IMPACT OF RESOURCE UTILIZATION ON THE PERFORMANCE OF PHYSICS IN KCSE IN PUBLIC SECONDARY SCHOOLS IN UGUNJA/UGENYA DISTRICTS, KENYA

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF EDUCATIONAL MANAGEMENT POLICY AND CURRICULUM STUDIES, SCHOOL OF EDUCATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION (PLANNING) OF KENYATTA UNIVERSITY

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DECLARATION

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

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DEDICATION

This project report has been dedicated to my loving and caring wife Jacqueline with our three sons, Moses Amenge, Horace Oniala and Bill Clinton Okoth. I pray that you all live to be great scholars and hardworking throughout your lives.
ACKNOWLEDGEMENTS

In carrying out this study I am indebted to several people without whom this work would not have been a success.

Special thanks first to my Almighty God for his providence, mercies and this far he has brought me. I am deeply indebted to my supervisors Dr. Nobert Ogeta and Dr. Mary Otieno for offering me very useful advice and continued encouragement. Their tolerance and patience during the numerous discussions immensely helped me in this study.

To reach the climax of my academic journey it would have been impossible without the moral support of my mother Lucia and late father Francis. My acknowledgements would be incomplete without thanking principals, teachers, students, friends and colleagues who provided all kinds of support in my endeavour to climb this academic ladder. Finally to my wife Jacqueline and children Moses, Horace and Clinton for the support, encouragement and patience they gave me throughout my study.
The tenet of this study was that despite the critical role of physics in promoting scientific and technological development, students’ performance in this subject was quite dismal. Factors leading to this dismal performance had not been adequately investigated and well-understood, hence hindering development of science education in the country. To this end, the purpose of this study was to determine factors influencing students’ performance in physics at KCSE level in selected secondary schools in Ugunja/Ugenya District. The study sampled schools using criteria of boarding, day and mixed status. All provincial schools in the districts were selected and then the six mixed secondary schools were randomly sampled from twenty mixed schools. From the sampled schools at most twenty students were selected from each form four class but where the candidature was fewer than twenty there was saturated sampling and only one physics teacher per school. Data was collected using questionnaires for students and teachers, and interview schedule for principals. Data collected was analysed using both descriptive and inferential statistics. The frequency and percentages tables, and graphs. The results collected were fed into the computer and analysed using SPSS. The tables were analysed, recorded and conclusions as well as recommendations were made. The suggestions for further research were made. The study was meant to determine strategies in improving performance in physics. The significance of the possible findings would provide information to policy makers and relevant stakeholders on the need to avail resources for improvement of performance in physics and the findings of the study would contribute to the improvement on the use of resources to enhance good performance in physics.
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LIST OF ABBREVIATIONS AND ACRONYMS

CATS - Continuous Assessment Tests
EFA - Education For All
FSE - Free Secondary Education
KCSE - Kenya Certificate of Secondary Education
KESSP - Kenya Education Sector Support Programme
KNEC - The Kenya National Examinations Council
NCIs - Newly Industrial Countries
NDP - National Development Plan
SEPU - School Equipment Production Unit
SMASSE - Strengthening Mathematics and Sciences in Secondary Education
SSP - School Science Project
UNESCO - United Nations Educational and Scientific Organization
USE - Universal Secondary Education
CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Education is universally recognized as a form of investment in human capital for economic benefit of the countries. Retention of excellent employees is one of the biggest challenges facing organizations today. This is also seen in schools as one of the Americas most influential educators of the time, Ellywood P.C. who characterised schools as a factory processing raw materials for social consumption. Hanson E.M (1979), emphasized that our schools are in a sense, factories in which children are to be shaped and fashioned into products to meet the various demands of life. The specifications for manufacturing come from the demand of twentieth century civilisation, it is the business of the school to build its pupils according to the specifications laid down. This demands good tools, specialised machinery, continuous measurement of production to see if it is according to specifications.

This is why governments committed themselves to have Education For All (EFA) as per the deliberations at Jotiem Thailand in 1990 and Dakar Senegal in 2000. In the African case for more than 40 years, different stakeholders have partnered to support the development of basic education throughout the developing countries since independence (Chimombo, 2005). The progress achieved in Education has been remarkable.

In USA, all kindergarten to 12th grade schools need to accommodate computers. This is because secondary schools have greater need for integrated technologies that support more sophisticated curricular and performance arts. According to Ellen
(2009), the challenge in secondary school design is to incorporate high performance design features and technology cost effectively.

Secondary education is important as it constitutes an investment in education that yields considerable social and private returns. According to Oketch and Rolleston (2000), Kenya, Tanzania and Uganda are among the countries in sub Saharan Africa which have recently implemented policies of free education. The Ministry of Education has developed KESSP and the overall goal is to provide a framework for the advancement of the policy goals, targets and strategies in the Economic Recovery Strategy 2003-2007 and sessional paper No 1 of 2005 where one of the special importance is providing resource for infrastructure development to improve schooling facilities and strengthening boarding institutions (ROK 2005).

Kenya is currently offering the 8-4-4 system of education, thus eight years in primary, four years in secondary and four years university level. The importance of secondary education is the moulding of learners into responsible citizens of tomorrow and cannot be undermined (Kurian 2008). Availability of necessary physical facilities enhances quality of teaching and learning and the academic performance of learners in all subjects.

The objective to provide quality education in Kenya is a concern that has preoccupied the minds of parents, educationists and the government and other interested parties for many years. It continues to do so to date. The worth of a learners output is determined by the quality of education offered to the learner either formally or informally. Several factors have to be considered if the quality of education is to be raised of
these factors include teacher training, discipline, the students family background and the availability of teaching resources.

