectiveness of its implementation. The wanton destruction of the forest covers and water catchment areas as well as environmental degradation attributable to human activities demands that knowledge-based interventions be investigated. There is therefore, a need to investigate both limiting and facilitating factors influencing the implementation of EE since there is a lack of appreciation and respect for the protection of the environment by many graduates of the education system (UNESCO, 2010/11). It is also an indictment on the efficacy of integrated environmental education on a pro-environment attitude change. If the challenges facing the implementation of environmental education are not treated with the seriousness they deserve the intention of promoting a healthy environment for sustainable development through knowledge-based interventions may not be realized.

1.3 The purpose of the study

Based on the above mentioned background, the purpose of this study therefore was to investigate school-based factors influencing the implementation of the environmental education in secondary schools in Molo District, Nakuru County. The study also sought to find out from teachers and students as well as the heads of schools the problems experienced in the implementation of environmental education as well as limiting and facilitating factors in the teaching of this integrated education with a view to redressing challenges to environmental education.
1.4 Objectives of the study

In this Study the objectives were:

i) To find out the status of instructional resources in the teaching of environmental education.

ii) To determine teachers' levels of training and preparedness in handling environmental education curriculum.

iii) To identify approaches used in the teaching of environmental education.

iv) To determine opportunities in schools for the teaching of environmental education.

v) To determine the challenges facing environmental education.

1.5 Research Questions

The following research questions guided the researcher in achieving the stated objective.

i) What is the current status of instructional resources in the teaching of environmental education?

ii) How prepared in terms of training are the teachers handling environmental education?

iii) To what extent are the approaches used in the teaching of environmental education achieving the curricula objectives?

iv) At what level do teachers and students interact in the teaching of the environmental education?

v) What are the problems experienced by teachers and students in relation to environmental education?

1.6 Significance of the study

It is hoped that in the envisaged objectives of this study, the findings will be of help in curriculum development and policy formulation in dealing with contemporary issues such as
environmental challenges. The research findings and recommendations will be of use to secondary schools in promoting a healthy environment through knowledge - based interventions as well as promoting positive behavior change amongst the students towards the environment. Further, the findings will be an addition to the existing literatures on the environment and a basis for further studies in Environmental Education.

1.7 Assumptions of the Study

In the proposed study the following assumptions were made:

i) All the respondents were to be cooperative and honest in providing reliable information.

ii) All the respondents understood the importance of a healthy biophysical environment.

iii) The subject if taught the way envisaged would bring about pro - environmental behavior change amongst the students.

iv) The findings from the study are representative enough to guarantee an accurate generalization and conclusion.

1.8 Limitations of the Study

The study was confined to students, teachers and head teachers in public secondary schools in Molo District. However, more useful information could have been obtained from parents and schools' supervisory, quality assurance and standards bodies. It was not possible to include all of them because it required considerable time, resources and other logistics. Further, the study was confined to school-related factors in secondary schools since to study all the factors affecting Environmental Education would have been an enormous task and detracts from the major thrust of this study. The study therefore focused on institutional factors in the study District.
1.9 Delimitations

The study was done in public schools in Molo District, Nakuru County. For more conclusive results both public and private schools should have been studied. However, this was not possible because of the available resources to conduct the study as well as the terrain and other logistical constraints.

1.10 Theoretical Framework.

This study was guided by Expectancy Value Theory (EVT) formulated by Vroom (1964). The theory states that the motivation to perform a particular task is viewed as the product of three factors: valence - perceived attractiveness or repulsiveness of an object, expectancy - outcome or sets of outcomes that follows a particular action and instrumentality - expected utility or usefulness of a direct outcome of the attained or avoided relation between direct and indirect outcomes (Orodho, 2010). In this regard therefore EVT views motivation as an outcome of how much an individual wants a reward (Valence), the assessment that the likelihood that the effort will lead to expected performance (Expectancy) and the belief that the performance will lead to a reward (Instrumentality). In short, Valence is the significance associated by an individual about the expected outcome. It is an expected or the appeal of the outcome to the individual in this case the teacher and not the actual satisfaction that the teacher expects to receive after achieving the goals. Expectancy is the faith that better efforts will result in better performance.

Cruz (2005) postulates that Expectancy is influenced by factors such as possession of appropriate skills for performing a task, availability of right resources, availability of crucial information and getting the required support for completing the task. Further, she argues that Instrumentality is the faith that if you perform well, then a valid outcome will be there.
Instrumentality is affected by factors such as believe in the people who decide who receives what outcome, the simplicity of the process deciding who gets what outcome, and clarity of relationship between performance and outcomes. Thus, the expectancy theory concentrates on the interactions of three factors to create a motivational force:

\[
\text{Motivation Force} = \text{Valence} \times \text{Expectancy} \times \text{Instrumentality}
\]

Figure 1:1 Expectancy Value Theory
Source: (Cruz, 2005)

The object in this case related to Environmental Education that factored in teacher’s dispositions, his/her training experience, nature and context of his/her interaction with the students and the school environment. The Theory is important because in the implementation of Environmental Education curriculum a person’s behavior in this case the teacher, student or the head teacher and behavioral intentions will be determined by his/her beliefs about the outcome of performing the task specifically the value placed on outcomes and the perceived feasibility of the outcomes of the Environmental Education. As discussed earlier, Expectancy Value Theory has been used to understand motivations underlying individuals’ behaviors. Focus has been placed on intent, as the immediate precursor to a particular behavior. Cruz (2005) argues that the theory proposes that if one can determine the elements that impact intention, then one can more accurately predict whether an individual will engage in a particular behavior. Likewise, it proposes that by changing an individual’s perceptions of potential outcomes, one can alter the individual’s intent. The basis of the theory is that “individuals choose behaviors based on the outcomes they expect and the values they ascribe to those expected outcomes” (Borders, Earleywine, & Huey, 2004). The level of one’s willingness to perform a particular behavior is dependent on the extent to which the individual believes a consequence will follow and the value the individual places on the consequence (Mazis, Ahtola, & Kippel, 1975). The more attractive a particular outcome is to the
individual, the more likely the person will engage in the behavior. Similarly, as the number of positive outcomes increase, the motivation to engage in the behavior will increase. Expectancy itself is defined as “the measurement of the likelihood that positive or negative outcomes will be associated with or follow from a particular act” (ibid). Thus, the individual’s outcome expectations affect one’s attitudes towards the behavior. In addition to the expected outcome, the value the individual places on the outcome influences the individual’s intentions. Borders, Earleywine & Huey (2004) found that individuals choose from a variety of alternatives and thus must examine a variety of expectancies before choosing to engage in behaviors. Among the potential alternatives of decisions that can be made, some appear more attractive than others. For example, according to Bandura (1977/82/89) it appears individuals are likely to choose behaviors that have been positively reinforced by successful outcomes and by other individuals in social networks.

Further, Okumbe (1998) posits that teachers’ relevance and usefulness of their competence can be demonstrated only in a work situation by achieving certain practical results or a certain level of performance. In Kenya for example, performance at national exams has created an over drive for good grades in schools. Both teachers and students could be more willing to increase their efforts in a subject area if they value increasing their overall performance at the national examinations. For instance, if both teachers and students recognize that EE would increase the mean score average together with the attached rewards and they valued these rewards, they would be more willing to increase their effort in EE. Other factors that could heighten teachers’ and students’ efforts include increase in self-esteem, academic progression, resource availability, an enabling school environment and post-graduation job opportunities (ibid). The EVT model therefore provided a platform in assessing the undergirding motivation to the implementation of environmental education in Molo District, Nakuru County.
1.11 Conceptual Framework

In conceptualizing this study the researcher focused on the interaction of the various variables to the teaching of Environmental Education (EE) and their effects on the outcome. In Applying the Expectancy Value Theory therefore, various outcomes may impact teachers' and students' motivations in the implementation of EE. Many of these outcomes could be short-term to long-term goals, including the perceptions of successful syllabus coverage, personal disposition to realization of curricula goals. Further, the EE teacher's motivation and effectiveness are influenced by the availability of the necessary resources, possession of the right knowledge and skills, and support from the school administration. Also equally important to the implementation of EE is the leadership style that the head teacher assumes, the opportunities availed for the advancement of teachers' skills, and the entire school environment that the implementation process is taking place. The interaction of all these variables will determine the effectiveness of the implementation of Environmental Education. Thus, the independent variables included EE resources, teachers and students' attitudes and dispositions, administrative support and the school environment. The dependent variable was effective implementation of EE in public secondary schools that results from the interaction of the independent variables.
Figure 1: 2 Conceptual Framework representing the interaction of various variables in the Implementation of Environmental Education

Source: Researcher
1.12 Operational Definitions of Key Terms

Challenges: Difficulties attributable to implementation of Environmental Education

Environment: Physical surroundings or the natural world.

Environmental Consciousness: A state of being aware of and being sensitive to Environmental challenges and need to redress them.

Environmental Education: A deliberate attempt to help individuals learn about the impact of one’s actions on the natural world in order to help them engage in environmentally friendly behaviors.

Environmentalist: A person involved in the protection and conservation of the natural environment.

Pro-Environmental behavior: Behavior that results from exposure to environmental education and which consciously seeks to minimize the negative effect on the environment.

Sustainable development: Development that meets the needs of the present generation without compromising the ability of future generations to meet their needs.

Eco-school Activities: Schools’ activities aimed at promoting environmental awareness and consciousness in redressing environmental challenges especially in the immediate surroundings.
CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 Introduction

The chapter views the various literatures and researches that have been undertaken on the development and implementation of Environmental Education at a global level to the Kenyan scenario then a summary of the literature will be provided and gaps identified.

2.2 Global Environmental Education

The question that comes forth is on whether the Environmental Education (EE) has been effective on a global basis. Harold and Trudi, (2011) note that there has been a lack of direction in EE over the past 15 years. To them the lack of emphasis upon objectives that focused on helping students actually solve environmental problems and develop problem-solving skills is contrary to the recommendations for EE objectives as contained in the 1977 Tbilisi report. The concern has been on instructional goals that have not incorporated the variables that relate to “ownership” and “empowerment”. This involves curricula goals that develop citizens who become environmentally knowledgeable and above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and maintaining a dynamic equilibrium between quality of life and quality of the environment.

UNESCO (2004) report emphasizes that a new ethic must be developed in which humankind lives in harmony with the natural world. The report recommends that formal education provides an obvious route through which this can be achieved. At the same time the report indicates that there have been several impressive efforts to promote environmental Education at primary, secondary, and tertiary levels in many countries. Further, Follow-up events to the
Stockholm Conference of 1972 such as the Belgrade Charter of 1975 and the Tbilisi Conference of 1977 states that the goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current environmental problems and the prevention of new ones. According to UNESCO-UNEP (1976) report the key word in this goal statement of EE is environment. Thus, the focus of the Belgrade and Tbilisi conference was more on the plight of the environment than on the plight of the people such as human rights, democracy, or standard of living. Further, Otieno (2010) argues that research works on EE across the globe have shown that most environmental education initiatives have a bias towards preserving the natural environment and reducing human impacts on it. Most of them have a weakness of having less focus to the quality of life in terms of society and economic well-being enhancement. Therefore, in order to protect the environment, it is important to acknowledge social, economic, political and development concerns. As such the plight of the people was addressed more in the 1992 with preparation for the Earth Summit. Agenda 21 which came out of the Rio de Janeiro, Brazil in 1992 and a follow-up conference 20 years later (Rio+20) in June 2012 the term Sustainable Development was coined (Chirau, 2012). Since different development activities rely on the environment and have ecological social and economic impacts which may be positive or negative, Sustainable Development requires striking a balance between development activities and their impact on the environment. It should be socially acceptable and be able to impact positively on the economy of the local community. Sustainable Development not only recognizes the overall importance of the environment, but it also recognizes the world’s perceived need for development (Ibid). As a
result, Agenda 21 presents a more balanced blend between sustainable human development and environmental protection.

Environmental Education should therefore address the three realms namely: environment, society, and economy. It should be implemented in a locally relevant and culturally appropriate fashion. However, the impact of environmental education programmes on young people will not be immediate because there is an inevitable time lag before the children, who are being educated, are in planning or decision-making roles. For this reason Environmental Education programs should involve practical activities that besides promoting knowledge retention it should help in redressing Environmental challenges. Owens (2000) on information-based approaches argues that without deliberate and participatory procedures information-based approaches can be flawed, and not achieve much. A growing body of opinion points instead towards the need for more deliberative and inclusionary procedures.