Any education system that does not have adequate resources cannot achieve quality education. Indeed court et al (1995) documented the necessity to improve the quality of education through provision and effective use of teaching /learning resources. Therefore availability, acquisition and utilisation of resources require closer examination. A key reason for the use of the resources is both to facilitate effective and balance concrete/abstract learning experiences. Heinich et al (1990) have pointed out the concrete experiences that facilitate learning retention and usability of abstract symbols. Resources provide necessary concrete experiences in that skills that are hard to conceptualise are clearly showed. They also show how the processes of each skill relate to each other.

Many of the post independence education reports express the need for all secondary schools to acquire materials and store, learning resources. The Gachathi report (ROK 1976) points out that books and other educational materials are the basic tools for educational development.

They must therefore be available at the time they are required. The Kamunge report of 1988 asserts that the management and provision of quality and relevant education and training are dependent on among other things the supply of adequate teaching/learning materials. The report explained essentially the role of the government was to provide teachers through TSC, curriculum development, and
school inspection while the parents provide teaching/learning materials, textbooks and physical structure.

However, since the introduction of Free Secondary Education (FSE) in 2008, the government provides free tuition to the students in secondary Education and parents provide funds for school development. Tuition expenditure items include classrooms, teaching/learning materials, laboratory equipment, computer accessories, stationeries, laboratory chemicals, library facility, duplicating machines desks, chairs, photocopying machines, typing and printing facilities.

The government’s main concern is to increase the output of graduate science and mathematics teachers (Republic of Kenya 1974). The fourth national development plan [NDP] emphasized prominence on science and mathematics (Republic of Kenya 1979) while MacKay report recommended the strengthening of science education (Republic of 1981). Physics as a subject has undergone a lot of transformations in East African education system. In the 1960s Kenya, Uganda and Tanzania used to sit the same “O” levels and “A” levels Exams. During that time for ‘O’ levels, physics was under three categories: i. Pure Physics (two papers), and one practical. ii. Physical Science (physics) (two papers), one theory and one practical. iii. General Science (physics), one theory paper. In the 1970s, up to 1982, another physics paper was introduced in all national schools and a few provincial schools throughout the country called school science project [SSP] physics, chemistry and biology. This involved a lot of practicals during lessons using the discovery approach. In the examinations, there were two theory papers and no practicals. The categories of physics done in schools were dependent on the availability of the science apparatus.
(Assa Okoth, 1972). Pure physics was done in schools which were fully equipped. Physical sciences were done in schools with few equipment and general sciences were done in schools with no apparatus at all.

In 1979, East Africa Examinations Council broke up and Kenya National Examinations Council was formed which maintained the status quo of examining physics until 1982 when SSP series was dropped (KNEC Act 1980 cap 255A revised 1981).

Generally by 1986, candidates doing pure physics at form four were approximately 5000 and physical science (physics) were 20000, General Science about 35000. So, ‘A’ level class for physics in the whole country was about 5000 candidates with a few who were doing physical science opting for physics as one of the subjects. All these records are at the KNEC (1985).

Student performances were varied depending on the availability of the apparatus, teachers training, trained laboratory technicians; laboratories facilities and libraries. Physics is very important in career courses like laboratory technician, survey, engineering, metrology, technical subjects etc. During the first five years of 8-4-4 system, physics was a compulsory subject (Munavu R. N. and Ogutu D. N. And Wasanga P. M. (1988-2008): Beyond Primary Education.

The government of Kenya has been having a resource centre School Equipment Production Unit (SEPU) which produces and orders sciences equipment for schools to have standardised science equipment for curriculum implementation and for the
national examinations. The emerging problem nowadays is the emergence of many such centres which produce sub-standard apparatus that do not produce reliable results. The government has introduced a sum of 200000/ laboratory money for at least one school chosen by the district education board to alleviate the resources problems in the laboratories in every district per year (KESSP 2003/Sessional Paper No. 1 2005).

The emerging issue is lack of trained laboratory technicians to man laboratories as the teachers are overloaded with lessons to adequately prepare for the practical lessons. In some cases, the laboratories are not available and classrooms serve as temporary laboratories for only demonstrations. Lack of trained science teachers is another problem and this creates fear and lack of confidence in the students thus causing dropout in the subject. They are trained in some subject areas but due to inadequate funds in schools they could not be employed even by BOGs.

Sciences must be properly taught in the laboratories where experiments are done to reinforce the practical skills but the role of the laboratory has been increasingly marginalised in African schools, colleges and universities. This marginalisation is the source of major constraints on the teaching of science especially physics in Africa which include: attitudinal constraints, constraints imposed by examinations, constraints due to lack of apparatus and inability to improvise (Tsuma,1998) science education in the African context due to time factor in syllabus coverage, teachers teach physics solely at the theoretical level and the students most likely learn the material as encapsulated system e.g. lack of textbooks, lack of reagents, deteriorated buildings/equipment due to lack of maintenance. SMASSE trainings in ASEI/PDSI
are rarely applied in schools because of pressure to clear the syllabus and revise hard for good results in the national examinations.

The 8-4-4 system was introduced to enable students acquire both practical skills for self employment and salaried work. However unemployment of these graduates has persisted. The current development plan of 1997/2001 points out that a decade later after the introduction of the 8-4-4 system various problems still face education in Kenya as cited by (Olel MA 2000).

The highly industrialized countries such as Japan, the United States of America, Canada and most Western European Economies have by and large achieved universal secondary education (USE) and sent a significant percentage of young people on to university. A number of newly industrialized developing countries (NICs) such as Mexico and the Republic of Korea were capable of achieving USE and vocational training but still needed to be more efficient and effective investment in order to sustain growth and equalize access to education.

The fact that resources to manage educational institutions were scarce was indicated in the rising public expenditures on education and the government’s efforts to reduce it. The 1989/1993 Development plan points out that the problem of financing education from the public budget was taking a serious dimension of issues facing Kenyan’s education sector. It further added that though education costs were shouldered by the government, the community and parents, more emphasis would be placed on reduction of public expenditure on education through increased cost-sharing and efficient utilization of resources. This concern is mentioned by Psacharopoulos
and Wood Hall (1985) when they argued that as a result of increasing financial constraints on educational investments, developing countries were not only searching for alternative ways of financing education but they were giving more attention to the cost of educational investment and working towards reducing unit costs by improving utilization of educational resources as cited (Olel M.A 2000).

The need for more efficient utilization of educational resources had been with us for quite some time. In the 1974/1978 Development plan, efficient utilization of educational resources was encouraged when it pointed out that development of new schools should be given low priority and better and increased use of existing facilities be made by the establishment of at least three streams for each class in all schools. However the current position regarding this was not well documented cited by (Olel M.A. 200).

1.2. Statement of the Problem of Study

Under utilisation of human and physical resources had impacted negatively on performance in physics (DEOs office Ugenya/Ugunja districts). This study addressed the extent to which utilization of resources influenced performance in physics in secondary education under the 8:4:4 education system in Kenya. The poor performance in physics in Ugunja/Ugenya District was a big challenge to the planners, policy- makers and teachers. It was observed that performance in physics in form four national examinations had been declining in the district over recent years yet the performance in the same subject in national schools was improving yearly. The main concern of the study was that these students were being locked out of major careers like survey and engineering due to poor performance in Physics. The main
requirement from KNEC was to get 40% or mean grade D+ in practical in order to get the overall grade combined with theory papers from B- to A. The findings by researchers and leading educators showed that for better performance in physics, several factors should be considered such as qualification of teaching staff, availability of instructional resources that include textbooks, laboratories, apparatus etc and also availability of laboratory technicians. Others include the students’ attitudes towards the subject and preparedness as well as subject delivery. Additionally, involvement in other activities such as science congress competitions which further exposed students to outside classroom activities and organised symposia. It was being realised that physics was playing a very important role in maintenance of equipment in IT and modern technology as well as economic growth and as social systems (Orodho, 1996). Hence this study was set to find out how use of resources influence student performance in physics in KCSE.

Table 1.1: Physics mean grade analysis – Ugunja/Ugenya districts

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Scores In Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>6.587</td>
</tr>
<tr>
<td>2006</td>
<td>4.876</td>
</tr>
<tr>
<td>2007</td>
<td>4.890</td>
</tr>
<tr>
<td>2008</td>
<td>4.905</td>
</tr>
<tr>
<td>2009</td>
<td>4.590</td>
</tr>
</tbody>
</table>

DEO’s office Ugunja/Ugenya (formerly Siaya District) 2011

1.3 Purpose of the Study

The purpose of the this study was to establish factors that influenced the extent to which effective utilization of resources influences performance in physics in secondary education in Ugunja/Ugenya Districts. The study attempted to determine the impact of SMASSE on teachers to modify their teaching methods which had drastically changed with new technological advances like use of power points and
CDs as well as modules in various science subjects. The shifting from teacher-centred approach to student-centred approach. The evaluation approach which involved laboratory technicians to prepare students during practical lessons, and examinations.

Teachers’ and Lab. Technicians’ professional qualifications, experience and their general attitude towards teaching the subject were essential. The extent of curriculum implementation such as giving and marking assignments, supervised study time, extra tuition, teachers’ workload as well as practicals. The availability of physical facilities to do practical as well as textbooks.

1.4 Objectives of the Study

i) To determine the availability of the required resources for teaching physics.

ii) To find out the extent of utilization of the available resources to enhance performance in KCSE physics.

iii) To determine current status for effective utilization of resources in teaching physics.

iv) To determine strategies in improving performance in physics.

1.5 Research Questions

i) Are there adequate human and physical resources for teaching in the district?

ii) Do schools effectively utilize available resources in teaching physics?

iii) What is the current status of resource utilisation in the district?

iv) What strategies can be used to improve performance in physics?
1.6 Significance of the Study

i) The study would establish whether effective utilization of resources determined the performance in physics. The level of confidence by students to handle apparatus alone without being assisted and got required results.

ii) The study would provide information to policy makers and relevant stakeholders on the need to avail resources for the improvement of performance in physics. The relevance of practical to daily life in terms of technological changes.

iii) The findings of this study would also contribute to the improvement on the use of resources to enhance good performance in physics. The motivation to be hands on students in learning the concepts.

iv) The teachers would most likely be motivated to use practicals effectively to teach physics. The attitude change towards physics in the society to create development.

1.7 Assumptions of the Study

i) All the sampled schools were to avail the required physical facilities for teaching physics.

ii) The principals had interest to assist in support of purchasing the resource materials needed for teaching physics.

iii) All respondents replied honestly to the questionnaires.

1.8. Limitations

Expected in this study include:-

i) Financial constrains for movement by the researcher. Expensive means of transport due to inflated fuel prices, costs of research materials to be used, and accommodation as well as meals.
ii) Communication problems due to lack of electricity in rural areas to use computers and access to internet facilities.

iii) Due to demands and emerging issues in terms of technological changes and availability of materials was controlled by school term dates and availability of human resources.

iv) Lack of corporation to offer required information freely to enable research succeed

1.9 Delimitations of Study

i) The locale of study is Ugunja/Ugenya Districts since it was a familiar area of study for the researcher making it suitable for the researcher to mobilise the resources.

ii) The study covered only public schools, and they benefited from Government funding in Kenya.

iii) The study did not cover parents and board members because they were not always available in schools.