Other studies have shown that there are too few sound national strategies for EE. Marilyn (2010) emphasizes “learning as change,” rather than merely “learning about change” or “learning for change. He notes that, in many countries EE is a step – child of education or it receives only sporadic attention. Relatively few nations such as USA, Canada, Britain, China and India, have made a commitment to EE programs that involve students throughout their schooling and that utilize a carefully constructed, research-based scope and sequence. Where EE exists, students typically receive incidental exposure to environmental issues, with the emphasis on ecological foundations and/or awareness levels. Thus, there appear to be few concerned nationally focused efforts that prepare future citizens to make environmentally sound decisions or to participate responsibly in environmental care and maintenance. As a result, according to him only a fraction of learners are being exposed to logically developed, well-articulated EE programs.
Further an attempt to explain the gap between the possession of environmental knowledge and environmental awareness, and displaying pro-environmental behavior, Kollmuss and Agyeman (2010) assert that many studies have been undertaken, without any definitive explanation being found. According to them, the question of what shapes pro-environmental behavior is such a complex one that it cannot be visualized through one single framework. An analysis of factors that have some influence, positive or negative, on pro-environmental behavior shows that Environmental Education is influenced by demographic factors, external factors such as institutional, economic, social and cultural and internal factors such as motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, priorities and so on. To survey all these factors would be an enormous task and detract from the major thrust of this study since the focus in this study is school-based factors.

In a related study Owens (2000) argues that developing a model that tries to incorporate all factors might not be feasible, but can help illuminate this complex field of EE. A focus on institutional factors reveals several variables associated with responsible environmental behaviour. Harold and Trudi (2011) says that many studies have looked at only one variable at time, and numerous of these have been correlational studies that cannot claim “causal and effect” relationships.

A further concern according to UNESCO (2011) is that the single subject approach in some countries like Britain at secondary and tertiary levels inhibits the introduction of cross-curriculum teaching of the kind needed in environmental education.
2.2.1 Environmental Knowledge and Awareness Vis-À-Vis Behavior Change

In redressing environmental challenges the question that comes forth is on the extent to which knowledge and awareness of environmental issues promotes pro - environmental behavior amongst the students. Several systematic studies of the various school programmes have concluded that school-based interventions are effective means in behavior modification (Coyle, 2004). Education is therefore very important in addressing environmental challenges such as the climate change, biodiversity loss, environmental degradation and mitigation of their effects in both physical and human environment. Otieno (2010) note that education has the capacity to bring about changes in values and attitudes, skills, behavior and lifestyle among school going children so that a platform for championing environmental conservation and protection strategies is provided. Schools therefore play an important role in change and development. EE is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems making them act responsibly towards the environment. As noted by Shiundu and Omulando (1992) EE subsumes decision making and formulation of a code of behavior about issues concerning the environment. However the schools must address key areas of EE alongside underlying issues such as cultural dimensions, personal disposition and atmospheres within the school that come into play for any effective attitude change towards the environment. For example, Kollmuss and Agyeman (2010) say that, there is an agreement amongst researchers that only a small fraction of pro-environmental behavior can be directly linked to environmental knowledge and environmental awareness. In a related study Grob (1991) and Kaiser, Robert, Henry and Michael (1999), contend that, at least 80% of the motives for pro-environmental or non-environmental behavior seem to be situational factors and other internal factors. This argument is further strengthened by the study of Kempton, Boster and Hartley (1995). They
surveyed different groups in the US, ranging from strong environmentalists to those they thought were strong anti-environmentalists. They found that the average knowledge about environmental issues to be low where lack of knowledge was equally strong among environmentalists and non-environmentalists. The study therefore implies that environmental knowledge per se is not a prerequisite for pro-environmental behavior. However, people must have a basic knowledge about environmental issues in order to act pro-environmentally in a conscious way. The only variation is on the level of knowledge. Other studies have shown that very detailed technical knowledge does not seem to foster or increase pro-environmental behavior (Diekmann & Preisendoerfer, 1992; Fliegenschnee & Schelakovsky, 1998). Other incentives such as economic advantages and cultural values can motivate people to act pro-environmentally without doing it out of environmental concern.

2.2.2 Pedagogical Approaches to Environmental Education

Diclemente et al (1992) observes that knowledge alone is not enough to change behaviors, values and attitudes. Learning activities that are teacher - centered have proved to be ineffective and the focus should be on learner participation. Therefore approaches that rely mainly on conveying information about environmental precepts are bound to fail. Programmes that focus on helping teenagers to change behavior using role playing, games and exercises that strengthen social skills have shown signs of success (Aquilina, 2001). This means that approaches that the schools use in disseminating EE are crucial in determining pro - environmental behavior and actions. Further, Chawla (1999) defines Environmental awareness as 'knowing of the impact of human behavior on the environment'. She argues that Environmental awareness has both a cognitive, knowledge-based component and an affective, perception-based component. She notes that because of non-immediacy of many ecological
problems, pro – environmental behaviour can be inhibited. Hence, there may be lack of action on environmental problems by many people because most environmental degradations are not immediately tangible. Kollmuss and Agyeman (2010) posit that we cannot perceive nuclear radiation, the ozone hole, or the accumulation of greenhouse gases in the atmosphere. Even changes that would clearly be noticeable, for example the loss of species, often go unnoticed by the layperson. We can only experience the effects of pollution and destruction such as, smelling the rotten odor of a polluted water body, rotting garbage; poor refuse disposal and so forth. This implies a time lag where very often, we only perceive changes once the human impact has already caused severe damage such as in the case of poor farming methods. For this reason, Chawla (1999) argues that, information about environmental damage has to be translated into understandable, perceivable information (language, pictures, and graphs). Therefore, a vivid, provocative image can be found to explain a scientific concept that at the same time engages students emotionally for any effective Environmental Education.

According to Terrence, Kerry, Neville and Ron (2012) Environmental Education is best delivered through a wide range of teaching and learning activities, with utilization of all the key learning areas. Therefore, Students will develop strong environmental knowledge, awareness and capacity for positive environmental change when EE is contextualized in real examples, problem solving and with their active participation. In addition, according to Harold and Trudi (2011) most success stories in EE are issue – specific in nature. What this means is that successful EE that bring about pro – environmental behaviour revolve around educational efforts designed to help resolve specific issues. The knowledge and skills learned are focused on a particular issue such as endangered species, solid waste management, safe water supplies, forest conservation, and so on. The concern here however is on local
importance of these issues. Further, with a single-issue focus, there may exist little opportunity to generalize the knowledge and skills acquired to other issues unless they are closely related.

2.2.3 Curriculum Innovations and the Implementation Process

There is a general consensus globally, that education plays a key role in ensuring economic, social and political development (Nedim, 2003). However, disharmony exists in the conditions and needs at the societal, institutional and individual levels. Society changes over time, and will change in the future. Societal problems also take the form of these changes. Environmental issues such as climate change have both local and International dimensions. Education therefore is in the context of both the prevailing local conditions and their interrelatedness with the global situations, so that what happens in the local context has a bearing at a global level. This means that an action in a particular area must be in tandem with the global trend. As a result of this necessity, many innovations such as EE have taken place in education. They include changes in the structure of education systems, the curricula, teaching and learning process, and so on. Changes can be three pronged; internal and external change agents as well as personal beliefs. As Goodman (2001) argues, internal change agents work within school settings to initiate and promote change within an external framework of support and sponsorship; external change is mandated in top-down manner, as with the introduction of national curriculum guidelines by Kenya Institute of Curriculum Development (KICD) or new state testing regimes. Personal change refers to the personal beliefs and missions that individuals bring to the change process. However discrepancies exist on the adoption of the innovation such as Environmental Education.
Shiundu and Omulando (1992) observe that schools operate in a social, economic and cultural milieu. Thus what goes into the programmes is influenced by various forces and individuals in the society. In a related study, Geoffrey (1998) postulates that effective implementation of an innovation requires time, personal interaction and contacts, in-service training, availability of physical and material resources and other forms of people based support.

2.2.4 The School and the Implementation of Environmental Education

Fullan and Watson (2000) argue that individual understanding, commitment and ownership of any innovation or educational change are the critical point in change process; with Fullan (1993:13) saying that “each and every educator must strive to be an effective change agent”. So much more attention must be paid to individual participation and contribution to an educational change process, resource availability and so forth. Other studies have shown that programs proven to be effective have not been implemented in schools. Collins (2005) note that schools and in this case the teachers may be reluctant to implement complex and controversial issues resulting to difficulties in promoting and improving education to include literacy and lifelong learning for sustainable development.

Factors affecting implementation of a new curriculum include teachers’ level of training, their attitude and availability of resources (Kivuva, 2001). Further UNESCO (2006) on the implementation of 8-4-4 system of education also cites resources as a major inhibiting factor.

2.2.5 Teacher Factor in the Implementation of Environmental Education

Guang, Chi-Chung and Ngai-Ying (2010) argue that researches have shown that teachers’ work is strongly influenced by the way they see a new initiative. Hence, understanding teacher’s disposition, beliefs and knowledge about EE is important. In support of this
argument, research works investigating the characteristics of teachers and the factors in the school environment that affect whether programs addressing important issues are implemented have demonstrated that teachers' adoption and implementation of educational programs are strongly influenced by their attitudes, subjective social norms and teachers' general disposition (Nedim, 2003). Further, because of fragility of the physical environment and the effects of human decisions, there is need to interrogate EE programs on whether they are addressing commitment of integrating environmental concerns into the various activities in schools.

In this regard therefore, there was need to evaluate the interplay of the various variables in school on their place and function in the implementation of EE for pro – environmental behaviors.

2.3 Environmental Education in Kenya

The Government of Kenya's investment in education is guided by a broad philosophy encompassing many values including national unity, unity of purpose, social responsibility, moral and ethical values, lifelong learning, science and technology, equity, quality and environmental conservation (GoK, 2007). The Ministry of Education through learning institutions prepares Kenyans to serve and contribute to socio-economic development in diverse sectors. Over 40% of GDP is dedicated to educational activities. Besides the Ministry of Education (MoE), other ministries have dedicated financial allocations for training and awareness creation. "The government expects all education and training to empower people to conserve sustain and exploit the environment for sustainable development" (GoK, 2007:27).

The EE for Sustainable Development (SD) implementation strategy intends to influence education and awareness activities by diverse ministries, private and civil society institutions
to promote SD and attainment of Vision 2030. The Vision 2030 is the latest Government’s strategy aimed at transforming national development with key among the strategies being promotion of a just and cohesive society enjoying equitable social development in a clean and secure environment (GoK, 2007).

2.3.1 Implementation of Environmental Education in Kenya

As Otieno (2010) notes, Environmental education in Kenya today is carried out in two dimensions: one approach is geared towards teaching about nature and ecology, in subjects like biology, natural science and geography. This approach is used in the classroom situation where the teachers have to follow to a given curriculum. The second approach involves creating awareness, developing skills and active participation. This method is used in school to a small degree in the extra curriculum activities schools have clubs such as environment clubs, young farmers clubs, geography clubs and wildlife clubs, in which students’ members take part in various environment awareness and conservation activities. But their existence and operations is a matter of concern.

However, a number of methods and strategies for teaching EE have been developed by the KIE in conjunction with UNESCO. According to KIE (2002), KIE (2006) and Shiundu and Omulando (1992) these methods include;

*Inquiry method:* where learners assume an active role in the learning process and use their investigative skills under the guidance of the teacher. Conclusions of the findings are used in solving problems in the area of concern.

*Process method:* The method is similar to inquiry method but in this approach students are involved in the active search for potential solutions to problems in the interaction between
man and his environment. The focus in this method is on the process of scientific inquiry, with less emphasis on the content of the discipline under study.

*Conceptual method*: where a teacher uses the method to develop EE around broad concepts in a multi-field approach such as energy conservation, water, human population and food production.

*Relevance Method*: This involves the use of questions of social relevance and utility to organize teaching programmes in a subject such as geography, biology, chemistry and so forth. Environmental issues include; management and conservation of the environment, the role of science and technology, and the sites of industries.

*Value clarification*: This method works well in areas such as population education in Geography where the idea is to persuade people to adopt measures which often counter their moral beliefs and values. This helps in clarifying value issues related to the population problem.

### 2.3.2 An Evaluation of Kenya’s Environmental Education

An assessment of the progress made by Kenya in implementing the Earth Summit, Agenda 21 objectives and principles of Education for Sustainable Development (ESD) shows EE in Kenya has not adequately addressed threats to the environment—as demonstrated by the State of Environment Report for 2003 (Otieno, 2010). According to her this has been partly due to the lack of a comprehensive strategy. EE in Kenya has not focused much on inter-linkages between the environment and Sustainable Development (SD). Besides, the environment has been looked at in great detail from the biophysical view but with less emphasis on economic and social perspectives. There has been little emphasis on social, critical, reflexive and participatory approaches to EE. ESD therefore, provides Kenya an opportunity and a
framework within which an array of local innovations can be developed based on varied needs and priorities, as reflected in the millennium development goals and the NEPAD (New Partnership for Africa’s Development) plan of action. Kenya’s position is to domesticate and contextualize ESD towards an educational policy reform and practice. The strategy has drawn upon existing educational initiatives in the Kenyan education system such as the Eco-schools environmental action learning approaches. The scope, framework, principles, objectives and goals of ESD strategy are aimed at building the capacity of Kenyans to achieve SD as well as a better quality of life.

In addition, although environmental education integrated syllabus has been there in Kenya for a while the program has not been effective as hoped for. Recent studies have revealed that learners have attained skills in literacy, numeracy and communication which represent the cognitive domain of learning and not attained skills in areas such as creativity, social responsibility and so on UNESCO (2011). Further, with regard to aspects that relate to innovations and application of knowledge the curriculum is visibly deficient as the majority of its products do not exhibit those attributes after school (Ibid). This explains the lack of appreciation and respect for the protection of the environment by many graduates of the education system.

Otieno (2010) posits that experts have raised concerns over the secondary school curriculum, saying it could be defective. A draft report by the Ministry of Education (MoE) argues that the curriculum, has not fully achieved the objectives of secondary education. It is possible students are only taught to pass examination at the expense of their holistic educational development. The curriculum, in its current form, has also failed to adequately capture learner-related peculiarities such as aptitude, interests and regional diversities. It emerged
there are two sets of syllabus sent to schools; one from the Kenya Institute of Curriculum Development (KICD) and the other from the Kenya National Examinations Council (KNEC). According to the report, Summative Evaluation of the Secondary School Education Curriculum, the use of KICD and KNEC syllabuses negatively affect curriculum implementation. The report reveals the parallel syllabus developed by KNEC appears to be more attractive to teachers than that of KICD. Teachers, the report says, defend the use of the KNEC syllabus saying it helps them identify weak learners for remedial teaching. It has been a common practice that teachers only concentrate on aspects that are to be examined and skip the core values. The result is that students graduate with lack of practical skills and desired attitudes and values due to over concentration on theoretical skills. He says the buck stops with the teachers, who fail to utilise the allocated time to implement the entire curriculum.

At stake is the Environmental Education. If the examinations do not focus on environmental issues then EE will receive a peripheral consideration. Further, the report shows that the current secondary curriculum does not adequately equip learners with competencies to meet Kenya’s aspirations. Key among these aspirations is a right to a clean and healthy environment as enshrined in article 42 of the new constitution.

2.4 Summary and Gaps Identification

The following issues are identified that against the reality of a rapid environmental degradation occasioned by man’s interaction with his biophysical surroundings, more efforts are aimed at averting this crisis through increased awareness on the issues and promoting pro-environmental behaviors through education. Several questions emerge on the effectiveness of these interventional measures such as whether knowledge and facts about the environmental issues are able to promote young environmentalists. With the dynamic nature
of the society, there are questions however on the approaches used whether they are recognizing this fact and varied to be in tandem with the changing nature of the society. As noted earlier, the majority of approaches to EE assume a linear model where environmental knowledge and awareness presupposes an action.

As Aquilina (2001) observes, most environmental problems are intricate and immensely complex. Yet we are often unable to comprehend such complex systems and tend to simplify them and think linearly. This prevents us from a deeper understanding of the consequences of natural destruction. It might also lead to underestimating the extent of the problem. Overall, the limitation to understanding environmental degradation compromises the willingness to act and the approaches used to redress environmental destruction. Therefore the complex nature of the environment as well as the society, demands that the processes of interventions be interrogated.

Other Questions are on whether EE programs in schools are making students aware of the consequences of their actions on the environment. Does this education on environment include lessons that enable students to assess their own actions in and out of school and how they impact on the environment? Sufficient instructional efforts should be committed to activities that make students have a sense of personal responsibility to environmental degradation. As Kollmuss and Agyeman (2010) note, the impact of environmental education programmes for young people will not be immediate because there is an inevitable time lag before the students are in planning or decision-making roles. Thus, a question is raised on whether the knowledge gained is transferable in the future and how the students are engaged in decision making at school level on matters that relate to the environment.
Further, there is the question on whether the students own up this knowledge or are they perceiving Environmental degradation as a problem of other people or caused by other people such as industrialists, farmers, motorists and so on. As Harold and Trudi (2011) have argued, there exist too few EE programs which incorporate serious attempts to develop ownership and empowerment in learners. They further contend that there is general consensus amongst environmental educators that the aim of EE is to produce individuals who will willingly and responsibly participate in environmental maintenance and remediation. EE must therefore go beyond the typical educational practice of knowledge and awareness to that of ownership and empowerment. Also, because of the lengthy latency period associated with environmental degradation with its effects not immediately tangible there may be lack of action on environmental problems by many graduates of the school system. Students may have encountered few if any environmental problems. As a result many students may improperly assume that environmental issues are "somebody else's" problems. This therefore explains the need to evaluate the pedagogical approaches that these interventions take.

Thus an important focus of this study was on the entire implementation process, including the instructional approaches to EE, environment in which the intervention takes place, as well as the impact and the challenges to the intervention in their facilitating and limiting roles that they play. The researcher identified these as very important gaps that needed to be addressed in the research findings.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the description of the procedures and strategies that were used in the study. The section focuses on research design, locale of study, sample and sampling procedures, data collection techniques, research instruments, piloting of research instruments and data analysis.

3.2 Research Design

Kerlinger (1973) defines research design as a plan, structure and strategy of investigating and seeking to obtain answers to various research questions. It is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Orodho, 2010). Further, Kothari (2004) defines research design as an advance plan of the methods to be adopted for data collection and the analytical plan for the collected data.

The study employed descriptive design since the study sought to identify the state of affairs in regard to the implementation of environmental education in secondary school education in Molo District, Nakuru County. The descriptive design was appropriate for this study because as Borg and Gall (1989) note, descriptive survey is intended to produce statistical information about aspects of the population that are of interest to the policy makers without manipulating any variable. The study therefore, aimed at collecting information from the respondents on their attitudes, opinions and habits in relation to the implementation of environmental
education in secondary schools without manipulating any variable. The data was obtained using questionnaires for teachers and students, and interview schedule for head teachers.

3.3 Locale of the study

![Figure 3: A sketch Map for Molo](image)

The study was carried out in Molo District, Nakuru County. Molo town is approximately 50 kilometers from Nakuru town and 4 kilometers from Nakuru – Eldoret Highway. The area is a highland with a cool and wet climate. The main economic activities are farming and forestry. The District covers part of the Mau Ranges on the western border of the Great Rift Valley.

Wamahiu and Karugu (1995) and Singleton (1993) say that a study locale should be one that the researcher is familiar with in order to gain acceptance from the respondents. It should be accessible to the researcher and one that permits instant rapport with the informants. The choice of the area as a research site therefore was because of the researcher familiarity with the area. The area is also accessible to the researcher and to the best of the researcher’s knowledge no such study has been carried out in the District. Further, the prevalence of environmental degradation as witnessed by the drying up of rivers, and water sheds, destruction of forests and so on, with the controversial Mau complex lying in the District
necessitates the need for such a study and perhaps raise the prospects of redressing this environmental degradation through improvement of knowledge-based interventions.

3.4 Target Population

Orodho (2010) posits that all the items or people under consideration in any field of inquiry constitute a universe or targeted population, only a few items from the target population in universe are selected for study. Borg and Gall (1989) defines target population as members of real or hypothetical set of people, events or objects, to which the researcher wishes to generalize the results of the research. Thus, the population of the study was 29 public schools in the District. According to Molo District Education Office, the District comprises of 219 teachers with an enrolment of 7776 students in public secondary schools. The respondents included head teachers, teachers and students.

3.5 Sample and Sampling Techniques

The study employed a purposive sampling technique on the criterion of boarding or day status and the type as Boys, Girls and mixed to select respondents from a total of 15 schools. According to Mugenda and Mugenda (2003) a purposive sampling technique allows the researcher to use cases that have the required information with respect to the objectives of the study. Thus, the purposive sampling design helped in identifying the informants who provided the required information in this study on institutional factors affecting the implementation of Environmental Education in secondary schools in Molo District – Nakuru County. From the sampled schools, 40 students in each school were randomly selected, giving a total of 600 students. From each school 5 teachers were selected making a total of 45 teachers and 15 head teachers and this gave a total sample size of 660 respondents.
The sampled schools constituted 52% of the target population. According to Gay (1992) the minimum sample size should be 10% where the population is large and 20% if the population is small. However, since Molo District constitute of only 29 public schools, a higher percentage of 52% was considered appropriate.

Table 3:1 Sample Size of the Study

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Population</th>
<th>Sample</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>7776</td>
<td>600</td>
<td>8</td>
</tr>
<tr>
<td>Teachers</td>
<td>219</td>
<td>45</td>
<td>21</td>
</tr>
<tr>
<td>Head Teachers</td>
<td>29</td>
<td>15</td>
<td>52</td>
</tr>
</tbody>
</table>

3.6 Research Instruments

Orodho (2010) asserts that in Education and social science research, the most commonly used instruments are questionnaires, interview schedules and observation forms. Thus in this study, Data collection instruments included questionnaires for students and teachers, and interview schedules with head teachers.

3.6.1 Principals Interview Schedules

In order to get a detailed understanding of the factors influencing the implementation of Environmental Education, the researcher used interview schedules for the Schools' principals. Interview schedules assisted in gathering data on the contribution of the school heads to the Environmental Education. Head teachers play an important role in the curriculum implementation process and can either inhibit or facilitate the success of the implementation. The head of a school allocate resources, supervises and coordinates learning. Thus, information on resource allocation, strategies and policies existing in schools that relate to the implementation of Environmental Education were gathered from the head teachers including
the challenges faced in the implementation of Environmental Education. This also helped to
gauge their opinion about the effectiveness of EE and how it delivers on the envisaged
objectives.

3.6.2 Teachers Questionnaires
According to Gay (1992) questionnaires are important research instruments since they give
respondents the freedom to express their views and opinions as well as allowing them to make
suggestions. Thus, teachers’ questionnaires were used to collect information on the
approaches employed in the EE, challenges faced in the teaching of EE as well as the
effectiveness of these techniques in raising awareness of environmental issues for pro-
environmental behavior. They were useful in gathering information on the levels of
interaction between teachers and the students and the difficult areas of communication in
Environmental Education.

The questionnaires in this study had both closed – ended and open – ended questions.
Mugenda and Mugenda (1992) contend that closed – ended questions are easier to analyze
since they are in an immediate usable form, whereas open – ended questions allow a greater
depth of response.

3.6.3 Students Questionnaires
Students’ questionnaires were useful in assessing the learner’s level of understanding of
environmental issues, how they participate in redressing environmental degradation at school
level and their perception of the implementation process. The questionnaires helped in
gathering information on the levels of students’ interaction with the various EE programmes
and the existing EE programmes in school. The instrument also helped to gather data on the
students’ opinion about EE in school and how it helps in empowering them to address environmental challenges in the future. As suggested by Kothari (2004) the questionnaires proceeded in a logical sequence from easy to complex ones.

3.7 Piloting of Research instruments

To test the reliability and validity of the items in the research instruments, the instruments were pre-tested in three of the schools that were not involved in the main study. In order to have meaningful observations during data collection, selected sample for pre-testing the questionnaires should be identical from those that were used during the actual study (Orodho, 2010). Therefore, the procedures followed during the pre-testing of the research instruments were the same as those that were used in the main study.

3.7.1 Validity of instruments

The selection of a research instrument is determined by the objective to be evaluated (Stokking, Van Aert, Meijiberg & Kaskens, 1995). So the question arises as to whether the instrument is measuring what it was supposed to measure (Orodho, 2010). Thus, to determine this, the researcher sought for Expert judgment from a panel of three judges competent in the area under investigation who were requested to assess the relevance of the content used in the questionnaire developed. Further, recommendations of the supervisors and discussion with colleagues were used in appraising the suitability of the items in gathering data according to the research objectives.