1.10 Theoretical Framework

The study was based on Brunners Theory of Structure of Discipline. Brunner [1960] focused the on teaching of subject concepts in a related manner rather than teaching isolated concepts and facts. He argued that facts and concepts should be related to generalization and that they should be used in problem-solving. The notion that structures could be identified in subjects of instruction such as biology and chemistry, and that facts as well as concepts were related within the structure was given prominence. At the same time, the notion of structure had other benefits. It gave more
assurance of transfer, enhanced comprehension of subjects, and facilitated recall. Little wonder, there had been interest by curriculum specialists and other educationists to peruse this notion advanced by Brunner.

For example, in mathematics, algebra is a way of arranging known and unknown in an equation so that the unknown are made known. The three fundamentals involved in working with these equations are commutation, distribution and association. Once a student grasped the ideas embodied by these three fundamentals, he/she was in a better position to recognize that ‘new’ equations to be solved were not new at all, but variants in a familiar theme. Whether the student knew the formal names of these operations was less important for transfer than whether he/she was able to use them. The issue of the three variables involved, that were, physical resources, human resources and students reflected on performance and the feedback. The effective utilisation of the resources had a big impact on the performance and any shortages could be noticed by big change in the performance.

The bright students in some schools were not allowed to choose physics so that they choose easier alternatives to score highly to improve the school’s mean grade by scoring highly in other subjects. The average and the weak students were on the other hand allowed to the physics. This was mainly in mixed schools and girls schools.
1.11. Conceptual Framework

![Conceptual Framework Diagram]

Source: Researcher 2010

Figure 1.1: The Correlates of Planning and School Performance in Physics

School was a system with the following subsystems: laboratories, library (text books) and teachers/technicians. These systems provided the following inputs:

1. Laboratory – chemicals/reagents and apparatus.
2. Library-textbooks and other instructional materials.
3. Science teachers and lab technicians processed the above inputs into skills and knowledge passed on learners.

The learner received the processed inputs and gave out the following outputs: manipulative skills, observation skills, recording skills and other skills. This in turn was converted into results (performance).
The availability of physical resources e.g. laboratories, textbooks, apparatus and chemicals when properly used by quality teaching staff i.e. the teachers with working experience in-serviced by SMASSE, trained examiners by KNEC and District Mock Examiners since Teachers know the strategic areas where marks are awarded during the marking in the main examinations, teachers apply this in setting and marking of internal examinations. This instils in all students the best answering techniques and enhances good performance in the final examinations. The short courses, seminars and workshops update the teachers on emerging issues in curriculum implementation and hence in performance in physics and technological changes globally.

1.12 Operational Definition of terms

**Impact:** The realisation of the cause as a result of action.

**Resource Utilization:** How the resources are used to get good results.

**School:** is a system with the following subsystems:-laboratories, library, teachers/technicians, students and non-teaching staff.

**School resources and process:** Class size, textbooks, school administration and management including BOG and PTA, library and laboratory facilities.

**SMASSE:** Strengthening mathematics and sciences in secondary education – refresher course for all science teachers in the country.

**Student traits or characteristics:** Pre-primary education, primary education and social characteristics.

**Teachers characteristics:** Teacher certification, experiences, training, teacher-pupil ratio, professional commitment and transfer index etc.
CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

The literature reviewed in this study emanates from various studies and works of educationists committed to the proper planning and continuity in the use of the available educational resources:

The first part highlights the availability of resources required in teaching physics at KCSE. The second part is the effective utilization of the available physical resources, which is a first step towards ensuring that resources are not underutilized. The third part is the current status of resources in teaching physics and finally the strategies in improving performance in physics.

The significance of these previous studies to the current one was explained. This study investigated and determined new knowledge needed for planning of education resources. Meeting students’ needs serious dedication to learning goals and adequate financial support.

2.2 Availability of Laboratory Equipment and Facilities for Teaching Physics

Resources according to Njeri (1990) enhance interest, comprehension, retention and concreteness to any learning situation. Learning takes place more effectively when appropriate resources fitting the curriculum are used. The resources required for teaching physics are standardised and expensive but improvisation is allowed to make students understand the concepts properly. Under SMASSE training, improvisation is allowed to make students understand the concepts in physics clearly. This is student
centred learning process which is practical oriented. Learning resources enables students to understand better through the use of more than one sense. Research by Douglass (1964) shows that instructional activities involving a multisensory approach are superior to those directed towards a single sense. Uses of resources therefore provide appropriate introduction and learning of new and complex concepts. They also help in motivating the students to learning thus increasing their participation and concentration. The use of instructional sources would make discovered facts glued firmly to the memory of students. Sovaury (1958) also added that a well planned and imaginative use of visual aids in lessons should supplement inadequacy of books as well as students interest by giving them something practical to see and do, and at the same time helping to train them to think things out themselves.

On the relationship between educational resources and students academic performance (Idiagbe 2004) concludes that teacher’s qualification and adequate facilities were determinants of assessing academic performance of students in secondary schools.

Hence availability or non availability of facilities in schools affects the academic performance of students. This is in agreement with Nwangwu (1997) who believed that teaching and learning activities, which result in effective teaching and improved academic performance. The school climate is determined by the resources such as laboratories, libraries with equipment and facilities which the teachers and students use and which influences attitude in teaching and learning. Uncondusive environment create stress on teachers and students thus resulting in negative attitude and poor performance by students. Facilities which are below approved standards could also
lead to producing wrong results and dilute the quality of teaching and learning producing poor academic performance (Uwhereka 2005).

The school environment affects academic performance of students. Facilities such as laboratory equipment and apparatus as well as textbooks and other teaching aids are ingredients for effective teaching and learning (Olutola 2000). For a good educational policy in planning to guarantee quality outputs, it must be services optimally with appropriate trained and motivated teaching staff adequately supplied with necessary facilities and equipment.