3.7.2 Reliability of instruments

Reliability refers to the extent to which a repeated measurement in respect of the same respondent produces the same result (Stokking, Van Aert, Meijiberg & Kaskens, 1995).
Further, Mugenda and Mugenda (2003) describe reliability as a measure of the degree to which a research instrument yields consistent results after repeated trials. For this reason, this study employed test – retest technique in order to determine the reliability of the research instruments. The instruments were tested in three schools and then re – tested after two weeks with the same group of respondents. The Pearson’s product moment formula for the test – retest was employed to compute correlation coefficient. This was in order to establish the extent to which the contents of the questionnaires are consistent in eliciting the same response every time the instrument is administered (Orodho, 2010). Twelve responses from each of the 5 teachers and 5 students were used as raw data points to calculate the correlation coefficient between the corresponding data points for the two times the instruments were administered. The Pearson product – moment correlation coefficient formula given below was used to calculate the correlation coefficient in which: $x_i$ values were the data points consisting of the respondents of corresponding questions for the first trial and $y_i$ value are the data points obtained in the second trial

$$r_{xy} = \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{\left\{ n \sum x_i^2 - (\sum x_i)^2 \right\} \left\{ n \sum y_i^2 - (\sum y_i)^2 \right\} }}$$

Correlation coefficients of 0.8027 for teachers questionnaires and 0.7993 for those of the students were obtained and since they were greater than 0.7, it was considered that these levels were high enough to conclude that the questionnaires were reliable for the study. The working is as shown below.
3.7.2.1  **Reliability of Teachers Questionnaires**

The researcher used twelve items from Environmental Education teachers’ questionnaires that were used in the pilot study to calculate the $r_{xy}$ value.

<table>
<thead>
<tr>
<th>$x_i$</th>
<th>$y_i$</th>
<th>$x_i y_i$</th>
<th>$x_i^2$</th>
<th>$y_i^2$</th>
</tr>
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<tbody>
<tr>
<td>4</td>
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<td>20</td>
<td>16</td>
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<td>4</td>
<td>3</td>
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<td>16</td>
<td>9</td>
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<tr>
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<td>4</td>
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<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

$\sum x_i = 51$  $\sum y_i = 52$  $\sum x_i y_i = 231$  $\sum x_i^2 = 229$  $\sum y_i^2 = 238$

$$r_{xy} = \frac{n \sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{\left[n \sum x_i^2 - (\sum x_i)^2\right] \cdot \left[n \sum y_i^2 - (\sum y_i)^2\right]}}$$

$$r_{xy} = \frac{(12 \times 231) - (51 \times 52)}{\sqrt{\left[12 \times 229 - (51)^2\right] \cdot \left[12 \times 238 - (52)^2\right]}}$$

$$= \frac{2772 - 2652}{\sqrt{(2748 - 2601)(2856 - 2704)}}$$

$$= \frac{120}{120} = \frac{120}{147 \times 152} = \frac{120}{\sqrt{22344}} = 149.5$$

$+0.8027$
Reliability of Students Questionnaires

Twelve items from the students' questionnaires used in the pilot study were used to calculate the $r_{xy}$ value. The working is as shown below:

<table>
<thead>
<tr>
<th>$x_i$</th>
<th>$y_i$</th>
<th>$x_i y_i$</th>
<th>$x_i^2$</th>
<th>$y_i^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>25</td>
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<td>5</td>
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<td>25</td>
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<tr>
<td>3</td>
<td>4</td>
<td>12</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>25</td>
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<tr>
<td>5</td>
<td>4</td>
<td>20</td>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>12</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>12</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>25</td>
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<td>25</td>
<td>25</td>
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<tr>
<td>5</td>
<td>5</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>$\sum x_i = 49$</td>
<td>$\sum y_i = 48$</td>
<td>$\sum x_i y_i = 212$</td>
<td>$\sum x_i^2 = 216$</td>
<td>$\sum y_i^2 = 218$</td>
</tr>
</tbody>
</table>

$$r_{xy} = \frac{n\sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{n\sum x_i^2 - (\sum x_i)^2} \sqrt{n\sum y_i^2 - (\sum y_i)^2}}$$

$$r_{xy} = \frac{12 \times 212 - 49 \times 48}{\sqrt{12 \times 216 - (49)^2} \sqrt{12 \times 218 - (48)^2}}$$

$$= \frac{2544 - 2352}{\sqrt{2592 - 2401} \sqrt{2606 - 2304}}$$

$$= \frac{192}{57682} = \frac{192}{240.2}$$

$$= +0.7993$$

39
3.8 Data Collection Procedure

The researcher first got a letter of authorization from Kenyatta University in order to get a research permit from the National Council for Science and Technology. The pre-tested research instruments were administered by the researcher in the sampled schools where teachers and students were accessed through the head teachers in their stations. The researcher personally conducted the interviews with the schools heads.

3.9 Data analysis and Presentation

The collected data was edited, coded and entered in the computer for analysis. The result of analysis was presented in the form of frequency distribution tables, graphs and charts. Computation of various percentages, coefficient of correlation using Pearson’s product moment formula was also made and tabulated. The researcher used both quantitative and qualitative data analysis techniques. Quantitative data was analyzed using descriptive statistics using the Statistical Package for Social Sciences (SPSS). Qualitative data was analyzed thematically, that is, organizing it according to the main themes, objectives and research questions with interview schedules reported in quotes and narratives. Statistical inferences based on the main theme and objectives were made with conclusions and recommendations drawn from the research findings.

3.10 Logistical and ethical Considerations

Orodho (2009) underscores the importance of logistical and ethical issues that each researcher needs to be aware of before undertaking a research project and proceeding to the field. This is especially so in the new political dispensation where the rights of people are well defined in the new constitution. Thus, before embarking on the study, the researcher sought permission from the relevant authorities to seek their approval and co-operation. The respondents were
informed and assured of confidentiality. In order for the respondents to remain anonymous they were not required to write their names on the questionnaires and were informed of the same prior to filling-in the questionnaires. At all times no respondent gave information under any duress. The researcher adhered to strict discipline and punctuality during visits to the field.
CHAPTER FOUR

PRESENTATION OF RESULTS, AND DISCUSSIONS

4.1 Introduction

The chapter contains the findings presentation, interpretation and discussions of the analyzed data by objectives. The data will be discussed alongside the literature and organized according to the objectives which will form the main themes. The main objectives that guided the study were;

i) To find out the status of physical resources in the teaching of environmental education.

ii) To determine teachers’ levels of training and preparedness in handling environmental education curriculum.

iii) To identify approaches used in the teaching of environmental education.

iv) To determine opportunities in schools for the teaching of environmental education.

v) To determine the difficult areas of communication in the environmental education

4.2 General and Demographic information

4.2.1 General Information

The study had a sample size of 660 consisting of 600 students, 45 teachers and 15 headteachers out of which 474 students, 30 teachers and 7 headteachers filled and returned the questionnaires as required. Thus the study had a 77% response rate.

4.2.2 Demographic Data

The respondents were drawn from schools in Molo District and distributed as shown in table 4.1. More than three quarters of the students were from mixed schools and rural schools in
the district. Students in urban schools may experience different environmental issues from those in rural schools. However, the EE concepts and factors affecting its implementation are similar.

Table 4.1 Type and location of the participating Schools

<table>
<thead>
<tr>
<th>Schools</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>403</td>
<td>85.0</td>
</tr>
<tr>
<td>Boys</td>
<td>25</td>
<td>5.3</td>
</tr>
<tr>
<td>Girls</td>
<td>46</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>School Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>51</td>
<td>10.8</td>
</tr>
<tr>
<td>Rural</td>
<td>423</td>
<td>89.2</td>
</tr>
</tbody>
</table>

Source: Students Questionnaires

The gender of the students was distributed as shown in figure 4.1 where majority of the respondent were females. While gender presentation was in favor of the female students the study did not categorize the responses on environmental education as per the gender of the respondents. However, the findings in this study may to the extent of this disparity of gender distribution, represent the views of female students.

Figure 4.1 Gender Distribution of the Students
The students participating in the study were those in Form 3, and 4. As shown in figure 4.2, three quarters of the students were in Form four while the rest were in Form three. Students in these two classes were ideal since they have spent a considerable time in their respective schools and could adequately report on the EE.

![Figure 4.2 Students' Educational Level](image)

**Figure 4.2 Students' Educational Level**

### 4.3 Current Status of Physical resources used in teaching Environmental Education

The first task of this study was to establish the current status of physical resources in the teaching of environmental education. Availability of relevant resources is important in the implementation of environmental education.

#### 4.3.1 Resources Used to Teach Environmental Education

To establish the availability of resources, students were required to indicate resources used by teachers when teaching environmental education. As shown in table 4.2, majority of the students indicated text books as one of the resources that are commonly used in teaching environmental issues. Charts and diagrams, pictures/photos were also frequently used as indicated by more than three quarters of the students. The least used resources were internet and slide-shows as shown by less than a quarter of the respondents in each.
### Table 4.2 Resources Used to Teach Environmental Education

<table>
<thead>
<tr>
<th>The Resources Used in Environmental Education</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>Text book</td>
<td>431</td>
<td>90.9</td>
</tr>
<tr>
<td>Internet</td>
<td>107</td>
<td>22.6</td>
</tr>
<tr>
<td>Videos/DVDs/CD shows</td>
<td>207</td>
<td>43.7</td>
</tr>
<tr>
<td>Slide shows</td>
<td>117</td>
<td>24.7</td>
</tr>
<tr>
<td>Charts and Diagram</td>
<td>419</td>
<td>88.4</td>
</tr>
<tr>
<td>Pictures/photos</td>
<td>397</td>
<td>83.8</td>
</tr>
<tr>
<td>Newspaper/magazine</td>
<td>294</td>
<td>62.0</td>
</tr>
<tr>
<td>Eco school activities</td>
<td>262</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Resources are an important factor in the implementation of an innovation such as EE and this finds agreement with UNESCO (2006) where in the implementation of 8-4-4 system of education resources were cited as a major inhibiting factor. Further, a study by Geoffrey (1998) notes that availability of material and physical resources and other forms of people based support enhances learning. Therefore teaching and learning resources are an important component in an effective implementation of EE. However, these findings reveal that resources used in delivering EE are biased towards the teacher-centered approach of teaching. This approach according to Diclemente (1992) has proved to be ineffective and the focus should be on learner participation. More use of technology based resources such as internet would provide interactive means of learning.
4.4 Teachers' levels of training and preparedness in handling Environmental curriculum

The second task of this study was to determine teachers' levels of training and preparedness in handling environmental education curriculum. This was established by assessing their training, experience, methods of teaching and attitude in respect to Environmental Education. This was important because as noted by Kivuva (2001) and Geoffrey (1998) factors affecting implementation of a new curriculum include teachers' levels of training in the particular curriculum area.

4.4.1 Training and Experience

The participating teachers were requested to indicate their academic qualification. As shown in figure 4:3 about three quarters of the teachers had a graduate level of education while less than a quarter were diploma holders with just a handful having attained a Masters Level.

![Teachers' Academic Qualification](image)

Figure 4:3 Teachers' Academic Qualifications

Apart from academic qualifications, teachers were also required to indicate whether they were trained teachers or not. As shown in figure 4.4 majority of the teachers were trained teachers with only a few indicating that they were not trained.
Further, the teachers were required to indicate whether they had received special training in Environmental Education. More than three quarter of the teachers indicated that they have not received any special training in environmental education.

In total teachers handling environmental education have adequate academic qualification, are trained as teachers but are not adequately trained in special environmental education. This therefore means that an effective implementation of Environmental Education may not be
realized. The argument is supported by Kivuva (2001) who notes that factors affecting effective implementation of a new curriculum include teacher’s level of training in the area. Also Geoffrey (1998) shows that regular in-service training is important in empowering teachers to be effective. He postulates that for effective implementation of an innovation in-service training is an important ingredient in enhancing teachers’ capacity to effect any change in the behaviours of learners towards a desired goal.

4.4.2 Teachers’ knowledge on the Environmental Education Concepts

Apart from academic qualification and training the study sought to establish the teachers’ knowledge on various environmental education concepts. The participating teachers were required to indicate whether their knowledge is adequate, inadequate or none. An examination of table 4:3 shows that none of the teachers indicated they had completely no knowledge in any of the concepts. Instead over half of them had adequate knowledge in all the concepts. However a high number of teachers (86.7%) had adequate knowledge in atmospheric pollution and greenhouse effect while 80% had adequate knowledge in water pollution and environmental management and conservation.
Table 4.3 Teachers Knowledge in Environmental Concepts

<table>
<thead>
<tr>
<th>Environmental Education Concepts</th>
<th>Inadequate</th>
<th></th>
<th>Adequate</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>Environment and Sustainable Development</td>
<td>14</td>
<td>46.7</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Atmospheric Pollution</td>
<td>4</td>
<td>13.3</td>
<td>26</td>
<td>86.7</td>
</tr>
<tr>
<td>Green House Effect</td>
<td>4</td>
<td>13.3</td>
<td>26</td>
<td>86.7</td>
</tr>
<tr>
<td>Climate change</td>
<td>10</td>
<td>33.3</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Acid Rain</td>
<td>8</td>
<td>26.7</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Ozone layer depletion</td>
<td>12</td>
<td>40.0</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Water pollution</td>
<td>6</td>
<td>20.0</td>
<td>24</td>
<td>80.0</td>
</tr>
<tr>
<td>Global warming</td>
<td>2</td>
<td>6.7</td>
<td>28</td>
<td>93.3</td>
</tr>
<tr>
<td>Environmental Hazards e.g. floods</td>
<td>12</td>
<td>40.0</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Land Pollution</td>
<td>10</td>
<td>33.3</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Ecological balance</td>
<td>14</td>
<td>46.7</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Human Wildlife conflict</td>
<td>12</td>
<td>40.0</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Environment management and Conservation</td>
<td>6</td>
<td>20.0</td>
<td>24</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Given the teachers self-reporting on the knowledge in environmental education it follows that schools participating in the study had adequate knowledgeable human resource in respect to environmental education. However, an examination of Table 4.5 reveals that the least taught concept was Green house effect and ecological balance both at slightly below three quarters. This notwithstanding the fact that Green house effect is a concept that the teachers have an adequate knowledge at 80% and being second after atmospheric pollution. These findings seems to have an agreement with Kollmus and Agyeman (2010), Grob (1991) and Kempton, Boster and Hartley (1995) that environmental knowledge alone is not a prerequisite for pro-environmental behaviour. However, one must have environmental knowledge for competency in handling EE.
4.4.3 Teachers Motivation to teach Environmental Education

Teachers' attitude towards Environmental Education is important for implementation of EE. Thus, the study sought to establish the motivation behind the teaching of environmental education. As shown in figure 4.6, a majority of the teachers are motivated by the fact that Environmental education is tested in KCSE, its curricular requirements and to cover the syllabus. Very few teachers (at 17.6%) are motivated by need to change students' behavior in relation to the environment as well as concern for the environment.

![Figure 4.6 Teachers' Motivation to Teach Environmental Education](image)

Figure 4.6 Teachers' Motivation to Teach Environmental Education

It follows therefore that teachers are motivated more by educational demands than concern for environment or change the students' behavior to act in a way that is environmentally friendly. The findings seem to find support from Otieno (2010) who posits that students are only taught to pass examinations at the expense of other curricular objectives. Further, the findings confirms the argument by Ministry of Education (MoE) that students are only taught to pass examination and that teachers only concentrate on aspects that are to be examined and skip the core values. Also the findings concur with Nedim (2003) argument that environmental
knowledge *per se* is not a prerequisite for pro-environmental behavior. Instead teachers’ adoption and implementation of educational programs are strongly influenced by their attitudes, subjective social norms and teachers’ general disposition.

### 4.4.4 Teachers’ Perception on Environmental Education implementation in Schools

Teachers were asked to indicate their level of agreement or otherwise to a number of indicators in respect to EE implementation. While slightly less than half of the teachers (at 46.7%) strongly believe that schools are supportive of EE, only a third of them (33.3%) strongly agree that schools have enough resources to teach EE. On competence, more than a quarter (26.7%) strongly agrees that they are well prepared to handle EE while six out of ten teachers (at 60%) agree on the same. On coverage of EE content only a small number (6.7%) strongly agree that there is enough time to cover EE content while a nearly half of them (46.7%) agree on the same.

<table>
<thead>
<tr>
<th>Table 4:4 Teachers’ Perception on Environmental Education implementation in Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers Perception on Environmental Education Implementation in Schools</td>
</tr>
<tr>
<td><strong>Strongly Disagree</strong></td>
</tr>
<tr>
<td><strong>%</strong></td>
</tr>
<tr>
<td>Schools have enough resources e.g. textbook</td>
</tr>
<tr>
<td>I am well prepared to handle EE</td>
</tr>
<tr>
<td>Effective in changing students’ behavior</td>
</tr>
<tr>
<td>School is supportive of EE</td>
</tr>
<tr>
<td>Colleague supportive of EE</td>
</tr>
<tr>
<td>Student taught EE in all relevant subjects</td>
</tr>
<tr>
<td>Enough time to cover EE content</td>
</tr>
</tbody>
</table>
Overall, teachers' perception on EE implementation indicates that schools are supportive of EE but lack adequate resources. These findings are supported by UNESCO (2006) which notes that relevant resources are an important component of curriculum implementation. However, with the below average of response strongly agreeing with the various promptings, it is clear that EE receives little attention. This argument is supported by Marylin (2010) who argues that, in many countries EE is a step – child of education or it receives only sporadic attention and that students typically receive incidental exposure to environmental issues. However, although there is shortage of resources and time is not enough to cover the EE content, teachers still perceive EE as being effective in changing students’ behavior.

4.5 Effectiveness of approaches used in the teaching of Environmental Education

The third task of the study was to assess the effectiveness of the approaches used in delivering Environmental Education. First by identifying various sources of environmental information to students, the subjects that offer EE to students, the environmental concepts taught in school, the environmental programs existing in schools and the methods of delivering EE in these schools. To find out the effectiveness of these approaches used, students’ perception on the implementation of EE was also assessed, effects of resources used, the school environment, and concepts taught in EE.

4.5.1 The Source of Environmental information to the Students

By establishing the source of enviromental information the study intended to compare such sources with what is used in schools. To establish the most important source of enviroment related information to the students, the participant were required to indicate where they first heard about enviromental issues as shown in figure 4.7.
From the figure nearly half of the students (at 47%) heard of environmental issues for the first time from TV/Radio/Newspaper. Teachers were the second most important source of environmental information at 36% while parents and the internet were the least important source of environmental information. Further, the students were also asked to indicate which among these sources presented the information in the most interesting way. An examination of figure 4.8 reveals that the media (TV, radio, newspaper) was indicated to be the most interesting by over half of the respondents at 54%, while teachers were the second most interesting source as indicated by nearly a third of the students.
The findings reveal that students enjoy EE when delivered through images and photographs as opposed to information dissemination in the traditional class setting. This corresponds with earlier findings by Chawla (1999) who argues that information about environmental has to be translated into understandable, perceivable information (language, pictures, and graphs). Further the author observes that a vivid, provocative image can be found to explain a scientific concept that at the same time engages students emotionally for any effective Environmental Education.

**4.5.2 Subjects offering Environmental Education**

The study sought to understand which subjects offer environmental education in schools. Geography, Agriculture, Biology were indicated as the subjects that mostly offer EE as shown in figure 4:9.

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*Figure 4:8 The most interesting source of environmental information*
Further, the study sought to establish the subject that offered EE in the most interesting way as shown in figure 4.10.

Figure 4:10 The most interesting subjects in environmental issues
As shown in figure 4.10, Geography was the most interesting subject in environmental issues as indicated by about half of the students. It therefore follows that those students who take these subjects have better chance of learning environmental issues than those who do not. Further, those who take Geography find EE more interesting and are more likely to change their behavior towards the environment.

4.5.3 The Environmental Concept Taught in Schools

Having established the subjects that offer environmental education, the study sought to identify the environmental concepts taught to students. As shown in table 4:5 students were required to indicate whether they have been taught a variety of environmental concepts or not. About three quarter of the students indicated that they have been taught all the environmental concepts under consideration. However, the most taught concept was Soil erosion with majority of the students indicating they have been taught the concept. The least taught was Green house effect and ecological balance. It follows therefore that environmental concepts are well covered providing students with a theoretical background of environmental issues. However the contemporary environmental challenges such as Green house effect seems to have less attention by being the least taught.
Table 4:5 Environmental Concept Taught in Schools
The Environmental Concept Taught to Students

<table>
<thead>
<tr>
<th>Environmental Concept</th>
<th>YES Count</th>
<th>YES %</th>
<th>NO Count</th>
<th>NO %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Erosion</td>
<td>469</td>
<td>98.9</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>Pollution of land, Water &amp; Air</td>
<td>431</td>
<td>90.9</td>
<td>43</td>
<td>9.1</td>
</tr>
<tr>
<td>Green House Effect</td>
<td>346</td>
<td>73.0</td>
<td>128</td>
<td>27.0</td>
</tr>
<tr>
<td>Climate change</td>
<td>431</td>
<td>90.9</td>
<td>43</td>
<td>9.1</td>
</tr>
<tr>
<td>Ozone layer depletion</td>
<td>376</td>
<td>79.3</td>
<td>98</td>
<td>20.7</td>
</tr>
<tr>
<td>Acid Rain</td>
<td>386</td>
<td>83.5</td>
<td>78</td>
<td>16.5</td>
</tr>
<tr>
<td>Environmental Hazards e.g. floods</td>
<td>408</td>
<td>86.1</td>
<td>66</td>
<td>13.9</td>
</tr>
<tr>
<td>Global warming</td>
<td>386</td>
<td>81.4</td>
<td>88</td>
<td>18.6</td>
</tr>
<tr>
<td>Ecological balance</td>
<td>351</td>
<td>74.1</td>
<td>123</td>
<td>25.9</td>
</tr>
<tr>
<td>Environment management and Conservation</td>
<td>396</td>
<td>83.5</td>
<td>78</td>
<td>16.5</td>
</tr>
<tr>
<td>Human Wildlife conflict</td>
<td>353</td>
<td>74.5</td>
<td>121</td>
<td>25.5</td>
</tr>
</tbody>
</table>

4.5.4 Methods used to teach Environmental Education

After establishing environmental concepts taught in schools, the study sought to understand how teachers deliver this content. The participating teachers were required to indicate the extent to which they used various methods in teaching environmental education. The teachers were to indicate whether they use a given method whether; not at all, to a small extent, to a reasonable extent or to a large extent.

In as far as environmental education is concerned; an examination of Table 4.6 reveals that the most popular method of instilling behavior change was talking to students about how they can contribute to a cleaner environment which was being used by more than three quarters of the teachers. This means that three in every four teachers use this teacher- centered method to teach EE. Discussion of topical events concerning the environment and getting students to
work in groups on environmental issues was being used by slightly less than three quarters of the teachers interviewed. Commenting if students behave in a way that is environmentally unfriendly was also a popular method used to instill behavior change.

### Table 4:6 Teaching Methods used in teaching Environmental Education

<table>
<thead>
<tr>
<th>The Teaching methods used by teachers</th>
<th>Not at All</th>
<th>To a Small Extent</th>
<th>To a Reasonable Extent</th>
<th>To a Large Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion of topical events concerning the environment</td>
<td>6.7%</td>
<td>50.0%</td>
<td>43.3%</td>
<td></td>
</tr>
<tr>
<td>Getting students to make observations of nature and the environment</td>
<td>6.7%</td>
<td>40.0%</td>
<td>53.3%</td>
<td></td>
</tr>
<tr>
<td>Getting students to work in groups</td>
<td>6.7%</td>
<td>20.0%</td>
<td>73.3%</td>
<td></td>
</tr>
<tr>
<td>Getting pupils to conduct experiments</td>
<td>20.0%</td>
<td>6.7%</td>
<td>26.7%</td>
<td>46.7%</td>
</tr>
<tr>
<td>Getting students to conduct research in the vicinity of the school</td>
<td>13.3%</td>
<td>13.3%</td>
<td>73.3%</td>
<td></td>
</tr>
<tr>
<td>Getting students to hold group discussions</td>
<td>6.7%</td>
<td>43.3%</td>
<td>50.0%</td>
<td></td>
</tr>
<tr>
<td>Getting students to do outdoor work around the school</td>
<td>13.3%</td>
<td>13.3%</td>
<td>23.3%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Offering students neighborhood studies</td>
<td>23.3%</td>
<td>13.3%</td>
<td>26.7%</td>
<td>36.7%</td>
</tr>
<tr>
<td>Getting students to role play</td>
<td>6.7%</td>
<td>13.3%</td>
<td>46.7%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Reading environmental magazines /newspaper articles/book about nature and the environment with students</td>
<td>30.0%</td>
<td>33.3%</td>
<td>36.7%</td>
<td></td>
</tr>
<tr>
<td>Watching nature and environmental programmes on TV and films</td>
<td>70.0%</td>
<td></td>
<td>30.0%</td>
<td></td>
</tr>
<tr>
<td>Talking to students about their contribution to a cleaner environment</td>
<td>3.3%</td>
<td>13.3%</td>
<td>83.3%</td>
<td></td>
</tr>
<tr>
<td>Encouraging students to behave in a better way to the environment</td>
<td>6.7%</td>
<td>30.0%</td>
<td>63.3%</td>
<td></td>
</tr>
<tr>
<td>Comment if students behave in an environmentally unfriendly way</td>
<td>6.7%</td>
<td>30.0%</td>
<td>70.0%</td>
<td></td>
</tr>
<tr>
<td>Going out to watch wildlife with students</td>
<td>13.3%</td>
<td>53.3%</td>
<td>33.3%</td>
<td></td>
</tr>
</tbody>
</table>

The findings reveal that teachers use a combination of methods to deliver the EE content. This upholds the earlier findings by Terrence, Kerry, Neville and Ron (2012) that Environmental Education is best delivered through a wide range of teaching and learning activities, with
utilization of all the key learning areas. The authors argue that students will develop strong 
environmental knowledge, awareness and capacity for positive environmental change when 
EE is contextualized in real examples, problem solving and with their active participation.