According to Maeke (2003), poor learning resources and facilities have been classified under the causes of dropout rate and withdrawal. Bakhda (2004) points out those available facilities should be adapted and utilized to suit the school curriculum and good performance.

The improvisation needs a well trained human resource (teachers) of physics who lead the students clearly in the cause of the lessons without misleading them to understand the basic concepts in physics. The challenge is that such trained manpower is limited and understanding is the major problem in the teaching of physics.

Secondly lack of apparatus and textbooks make it difficult in the teaching of the subject.

Thirdly lack of laboratories where experiments can be done and the apparatus can be kept safely.
Modern instructional systems (campus-based as well as distance) include a diverse array of resources for intrapersonal dialogue (individual study) such as self-instruction texts and multi-faceted Web-based instructional system. In addition, there are various resources for interpersonal dialogue (instructor-student, student-student) such as face-to-face meetings, e-mail, telephones and websites for both synchronous and asynchronous interaction. (Gorsky & Caspi, 2005; Gorsky, Caspi & Chajut, 2007).

Physics education refers both to the methods currently used to teach physics and to areas of Pedagogical research that seeks to prove those methods. Historically physics has been taught at the high school and college level primarily by the lecture method together with laboratory exercise aimed at verifying concepts taught in the lectures. These concepts are better understood when lectures are accompanied by qualified personnel, apparatus with demonstrations, hands on experiments and questions that require students to ponder what will happen in an experiment and why students who participate in active learning for example with hands on experiments learn through self-discovery.

Physics education in America is taught in high schools, colleges and graduate schools (Physics educ Sept 2010 Wikipedia; the free encyclopaedia).

Good performance in high school physics depends on many things: the teacher, course content, availability of apparatus for laboratory experiments, a clear philosophy and workable plan for meeting students’ needs, serious dedication to learning goals and adequate financial support. Resources vital in providing education never seem enough to satisfy both private and social demand that education holds various studies have not only identified resource problems but also come up with
suggestions and ways in which some of the resource problems can be solved. Sifuna and Kiragu (1988) as cited by Olel (2000) in studies related to contemporary issues in education, discuss the major problem in secondary education as poor distribution of teachers. There is critical shortage of mathematics and science teachers in some schools.

2.2.1 Utilization of Resources

According to Onyango (2001) resource allocation to teachers and students should follow the laid down procedure since the resources are to be utilized for their benefit. There should be regular stock taking and updating of the inventory. Available resources should be known and conditions under which they can be utilized should also be spelt out to avoid unnecessary damages.

Physics is an experimental science, theoretical and experimental high degree of integration of scientific precision. In the current experiment in teaching is based on classical physics, modern physics as the basic content in order to teach the basic ideas and methods of physics processes in order to cultivate innovative thinking and practical ability of students as the goal. With the continuous Development of science and Technology and social needs of the continuous improvement of the experimental teaching program the limited practice time is far from being able to meet the needs of students in practical skills. Shen Yuan-hua. Fudan University press (2004).

The utmost significance in studying how best education resources can be utilized is in the endeavour not only for schools to be efficient but also in the process allow for higher enrolment of students and provide greater opportunities for all.
World Bank (1990) as cited by Olel (2000) studies show that the three main challenges of educational development are improving access to learning, improving effectiveness of education and training systems and mobilizing the resources for both.

### 2.3 Effectiveness of Human Resource in Teaching Physics

This is an area where by the physics teachers need to prepare properly in lesson planning and teaching the subject with relevant examples and experiments. The laboratory technicians need to prepare the experiment which produce results. In some cases experiments fail which lead to the belief that physics is very hard. Direct involvement of the students in doing practical with the help of the physics teachers and laboratory technicians help in the promotion of understanding of the basic concepts in the physics as subject. With proper improvisation and availability of the apparatus will highly motivate the students to like the subject and perform better in the final examinations when properly guided throughout.

The role of teacher however is the most important without a well-educated strong motivated, skilled, well-supported teacher the arch of excellent in high school physics collapses. The teacher is the keystone of quality. Education research has continued to show that our effective teacher is the single most important factor of student learning (Darling-Hammond, 2000; Marzano,2007). Marzano characterizes an effective teacher as one who matches the strategies to the students. In its efforts to promote creativity and innovations in the way physics is taught at university, UNESCO supports teacher upgrading and innovative approaches in developing countries. Active learning in physics, developed over the last decade has been demonstrated in the United States and other developed countries to enhance students understanding of
basic physics concepts. In this model, students are guided to construct their knowledge of physics concepts by direct observations of the physical world. Use is made of a learning cycle including predictions, small group discussions, observations and comparisons of observed results with predictions. In this way, students become aware of the differences between the beliefs that they bring into the introductory physics classroom, and the actual physical laws that govern the physical world. The focus of the active learning in optics and photonics project begun in 2003 is on one of the experimental physics areas that have been found to be relevant and adaptable to research and educational conditions in many developing countries. Optics has been termed an “enabling science“ as it is believed to be the basic of many modern advances in high technology (Education and training of optics and photonics 2005 Minella Alarcon, UNESCO).

The launch of continent wide physics society in Dakar Senegal Jan 12, 2010

This is to support existing physics societies in Africa as well as helping physicists who are working or studying in an African country that does not have its own society. It will also help to bring together physicists in different countries in Africa to collaborate with each other. As an advocate for physics across the continent, the physics society will endeavour to increase the resource for physics training and research in Africa and the economic and social development of the continent. One of the reasons for setting up a continent-wide society is that no African country ranks in the top 20 as measured by the average number of citations that papers from Africa get. Yet each country that is in the top 20 has national and regional structures for supporting physics and astronomy. The first African school of physics brings cutting-edge physics and technology to sub-Saharan Africa. This took place in South Africa
in August 2010 and the topics covered include current and future particle and nuclear physics experiments; theoretical physics particle accelerators and technology, information technology and grid computing. The lessons learnt will help link students to the concepts they’ve learned to the real world. (Physics Conference in South Africa in August 2010).