However, the least used method of teaching by teachers is watching nature and environmental 
program on TV and videos/films with only three in every ten teachers indicating they use it to 
a large extent. Further, more than a quarter of the teachers do not use it at all. Conversely an 
examination of Figure 4.7 and Figure 4.8 reveal that a majority of the students had indicated 
that they heard about environmental issues for the first time through the media 
(TV/radio/newspaper) and it was the most interesting source of environmental issues with 
over half of the students indicating so. This indicates that students learn about environment 
through TV/videos/radio/newspaper elsewhere apart from the school. It also indicates that 
teachers fail to use one of the most influential means of teaching environmental education as 
indicated by the interest the students had shown on information technology. These findings 
are supported by Diclemente (1992) and Aquilina (2001) who observed that knowledge alone 
is not enough to change behaviors, values and attitudes. Learning activities that are teacher -centered have proved to be ineffective and the focus should be on learner participation in 
activities that helps them change behavior using role playing, games and exercises that 
strengthen their social skills. Further, the findings seem to find support from Chawla (1999) 
who argues that, information about environmental damage has to be translated into 
understandable, perceivable information (language, pictures, and graphs). Therefore, a vivid, 
provocative image can be found to explain a scientific concept that at the same time engages 
students emotionally for any effective Environmental Education.
4.6 Opportunities existing in schools for the teaching of the environmental education

The fourth task of the study was to establish opportunities existing in schools for the teaching of environmental education. This was done by evaluating the environmental programs existing in schools and other forums for learning environmental education. At this stage students' response and perception on the implementation process was considered as the most significant since the students are the recipient of environmental education.

4.6.1 Environmental programs

The study sought to establish whether there are environmental programs that offer students an opportunity to participate and practically engage in environmental activities. The students were required to indicate which programs are active in their respective schools.

Table 4.7 The Schools' Environmental Programs

<table>
<thead>
<tr>
<th>The Schools' Environmental Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Eco school activities</td>
</tr>
<tr>
<td>Wildlife club</td>
</tr>
<tr>
<td>Young farmers clubs</td>
</tr>
<tr>
<td>Geography clubs</td>
</tr>
<tr>
<td>World environment day</td>
</tr>
<tr>
<td>Tree planting day</td>
</tr>
</tbody>
</table>

As shown in Table 4.7 almost all the students (99.6%) indicated that they participate in tree planting activities making it the most popular activity in school, while more than half in Eco-school activities. Wildlife, Young farmers and Geography clubs were largely active with more than three quarter indicating they actively participate in them. A majority of the students also
participate in environmental days as indicated. The findings contradicts with the earlier findings by Otieno (2010) that extra curriculum such as environment clubs, young farmers clubs, geography clubs and wildlife clubs, are only used to a small degree in schools to teach EE.

4.6.2 Other Forums for Learning Environmental Education

Apart from clubs and environmental days, students were prompted to mention other forums within their schools that offered opportunities to learn environmental issues. About three quarters did not know any other forum through which to learn EE only about a quarter mentioned Red Cross and a handful were members of scout movement where they learnt environmental issues.

![Figure 4:11 Other Forums for Learning Environmental Issues](image)

4.6.3 Students' Perception on Implementation of Environmental Education

Having established the status of the teaching resources, the competency and attitude of teachers, teaching methods used in respect to EE, and the opportunities existing in school for the teaching of EE, the study sought to understand how students perceived implementation of
EE in their respective schools. To establish the students’ perception on EE implementation, students were required to indicate their level of agreement on various indicators of EE implementation. As shown in table 4.8 more than half of the students strongly agreed that their schools support environmental programs such as tree planting. Similarly more than half strongly agreed that they learnt more about environment in school than anywhere else. Slightly more than half strongly agreed that their schools have active environmental clubs. However, more than half of the students strongly disagreed that schools are involved in recycling wastes or involved in cleanup activities in towns and market places.

**Table 4.8 Students’ Perception on Environmental Education implementation**

<table>
<thead>
<tr>
<th>Perceptions of students on the Implementation of the Environmental Education</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Not Sure</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>School has enough teaching Resources</td>
<td>13.5</td>
<td>5.5</td>
<td>16.9</td>
<td>26.2</td>
<td>38.0</td>
</tr>
<tr>
<td>School has active Environmental clubs</td>
<td>12.0</td>
<td>9.5</td>
<td>1.7</td>
<td>23.6</td>
<td>53.2</td>
</tr>
<tr>
<td>School participate in environmental days</td>
<td>21.5</td>
<td>23.6</td>
<td>5.1</td>
<td>7.6</td>
<td>42.2</td>
</tr>
<tr>
<td>School support environment programs (tree planting)</td>
<td>6.5</td>
<td>3.0</td>
<td>1.1</td>
<td>23.6</td>
<td>65.8</td>
</tr>
<tr>
<td>School involved in corrective environment programmes (e.g. Garbage collection)</td>
<td>14.3</td>
<td>7.0</td>
<td>19.2</td>
<td>40.5</td>
<td>19.0</td>
</tr>
<tr>
<td>School involved in cleanup activities (e.g town &amp; market place)</td>
<td>21.5</td>
<td>7.0</td>
<td>11.8</td>
<td>35.7</td>
<td>24.1</td>
</tr>
<tr>
<td>Schools practice environmental care and protection</td>
<td>9.7</td>
<td>10.8</td>
<td>50.8</td>
<td>4.9</td>
<td>23.8</td>
</tr>
<tr>
<td>School involved in recycling wastes</td>
<td>45.4</td>
<td>10.1</td>
<td>13.5</td>
<td>11.8</td>
<td>19.2</td>
</tr>
<tr>
<td>Students practice preventing environment degradation</td>
<td>4.9</td>
<td>16.9</td>
<td>14.1</td>
<td>33.3</td>
<td>30.8</td>
</tr>
<tr>
<td>Through lessons learnt student can conserve environment</td>
<td>4.6</td>
<td>15.6</td>
<td>12.9</td>
<td>32.5</td>
<td>34.4</td>
</tr>
<tr>
<td>Learnt more about environment school in than anywhere else</td>
<td>7.4</td>
<td>9.5</td>
<td>4.4</td>
<td>19.4</td>
<td>59.3</td>
</tr>
<tr>
<td>Environment programmes in school enough</td>
<td>8.9</td>
<td>26.2</td>
<td>18.4</td>
<td>19.0</td>
<td>27.6</td>
</tr>
<tr>
<td>School is doing enough to prevent pollution</td>
<td>.8</td>
<td>22.6</td>
<td>16.9</td>
<td>31.0</td>
<td>28.7</td>
</tr>
</tbody>
</table>

Based on these findings it can be argued that EE is fairly implemented from the students’ perspective. Such perception is based on the availability of resources relevant to EE and activities related to environmental issues. It is against this background that students believe that schools are the most appropriate places to learn environmental issues. Though the
Environment Report for (2003) observed that EE has been looked at in great detail from the biophysical view but with less emphasis on economic and social perspectives, there are indications that environmental program, activities and various methods employed by teachers in the district offers an avenue for practical approach and social responsibility. Further, Terrence, Kerry, Neville and Ron (2012) also found that EE is best delivered through a wide range of teaching and learning activities, with utilization of all the key learning areas. Therefore, Students will develop strong environmental knowledge, awareness and capacity for positive environmental change when EE is contextualized in real examples, problem solving and with their active participation.

4.7 Challenges encountered in the teaching of environmental education

The fifth task of this study was to determine the challenges encountered in communicating EE. The study established the challenges in communicating the environmental education in schools in Molo district by interviewing the principals of seven schools. Communication of environmental education requires a combination of effective methods, relevant resources and right attitude among the instructors. The Schools’ administrators revealed that among the challenges facing the teaching of EE is lack of relevant resources. This was also confirmed by teachers and students on their perception on the availability of relevant resources as shown in Tables 4.4 and 4.8 respectively a third of teachers (33.3%) and slightly more than a third of students (38%) strongly agree that the schools have enough resources. This means that two in every three teachers and nearly a similar number of students have a contrary opinion on the availability of resources. When probed about the type of resources they are referring to, a majority of the principals referred to information technology related resources such as the computer and the internet as one principal said “our major handicap is lack of IT tools”. This
confirms previous study that factors affecting implementation of a new curriculum is availability of relevant resources (Kivuva, 2001). Further, UNESCO (2006) on the implementation of 8-4-4 system of education also cites resources as a major inhibiting factor.

A further confirmation on the unavailability of relevant resources is the fact that a majority of teachers (90.9%) as revealed in Table 4.2 mainly use text books to deliver EE yet an examination of Figure 4.7 and 4.8 reveals that most students rate TV, radio and internet as the most interesting source of such information. According to the school administrators this discrepancies are as a result of lack of these relevant resources preferred by students.

Further, environmental studies are taught as part of other subjects thus it is never given the emphasis required. The findings reveal that EE is taught in subjects such as Agriculture, Biology and Geography. Due to the wide content teachers have to cover, rarely do they have enough time to cover EE as required. In fact, an examination of Table 4.4 reveals that only 6.7% of the teachers indicated they have enough time to complete EE content. This shows that an average of nine in every ten teachers believe that time is hardly enough to cover EE content, forcing them to focus on the areas relevant to the examinations. In addition teachers are more concerned to finish the syllabus to enable students perform well in KCSE confirming Otieno (2010) argument that students are only taught to pass examination at the expense of their holistic educational development.

4.8 The effect of availability of resources, school environment and environmental activities on Environmental Education

After identifying the resources used and various opportunities offered by schools in respect to EE the study sought to assess how the availability of resources and school environment
affects the implementation of EE. The resources were taken to be those resources used to teach the student about EE. The school environment constitutes various environmental activities and programs offered by schools and environmental concept taught to students. On the other hand Implementation of EE was based on the students' perception on implementation process. Students perception was preferred over teachers perception since students are the recipient of the environmental education and thus well placed to rate the implementation level.

Table 4: 9 Correlation of Resources, school environment and EE Implementation

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Enviromental Concept taught to students</th>
<th>Resources used to teach Environmental Education</th>
<th>Enviromental Activities</th>
<th>EE Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enviromental Concept taught to students</td>
<td>Pearson Correlation</td>
<td>.691**</td>
<td>.381**</td>
<td>.228**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>474</td>
<td>474</td>
<td>474</td>
<td>474</td>
</tr>
<tr>
<td>Resources used to teach Environmental Education</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.400**</td>
<td>.154**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>474</td>
<td>474</td>
<td>474</td>
<td>474</td>
</tr>
<tr>
<td>Enviromental Activities</td>
<td>Pearson Correlation</td>
<td>.381**</td>
<td>1</td>
<td>.594**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>474</td>
<td>474</td>
<td>474</td>
<td>474</td>
</tr>
<tr>
<td>EE Implementation</td>
<td>Pearson Correlation</td>
<td>.228**</td>
<td>.154**</td>
<td>.594**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>474</td>
<td>474</td>
<td>474</td>
<td>474</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 4:9, the correlation between environmental concepts taught in schools and EE implementation is 0.228 with a significance level of 0.000. For the results to be statistically significant, the significance level should be less than 0.01. In this case the significance level is 0.000 thus environmental concepts taught in school have a positive relationship with EE implementation and an important factor as a far as EE implementation is concerned.
Resources used to deliver EE and EE implementation had a correlation coefficient of 0.154 and a significant level of 0.001. Therefore resources are statistically significant as far as EE implementation is concerned and have a positive relationship with EE implementation. On the other hand, environmental activities and EE implementation had a coefficient of 0.594 and significant level of 0.000. As such environmental activities in a school positively influence EE implementation.