2.4 Strategies for improving performance in physics

The effective teaching of physics includes using strategies to promote constructivist learning, conceptual understanding of physics topics and to develop skills and methods for students to understand the process of scientific inquiry. These leading strategies include the use of cooperative learning, technology tools and activities performed. In order to collect, analyse and report data. The needs to understand the use of formative and summative assessments and techniques to create a learning environment where students share the responsibility for their own learning. American Association of Physics teachers (Role booklet 2011). There has been a lot of emphasis in physics practicals during Kenya national examinations but the knowledge gaps appear in lack of practicals during class lessons due to lack of apparatus. In schools where the apparatus are inadequate, only demonstrations are done by teachers to some extent with/without laboratories. The limited number of physics teachers in the country makes workload so heavy such that no emphasis is made on practical tests at end of term examinations which can be marked and correction done unless in mock examinations for form fours only. As a result, the impact of practicals in the performance of examinations goes unnoticed in many schools in the country yet without 40% pass in Kenya Certificate of Secondary
Examinations no distinction is awarded in subject. This study intends to examine this scenario in Ugunja/Ugenya Districts (KNEC report, 1989).

A successful physics teacher remains in close touch with classroom/laboratory realities. The principals are responsible for what the teachers do need for support

a) Planning of curriculum instruction.
b) Communicating policies in curriculum and instruction to teachers.
c) Motivating teachers, planning and preparation of curriculum and instruction and heads of departments to:
   i) Initiate reforms on curriculum and instruction where possible.
   ii) keep financial estimates for the department.
   iii) Maintain quality teaching on the subject.
   iv) Exercise close supervision on teachers.

Principals to hold regular meetings with heads of departments (Kibwalei 2004).

Research exploring why some children learn more in school than others and achieve better than others has revealed three determinants:- school resources, teacher characteristics and student traits:

v) School resources and processes (class size, textbooks, school administration and management including PTA, library and laboratory facilities).

vi) Teacher characteristics [teacher certification], experience, training, teacher-pupil ratio, professional commitment and transfer index etc.

vii) Student traits or characteristics (pre-primary education, primary education and social characteristic). Studies in a number of African countries have found a strong association between resources and students’ achievement
(Foster, 1980; Foster 1966, Heyneman 1984). Considering school science learning/teaching resources, the laboratory has for long been given a central distinctive role in education. Many studies have been conducted comparing the effect of methods of practical work in the laboratory with other instructional methods over past decades. Tamir (1978) compares a control group to a computer- simulation group in physics. Most of these research studies showed no significant differences between the instructional methods as measured by standard paper and pencil tests in student achievement, attitude and critical thinking in their understanding of the process of science (Orodho, 1996).

This study will attempt to investigate the influence of selected school quality factors such as teaching methods, quality, adequacy and use made of science instructional resources. The study will specifically attempt to determine the extent to which textbooks, laboratory equipment and the use made of these facilities influence students’ achievement in physics.

2.5 Summary

The performance in physics in Ugunja/Ugenya Districts was not up to the required standards nationally (DEO’s office Table 1.1). The study aimed to find out how this performance could be improved by the effective use of the available human and physical resources. From the observed results from 2005-2009, the gaps were: it required to look into the following factors which could be the cause: the availability of text books, laboratories, apparatus, qualified and experienced teachers. To what extent were students involved or participate in the learning activities? The extent to which principals cooperated with the science teachers to implement the curriculum by
purchasing the requirements and making follow-up of their effective use in the lesson preparations and teaching. The extent to which CATs, extra tuitions and end term examinations were conducted and quality of the papers set matters with analysis and targets set to be reached. This study intended to examine this scenario in Ugunja/Ugenya districts.

i) This study attempted to investigate the influence of factors such as teaching methods, quality, adequacy and use made of science instruction resources. The study would specifically attempt to determine the extent to which textbooks, laboratory equipment and the use made of these facilities influenced students’ achievement in physics.

ii) The study aimed to find out how the performance could be improved by the effective use of available human and physical resources from the observed results from 2005-2009.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction
The chapter entailed the procedures and methods used in the study research design, locale of study, and study population, sample and sampling research instruments, data collection, data analysis and presentation are also discussed.

3.2 Research Design
Research design was a master plan specifying the methods and procedures for collecting and analysing the needed information. It specified the framework or blueprint for the research. This study was about the effective utilization of resources to enhance performance in KCSE physics in the districts. Descriptive survey research was intended to produce statistical information about aspect of education that interest policy makers, planners and educators (Gay, 1976) said that descriptive research had the advantage of answering questions concerning the current status of the study after collecting data.

According to Mugenda and Mugenda (1999), a survey was an attempt to collect data from members of a population with respect to one or more variable. A survey research is therefore a self-report study that requires the collection of quantifiable information from the sample.

A survey was a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. The survey was the most frequently used methods for collecting information about people’s attitude, options, habits or any of
the variety of education or social (issues in Education, Lecturers and high school teachers gave relative standing on various issues such as teaching methods(styles) and knowledge of their subjects through student opinions and performance in the examinations Orodho (2008).

The research design adopted for this study was a descriptive survey. Survey enabled data on the effective utilization of resources to enhance performance in KCSE physics in the district because it gave more accurate research results. The design enabled the researcher to gather data from a large population on the study area. Kerlinger (1973) confirmed this view when he stated that survey was a method that studied large population (universe) by selecting and studying the samples from the population to discover the relative incidence, distribution and interrelations of sociological and psychological variables as cited by Aloo (2009).

3.3. Study Location

The study was conducted in Ugunja/Ugenya districts. It borderd Butere/Mumias district to the North, Busia district to the West, Siaya district to the South and Gem district to the east.

The Districts have a total land area of 518.2km². Ugenya district has five administrative divisions namely Sihay, Barndege, North Ugenya, Ukwala and Nyahamua. Population 135500 Ugunja District has three administrative divisions namely Sigomre, South Ugenya and Ugunja with a population of 103960 (Republic of Kenya 2010). The main economic activity in the districts is farming mainly food crops.
3.4. Study Population

Berg and Gall (1996) defined population as all members of a real or hypothetical set of people, events or objects to which the researcher wished to generalize the results of the research. The Ugunja/Ugenya districts have 26 schools with 1500 Form Four students. There are 20 mixed schools, 3 boys boarding schools and 3 girls boarding schools. The study also targeted 26 principals in all the public secondary schools in the districts and 42 physics teachers. Students doing physics in the sampled 12 schools were 549 and at most 20 students were randomly sampled from each school.

From these records about the candidate population in the districts compared to the population of candidates doing physics and passing the subject (source KNEC) prompted the research since lucrative job opportunities in the career world, physics must be a determining factor. The reason for using public schools for research was because the Government ensured:

i) Posting of trained teachers to the schools.

ii) KESSP project had ensured that teaching of science subjects in schools was a must.

iii) Provision of infrastructure funds.

iv) Free school education ensured availability of funds in public schools.

Generally the performance in physics was very poor in the districts.
Table 3.1: Targeted Study Population

<table>
<thead>
<tr>
<th>Schools</th>
<th>Enrolment in form four</th>
<th>No. of physics students</th>
<th>Percentage</th>
<th>Sample Size</th>
<th>% Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ambira</td>
<td>173</td>
<td>110</td>
<td>54.91</td>
<td>20</td>
<td>18.2</td>
</tr>
<tr>
<td>2. Ukwala</td>
<td>98</td>
<td>58</td>
<td>49</td>
<td>20</td>
<td>34.5</td>
</tr>
<tr>
<td>3. Rangala Boys</td>
<td>94</td>
<td>43</td>
<td>45.74</td>
<td>15</td>
<td>34.9</td>
</tr>
<tr>
<td>4. Rangala Girls</td>
<td>194</td>
<td>98</td>
<td>20.62</td>
<td>20</td>
<td>20.4</td>
</tr>
<tr>
<td>5. Got Osimbo</td>
<td>31</td>
<td>08</td>
<td>25.8</td>
<td>08</td>
<td>100</td>
</tr>
<tr>
<td>6. Sega Girls</td>
<td>99</td>
<td>13</td>
<td>13.3</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>7. Sigomre</td>
<td>56</td>
<td>11</td>
<td>19.82</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td>8. Moi Uloma</td>
<td>75</td>
<td>08</td>
<td>10.67</td>
<td>06</td>
<td>75</td>
</tr>
<tr>
<td>9. Nyasanda</td>
<td>80</td>
<td>15</td>
<td>18.75</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>10. Ndenga</td>
<td>91</td>
<td>32</td>
<td>35.16</td>
<td>18</td>
<td>56.25</td>
</tr>
<tr>
<td>11. Jera</td>
<td>124</td>
<td>77</td>
<td>50</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>12. Sega Township</td>
<td>64</td>
<td>36</td>
<td>56.25</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1179</td>
<td>594</td>
<td>17</td>
<td>204</td>
<td>37</td>
</tr>
</tbody>
</table>

3.5 Sample and Sampling Techniques

A sample was a small group obtained from the accessible population (Mugenda and Mugenda, 1999). According to Orodho (2005), sampling was a technique where the investigator seeks knowledge or information about whole population, objects or events by observing a sample and extending the findings to the entire population. (Govy (1992) asserts that for survey design a sample of at least 20 percent is justifiable for the study.

Stratified random sampling and saturated sampling techniques were used in this study. Saturated sampling technique is used to select principals, all physics teachers in public schools with single streams and schools with 10 to 20 form four physics students because the numbers are manageable. Since Ugunja/Ugenya Districts have four divisions and the number of public schools are not evenly distributed in the divisions, stratified random sampling technique is used to collect data from 26 principals and 20 mixed schools. According to Grinnell(1993) as cited in Aloo(2009), stratified sampling helped to reduce chance variations between a sample and the
population it represented. It allowed each member of the target to have an equal and independent chance of being included in the study (Mkapa, 1997). Saturated random sampling enabled the researcher to have proportionate representation of the respondents from boys and girls schools Ambira High School, Rangala Boys, Ukwala Boys, Rangala Girls, Sega Girls, Got Osimbo and mixed Schools, Sigomre, Moi-Uloma, Jera, Nyasanda, Sega township and Ndenga Ugunja/Ugenya districts.

According to Gay (1992) cited by Orodho (2009), form fours who had been in school for more than three years had more information and grasped the concepts in physics to address the problem effectively.