Comparing the three factors, environmental activities has a stronger influence on EE implementation than resources and environmental concepts taught in school given that environmental activity had a high correlation coefficient of 0.594 compared to resources (0.154) and environmental concepts (0.228). This implies that even if a school had enough resources and teaches environmental concepts, but does not offer environmental activities and programs such as clubs or being involved in tree planting activities EE may not be fully implemented. These findings seems to find support from Aquilina (2001) who argues that programs that focus on helping teenagers to change behavior using role playing, games and exercises that strengthen social skills have shown signs of success. Further; the findings seems to concur with those of Diclemente (1992) who argue that approaches that rely mainly on conveying information about environmental precepts are bound to fail.

4.9 Effectiveness of Teaching Methods, Teachers training and Knowledge of Environmental concepts

Environmental Education approaches also include methods used to teach environmental education and the teachers' competency (training and knowledge of environment concepts). As shown in Table 4:10 the correlation coefficient between teachers' knowledge and EE implementation was 0.448 with a significant level of 0.013. Correlation coefficient between
teachers' environmental training and EE implementation was 0.099 with a significant level of 0.603 while that of teaching methods and EE implementation was 0.581 and a significant level of 0.001.

Table 4: 10 Correlation between Teachers factors and Environmental Education implementation

<table>
<thead>
<tr>
<th></th>
<th>EE Implementation</th>
<th>Knowledge of Environmental Concepts</th>
<th>Environmental Training</th>
<th>Teaching Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE Implementation</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.448*</td>
<td>.099</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.013</td>
<td>.603</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Knowledge of</td>
<td>Pearson Correlation</td>
<td>.448*</td>
<td>1</td>
<td>.211</td>
</tr>
<tr>
<td>Environmental Concepts</td>
<td>Sig. (2-tailed)</td>
<td>.013</td>
<td>.263</td>
<td>.031</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Environmental Training</td>
<td>Pearson Correlation</td>
<td>.099</td>
<td>.211</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.603</td>
<td>.263</td>
<td>.338</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Teaching Methods</td>
<td>Pearson Correlation</td>
<td>.581**</td>
<td>.394*</td>
<td>.181</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.031</td>
<td>.338</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

It follows therefore that teaching methods used to deliver EE were the most important among teachers' based factors followed by the teachers' knowledge of environmental concepts. Environmental training received by teachers was the third. This therefore explains that key among the factors influencing effective implementation of EE curriculum are teachers related factors such as the pedagogical approaches they employ in the delivery of the EE content, their knowledge, training and preparedness in handling the content becomes very significant in the implementation process. The findings concur with those of Terrence, Kerry, Neville and Ron (2012) who argue that Environmental Education is best delivered through a wide range of teaching and learning activities, with utilization of all the key learning areas.

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5.1 Introduction

The chapter presents the summary, conclusions and recommendations of the findings by objectives of the study both for policy and further research.

5.2 Summary of the findings

The purpose of the study was to investigate school-based factors influencing implementation of environmental education in secondary school education in Molo District, Nakuru County.

The following is a summary of the findings by objectives.

The issues in the first objectives were on the use of physical resources in the teaching of environmental education. The schools’ physical resources relevant to implementation of EE included text books, slide charts and diagrams, computers, internet, Videos/DVDs/CDs, TVs and radios. According to the findings the most frequently used resources by teachers are text books, charts and diagrams, pictures/photos in teaching EE. However, information technology is the least used in teaching EE as shown by low usage of internet, slide shows TV and radios.

In the second objective the concern was on the level of training and preparedness of teachers in handling EE curriculum. The findings have shown that teachers handling environmental education in the participating schools had adequate academic qualification and were trained as teachers. Further, the findings have revealed that majority of these teachers are not adequately trained in environmental education. However, despite this inadequate special training on environmental education teachers were relatively well versed with environmental concepts.
Among the concepts that teachers had most knowledge on were atmospheric pollution, greenhouse, water pollution and environment management and conservation.

In the third objective the issues were on the approaches used in teaching environmental education. The findings have revealed that teachers use a combination of methods like talking to students on environmental issues and commenting if students behave in a way that is environmentally unfriendly. A majority of these methods however are teacher – centered. The findings also revealed that teaching methods are the most important teacher-based factors influencing implementation of EE, followed by teachers’ knowledge on environmental concepts. Further, the main motivation to teachers in teaching EE is that environmental education being tested in KCSE and coverage of syllabus. The teachers give priority to the examinable parts of EE.

In the fourth objective the focus was on the opportunities existing in schools for teaching environmental education. The findings reveal that apart from environmental concepts taught in class, there are environmental programs that offer students opportunities to participate and practically engage in environmental activities. Wildlife, young farmers and Geography clubs were found to be fairly active in schools that participated. Other opportunities for learning environmental issues included World environmental days, tree planting activities, Red Cross clubs and scout movements. These environmental activities were found to have the strongest positive influence on EE implementation compared to any other factors as far as students are concerned.
In the fifth objective the concern was on the challenges facing the teaching of environmental education. The findings reveal that Communication of environmental education requires a combination of effective methods, relevant resources and right attitude among the teachers. The main challenge however facing the teaching of EE is lack of relevant resources. This is confirmed by the fact that teachers mainly use text books to deliver EE yet most students rate TV, radio and internet as the most interesting source of such information. Further, environmental education is taught as part of other subjects thus it is never given the emphasis required. The findings reveal that EE is taught in subjects such as Agriculture, Biology and Geography. Due to the wide content the teachers have to cover there is hardly enough time to cover EE as required. Therefore teachers are more concerned with covering the syllabus and that part of the EE curriculum that will enable students perform well in KCSE.

5.3 Conclusion

The purpose of this study was to assess school – based factors influencing implementation of Environmental Education in secondary schools in Molo District, Nakuru County. Environmental education is intended to instill behavior change in students so that their actions are environmentally friendly. This can only be achieved if EE is effectively implemented. From the findings therefore the following conclusions are drawn based on the objectives of the study:

Many schools lack adequate and relevant resources for the delivery of Environmental Education. This is further strengthened by low utilization of resources such as information technology in the teaching of EE. There is also lack of enough time to cover EE content.
The study also established that many teachers handling Environmental Education are adequately trained in their areas of specialization. They however lack special training in EE. This therefore means that EE teachers are not exposed to pedagogical skills that will effectively help deliver EE curriculum. Moreover, Environmental education curriculum is taught in only three subjects namely; Agriculture, Biology and Geography. This means that those students who do not take the subjects were not exposed to EE.

On the Approaches used in Environmental Education, the findings reveal that these approaches are mainly teacher – centered and are only used to convey environmental concepts as opposed to learner participation for pro – environmental behavior change.

The study has also revealed that there are many opportunities existing in school for the learning of environmental issues especially in co – curricular activities. However there are very few occasions where these opportunities are utilized since the focus of majority of teachers is on the areas that will be examined in KCSE.

This study has been able to establish that teacher related factors such as approaches used in disseminating EE, teachers’ level of training in EE, use and availability of relevant resources and utilization of existing opportunities are the main factors influencing the implementation of EE curriculum in secondary schools in Molo District. More importantly is lack of clear policy on EE such that EE just forms a small part of other subjects thus compromising its effectiveness in instilling behavioral change.
5.4 Recommendations

Based on the findings of this study the researcher recommends that:

i. Schools invest in technology based resources such as computers, internet, TV, videos among others to facilitate delivery of EE content. This recommendation is grounded on the fact that information technology offers a more interactive and interesting forum of learning EE as indicated by students. It follows therefore that for an effective implementation of EE schools should integrate information technology in EE. Such integration will have the desired effect on behavior changes.

ii. Besides investing in Information Technology, EE teachers should be trained in a way that provides technical and pedagogical EE skills and reflected on their practices, teaching their specialist subjects. This training will acquaint them with contemporary environmental issues such as global warming and climate change. For the EE in Molo District, this study has a clear implication that EE curriculum is not fully implemented and therefore the approaches used in its delivery should be evaluated so that this implementation can capture the curricular goals and aspirations while allowing learner participation in the learning process.

iii. Further, information technology should be combined by student-centered methods of teaching such as group discussions and talks regarding environmental issues where EE is contextualized in real examples, problem solving with learners active participation. Students should be engaged emotionally for any effective EE. This should involve the use of vivid and provocative images to explain certain environmental concepts.

iv. The schools should make use of the various co-curricular activities such as clubs and activities related to the environment in order to impart lifelong environmental lessons.
in learners. There should be a complete departure from mere syllabus coverage and teaching meant for only passing KCSE exams to actual exposure of learners to the environmental education that meets the curricular goals. EE should be delivered through a wide range of teaching and learning activities for any effective implementation of the curriculum.

v. While EE cuts across various disciplines and thus the need to integrate EE in other subjects, it is also important to give it prominence. In the current arrangement EE is embedded in subjects such as Agriculture, Geography and Biology and due to the wide content of such subjects EE is inadequately covered. This study therefore recommends having Environmental Education as a stand-alone subject at secondary level apart from having it being taught in other subjects.

5.5 Suggestion for further Research

This study has been able to bring out the current status of human and instructional resources used in teaching EE, approaches used and problems encountered in the process of implementing EE. However, the purpose of EE is to instill behavioral changes towards environmental care and protection. Therefore it is important to monitor the actual behavioral changes among learners to ascertain that EE actually results into the desired change. A longitudinal research to establish the actual change in behavior is therefore suggested.
REFERENCES


74


Kollmuss A. & Agyeman J. (2010). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8:3, 239-26


Appendix I: Questionnaires Covering Letter

Date:...........

Dear Respondent,

I am a post graduate student at Kenyatta University pursuing a Masters Degree in Curriculum Studies. As part of my degree requirement I am conducting a study on factors influencing the implementation of Environmental Education in Secondary Schools in Molo District, Nakuru County.

I would most sincerely appreciate if you spare your time to fill-in the attached questionnaires by giving your honest opinions on the given questions. There are no correct or wrong answers.

Your response will be kept strictly confidential and will not be shown to other persons but only for the purpose of this research. I will not be asking for your name and therefore you should not be worried that anyone will know that you have provided the information.

I look forward to Your Responses

Yours Faithfully,

Mwangi Michael Gachie
E55/CE/22875/2010
Kenyatta University
Appendix II: Questionnaires for Students

INSTRUCTIONS

This questionnaire is meant to collect information on the factors affecting the implementation of Environmental Education in Secondary Schools in Molo District, Nakuru County. The information given will be strictly confidential and it is only for the purposes of research. You don’t need to write your name.

Kindly tick (√) in the appropriate boxes and fill in the spaces provided where applicable.

Section ONE: Contextual and Personal Data

1. School Name __________________________
2. School Type: Boys [ ] Girls [ ] Mixed [ ]
3. School Status: Boarding [ ] Day [ ]
4. Category: National [ ] County [ ] District [ ]
5. School Location: Urban [ ] Rural [ ]
6. Indicate your Gender? Male [ ] Female [ ]
7. Indicate your Class Form 1 [ ] Form 2 [ ] Form 3 [ ] Form 4 [ ]

Section Two

8. a) Where did you first hear about Environmental degradation? (Tick (√) where appropriate)
   i) From Parents [ ]
   ii) Radio/TV/News Paper/Videos [ ]
   iii) Internet [ ]
   iv) School/Teachers [ ]
   v) Friends [ ]

b) Any other (please specify) .............................................................................................................

c) Which one was more interesting (please explain) ...........................................................................

d) In your opinion was the information relevant (please explain) ......................................................
   ..................................................................................................................................................

80
9. Are you taught Environmental Education in your school (e.g. environmental degradation, Climate change, soil erosion, Flooding, Global warming etc)?  Yes [ ] No [ ]

10. a) Have you benefited from the lessons on Environmental Education? Yes [ ] No [ ]
    b) If Yes please explain ........................................................................................................
    c) In which subjects are you taught Environmental Education
    d) In which subject(s) do you find the lessons on Environmental Education more interesting?
       Please explain your answer in (d) above ..............................................................................
       What do you think should be done to other subjects to make them interesting?..............
       ...........................................................................................................................................

11. Which of the following environmental concepts have you been taught in your school?
    (Tick (√) all those you have been taught)
    i) Soil erosion [ ]
    ii) Air/ Land /Water pollution [ ]
    iii) Greenhouse effect [ ]
    iv) Climate change [ ]
    v) Acid rain [ ]
    vi) Ozone layer depletion [ ]
    vii) Environmental Hazards (e.g. Flooding) [ ]
    viii) Global warming [ ]
    ix) Ecological balance [ ]
    x) Environmental management and conservation [ ]
    xi) Human wildlife conflict [ ]

    Any other? (Please specify) ........................................................................................................
SECTION THREE
The focus here is on the implementation of Environmental Education.

12. How does the school support Environmental Education? (Please explain)

Does the teacher use the following resources when teaching Environmental Education?

i) Text books
   Yes [ ] No [ ]

ii) Internet /computer
    Yes [ ] No [ ]

iii) Videos/DVDs/CDs shows
     Yes [ ] No [ ]

iv) Slide shows
    Yes [ ] No [ ]

v) Charts and Diagram
   Yes [ ] No [ ]

vi) Pictures/Photographs
    Yes [ ] No [ ]

vii) News Papers/Magazines
     Yes [ ] No [ ]

Any Other (please specify) .................................................................

13. Does the school have/participate in the following Environmental Programs?

i) Eco - Schools Activities
   Yes [ ] No [ ]

ii) Wild - Life Club
    Yes [ ] No [ ]

iii) young farmers clubs,
     Yes [ ] No [ ]

iv) geography clubs
    Yes [ ] No [ ]

v) Celebration of World Environmental Day On 5th June Each year.
   Yes [ ] No [ ]

vi) Tree planting
    Yes [ ] No [ ]

vii) Any other that deals with the Environment? (Please explain)

14. Which activities in school deal with Environmental Challenges such as Climate Change, Global Warming, environmental pollution etc? (List all of them)

...........................................................................................................
Perceptions of students on the Implementation of the Environmental Education

15. Use the following scale to answer (use a tick (✓) for your answer)

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<tbody>
<tr>
<td>i) The school has enough resources such as Text books for Teaching Environmental Education</td>
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<td>ii) The school has active Environmental Clubs</td>
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<td>iii) The School participate in Celebrating special environment days</td>
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<td>iv) The school support environmental Programmes such as tree planting</td>
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<td>v) The School is involved in Corrective environmental programmes such as garbage collection</td>
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<td>vi) The School is involved in Clean Ups activities(e.g. in town and market places)</td>
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<tr>
<td>vii) The School takes special interest in environmental care and protection</td>
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<td>viii) The School is involved in recycling of wastes</td>
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<td>ix) Students are involved in preventing environmental degradation</td>
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<tr>
<td>x) Through lessons learnt in school I can help in Environmental conservation</td>
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<tr>
<td>xi) I have learnt more about the Environmental care in School than anywhere else</td>
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<tr>
<td>xii) The programmes in school on the environment are enough to Learn about the care for the environment</td>
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<tr>
<td>xiii) The School is doing enough in preventing all manner of pollution</td>
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</tbody>
</table>

16. Write any comment that you think is important in the teaching of Environmental Education in your school

THANK YOU FOR COMPLETING THIS QUESTIONNAIRE
Appendix III: Questionnaires for Teachers Teaching Environmental Education

Serial No. ..........................................................

INSTRUCTIONS
This questionnaire is meant to collect information on the factors affecting the implementation of Environmental Education in Secondary Schools in Molo District, Nakuru County. The information given will be strictly confidential and it is only for the purposes of research. You don’t need to write your name.

Kindly tick (✓) in the appropriate boxes and fill in the spaces provided where applicable.

Section ONE
Contextual and Personal Data
1. School Name ________________________________
2. School Type: Boys [ ] Girls [ ] Mixed [ ]
3. School Status: Boarding [ ] Day [ ]
4. Category: National [ ] County [ ] District [ ]
5. School Location: Urban [ ] Rural [ ]
6. What is your Gender? Male [ ] Female [ ]
7. What is your Age?
   Below 25 [ ] 25-35 [ ] 36-45 [ ] over 45 years [ ]
8. What is your Subject(s) of specialization (eg. Mat./Che) ................................................................
9. What is your highest qualification?
   PhD [ ] Degree [ ] Certificate [ ]
   Masters [ ] Diploma [ ] any other .................................................................
10. Are you a trained a teacher?
    Yes [ ] No [ ]
11. What is your Experience in teaching?
    0 - 4 [ ] 5 - 9 [ ] 10 - 14 [ ] Over 15 years [ ]
12. Have you ever attended any other course

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13. If yes what was the name of the course?

14. How long did you train in weeks?

15. Have you received any special training in Environmental Education?

16. If Yes which area of Environmental Education did the training handle? (e.g. Mitigating Climate Change - Please explain)

17. How long was the training in weeks?

18. How would you rate your knowledge on the following Environmental Education Concepts? (Use a tick (✓) for your answer)

<table>
<thead>
<tr>
<th></th>
<th>ADEQUATE</th>
<th>INADEQUATE</th>
<th>NON</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Environment and sustainable development</td>
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<tr>
<td>b Atmospheric pollution</td>
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<tr>
<td>c Greenhouse effect</td>
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<td>d Climate change</td>
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<td>e Acid rain</td>
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<td>f Ozone layer depletion</td>
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<tr>
<td>g Water pollution</td>
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<tr>
<td>h Global warming</td>
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<tr>
<td>i Environmental Hazards(e.g. Flooding)</td>
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<td>j Land pollution</td>
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<td>k Ecological balance</td>
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<td>l Human wildlife conflict</td>
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<tr>
<td>m Environmental management and conservation</td>
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</table>

Section TWO

The focus here is on the working methods teachers in Environmental Education use.
19. In your subjects which area(s) of Environmental Education do you teach?
e.g. Environmental Management and Conservation (list as many as possible)

20. Which method(s) do you use when teaching Environmental Education? (Tick (✓) as many as you use)

<table>
<thead>
<tr>
<th></th>
<th>Lecture</th>
<th>Guided Class Discussion</th>
<th>Role Playing/Games</th>
<th>Demonstration</th>
<th>Invite speaker/Resource Person</th>
<th>Question and Answer</th>
<th>Use of Audio/Visual</th>
<th>Student Project methods</th>
<th>Field Studies/ Excursions/Visits</th>
<th>Brainstorming</th>
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</table>

Any Other (Please explain)

21. To what extent do you use the following methods/activities to deal with subjects relating to the environment?
Use the scale below by ticking (✓) your answer:

<table>
<thead>
<tr>
<th>Extent</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>i) Discussion of topical events concerning the environment</td>
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<tr>
<td>ii) getting students to make observations of nature and the environment</td>
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<td>iii) Getting students to work in groups</td>
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<td>iv) Getting pupils to conduct experiments</td>
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<td>v) Getting students to conduct research in the vicinity of the school</td>
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<td>vi) Getting students to hold group discussions</td>
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<td>vii) Getting students to do outdoor work around the school</td>
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<td>viii) Offering students neighborhood studies</td>
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<td>ix) Getting students to role play</td>
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<tr>
<td>x) Reading environmental magazines/newspaper articles/books about nature and the environment with students</td>
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<tr>
<td>xi) watching nature and environmental programmes on TV and videos/films</td>
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<td>xii) Talking to students about how they can contribute to a cleaner environment</td>
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<td>xiii) Encouraging students to behave in a way that is better for nature and the environment.</td>
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<tr>
<td>xiv) Commenting if students behave in a way that is environmentally unfriendly</td>
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<td>xv) Going out to watch wildlife with students</td>
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</table>

22. Does the school support Environmental Education?  Yes [ ]  No [ ]

Please explain ..............................................................................................................................................
Section THREE
The focus here is on the instructional resources available to the teacher

23. a) Where do you get resources for teaching Environmental Education? (Tick as many as you use)
   i) Text books
   ii) Newspapers/Magazines
   iii) Journals
   iv) Internet/Computers
   v) Videos/DVDs/CDs
   vi) Friends and colleagues
   vii) Resource Persons
   viii) Personal Source
   ix) Any other (please specify)

   b) Please explain why you use some and not others in 23(a) above (where applicable)

24. In your own opinion explain how adequate these Environmental Education resources are in your school

Section FOUR
The focus here is on existing Environmental programmes/activities in schools

25. Does the school have/participate in the following Environmental Programmes/activities?
   i) Eco – Schools activities Yes [ ] No [ ]
   ii) Wild – Life Club Yes [ ] No [ ]
   iii) young farmers clubs, Yes [ ] No [ ]
   iv) geography clubs Yes [ ] No [ ]
   v) Tree planting Yes [ ] No [ ]
   vi) World Environmental Day On 5th June Each year

Any other that deals with the Physical Environment? (Please explain)

26. Do you have activities in school that deal with the following Environmental Challenges?
Section FIVE
27. What is your motivation to teach Environmental Education in your subject(s) area?

   i) Environmental Education being tested in the KCSE Examinations
   ii) Concern/care for the Environment
   iii) Curricula requirement
   iv) Syllabus coverage
   v) Change learners’ behavior in relation to the natural environment.

Any other (please explain)
Section SIX
Perceptions of teachers on the Implementation of the Environmental Education

28. Use the following scale by ticking (√) your answer

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<tbody>
<tr>
<td>i) The school has enough resources such as text books for Teaching Environmental Education</td>
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<tr>
<td>ii) I am always well prepared to handle Environmental Education</td>
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<td>iii) I am confident to handle Environmental Education</td>
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<td>iv) I am effective in changing the behaviors of students for pro – environmental actions</td>
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<td>v) The school is supportive of Environmental Education</td>
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<td>vi) Colleague teachers are supportive of Environmental Education</td>
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<td>vii) The students are taught Environmental Education in all the relevant subjects</td>
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<td>viii) There is enough time to cover Environmental Education content</td>
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<td>ix) I am well versed with Environmental Education Curriculum</td>
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<td>x) Infused Environmental Education is effective in bringing about environmental consciousness</td>
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29. In your own opinion what are the challenges facing the teaching of Environmental Education in your school?

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..............................................................................................................................................................
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Appendix IV: Interview schedule for Head Teachers

Serial No.........

Researcher: How are you sir/madam?

Head teacher

Researcher: My name is and I am carrying out a research on the factors affecting the implementation of Environmental Education in Secondary Schools in Molo District. It is my pleasure to visit your school and a great privilege to conduct this interview with you. I thank you very much that you have found time for this session. The information that I will gather will only be for research purposes and not for any other reason. Once again I thank you very much for sparing your time despite your busy schedule. I will not take much of your time

Head teacher

1. Researcher:

   School Type: Boys [ ] Girls [ ] Mixed [ ]
   School Status: Boarding [ ] Day [ ]
   Category: National [ ] Provincial [ ] District [ ]

2. For how long have you served in your capacity in this school?

3. Which subjects in your school handles Environmental Education syllabus?

4. How would you describe the teaching of Environmental Education in the school?

5. What kind of support do you provide to your school for environmental education?

6. How do you conduct the supervision of curriculum implementation such as in the case of Environmental Education?

7. How would you rate the competence of your teachers handling Environmental Education?
8. Do you have a school policy on Environmental Education?

9. Have your school held any activities on corrective measures to environmental challenges?

10. Have your teachers gone through any special training in Environmental Education?

11. Have any of your teachers gone through any seminar or workshop that relates to Environmental education?

12. What are your thoughts on the implementation of Environmental Education (e.g. its effectiveness in meeting curricula objectives)?

13. What can you say is the greatest gain in the teaching of Environmental Education in your school?

14. Which challenges do your teachers encounter in the teaching of Environmental Education in your school?

15. How do you overcome these challenges?

16. What do you think needs to be done to improve on Environmental Education in your school?

17. Which environmental education and awareness activities does your institution undertake to make members of the school responsible for improving their environment?

18. What improvements are needed to make environmental education and awareness in your institution more vibrant?

19. Which resource materials does your school have that relates to the Environmental Education?

Thank you once more for the time you have spared for this interview. The information you have provided is of great benefit to my research work. I want to assure you once again that this information will be treated with uttermost confidentiality.
# Appendix V: Budget

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<th>Item Description</th>
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<th>Unit Cost in Ksh.</th>
<th>Total cost in Ksh.</th>
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<td>Transport</td>
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<td>10,000</td>
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Appendix VI: Research Authorization

Republic of Kenya

National Council for Science and Technology

NCST/RCM/17018/11

Michael Gachiric Mwangi
Kenyatta University
P.O. Box 43844-00100
Nairobi.

RE: RESEARCH AUTHORIZATION

Following your application dated 30th April, 2013 for authority to carry out research on "School-based factors influencing implementation of environmental education in secondary school education in Mato District, Nakuru County," I am pleased to inform you that you have been authorized to undertake research in Mato District for a period ending 31st August, 2013.

You are advised to report to the District Commissioner and District Education Officer, Mato District before embarking on the research project.

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

DR. M. K. Rugutt, PhD, HSC
DEPUTY COUNCIL SECRETARY

Copy to:
The District Commissioner
The District Education Officer
Mato District
Appendix VII: Research Permit