**Table 3.2: Sample Size in Terms of Schools**

<table>
<thead>
<tr>
<th>Type of Schools</th>
<th>Number of Schools</th>
<th>Sample Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Girls</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Mixed</td>
<td>20</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>26</strong></td>
<td><strong>12</strong></td>
<td><strong>46.15</strong></td>
</tr>
</tbody>
</table>

**3.6 Research instruments**

**Questionnaire**

The use of questionnaire in this research was important in obtaining information from the principals/teachers and students from various schools. According to Loveu and Lawson (1971), questionnaires were widely used in education to obtain information about current conditions and practices and made enquiries concerning attitudes and opinions quickly and in precise form. Gall et al (1996) pointed out that questionnaires were appropriate for studies as they collected information that was important for making precise judgement. Orodho (2004) emphasized the use of questionnaire had the ability to collect large amount of information in reasonably quick space of time and the response could be easily analyzed.
The importance of using questionnaires were because they were useful in reaching a large group of respondents within a short time with little cost. The authority was obtained from the district education office to enable the conduct of research without any hitches. Gay(1996) explained that descriptive data were usually collected using questionnaires. Others like Simeons (1998), Cogen and Manion(1998), Emory(1985) and Ogola(1998) as cited by in Aloo(2009) had also positively identified questionnaires and interviews as crucial instruments of data collection in descriptive research.

(a) Physics teachers questionnaires

The teachers’ questionnaire consisted of two sections of closed and open ended questions seeking to established the experience in teaching candidates physics, and marking of examinations at district and national levels and professional qualifications. Established the availability and utilization of the resources in physics. The questionnaires would exhaustively capture the direct practical scenario in the laboratory as far as curriculum implementation was concerned. The availability of the apparatus and how they were frequently used by the teachers to perform the experiments. The methods used in the teaching process e.g demonstration, discovery or sharing of ideas before actual practical were done. The attitude of the physics teachers towards performing physics experiments during lessons. The motivation level and level of supervision as well as guidance of students during practical lessons. The teachers were briefed before the questionnaires were given out to them. The questionnaires were given to the physics teachers individually and given one hour to fill in then they were collected. They were instructed to give information accurately without guess work but honesty.
(b) Students questionnaire
The sampled students were taken to one class and briefed on how to fill in the questionnaire. The questionnaires were then issued out to them to give out accurate information to enable the researcher to find out the root cause of poor performance in physics as a result of resource utilization. The duration of filling in the questionnaire was one hour and were collected.

(c) Interview schedule for the principals
This instrument was used to target the principals. This strategy found grounds as at times such personalities might not have time to respond to the questionnaires. This instrument was also used alongside a questionnaire to provide a hint to the respondent.

3.7 Pilot Study
Piloting or pre-testing was carried out with at least thirty students form 4s to find out the shortcomings, vagueness and relevance of the questions. This enabled the researcher to rephrase the questions affected until they conveyed the same meaning.

The research instrument was pre-tested to establish their validity and reliability. The researcher sought the expertise of university supervisors and lecturers in the department. Piloting enabled the researcher to correct any ambiguities detected in the instruments. Gay(1992) and Orodho (2008). The pilot study was carried out in four selected schools outside those targeted schools for the actual study. The schools were 2 boarding schools Kisumu boys High School and Kisumu Girls High Schools for girls. Two day schools, Kisumu Day High School for boys and Lions Mixed High
School. A. A. Oseko (April 2010) could not generalize to all schools or teachers and students the results from pilot study.

Differences between schools and between teachers and students might affect the observed relationship in unknown ways and hence replication in other schools would be necessary before such results were accepted.

The researcher for the purpose of administration of the instruments got permission from the following authorities in order to conduct the research. This was in order of their sequence Permanent Secretary Ministry of Education, the District Education Officer, the Assistant Education Officer, the Principals and Physics teachers. Once the physics teacher was approached, the purpose of the visit was explained to him/her. The researcher with the help of the physics teacher randomly sampled the students. According to Orodho (2004-39) the purpose of random sampling techniques was that random sample yielded research data that could be generalized to a larger population within margins of error that could be determined statistically. When the above was done the teacher’s questionnaire was pre-tested.

3.7.1 Validity

Validity was the accuracy and meaningfulness of inference which were based on the research results. It was the degree to which results obtained from the analysis of the data actually represented the phenomenon under investigation. The issue of validity in this sense was the degree to which an empirical measure or several measures, of a concept accurately represented that concept.
According to Gall et al (1996) observed that content experts helped determine content validity by defining precise terms and domains of the specific content that the test was assumed to represent and then determined how well the content was sampled to test items. It could also be pointed out that the condition applied to pre-testing would also apply to the actual study.

According to Gay (1997), content validity was established by an expert. The researcher therefore was consulting the supervisors to review the contents of the instruments. The researcher had developed the instruments and taken them to the supervisors for perusal. The instruments were to be administered to students in the schools selected for the pilot study. The researcher with the help of the supervisors would revise the instruments.

3.7.2 Reliability

Reliability was a measure of the degree to which a research instrument yielded consistent results after repeated trials under similar conditions (Orodho, 2005), Kombo and Tromp (2006). Split-half method would be used to estimate the degree to which consistent results would be repeatedly obtained for accuracy of the same concept (Orodho, 2005).

Validity of research instrument was the degree to which an item measured what it was purported to measure (Gay, 1992), Mugenda and Mugenda (1999). The answered questionnaires would be scored manually. The correlation between the Dependent and independent variables would be calculated using Pearson’s correlation coefficient ($r$) would be worked out to establish the extent to which the contents of the questionnaire
were consistent in eliciting the same responses every time the instrument was administered.

The following formula would be used: \[ r = \frac{\Sigma XY - (\Sigma X)(\Sigma Y)/N}{\sqrt{\left[ (\Sigma X^2 - (\Sigma X)^2)/N \right] \left[ (\Sigma y^2 - (\Sigma y)^2)/N \right]}} \]

Where \( r \) = Pearson’s coefficient of correlation coefficient.

\( N \) = the number of respondents completing the questionnaires.

\( X \) = the scores of the first administration

\( Y \) = the scores of the second administration after one week.

A correlation coefficient of over 0.5 would be considered high enough to judge the instrument reliable for the study (Mugenda & Mugenda, 2003).

3.8 Data Collection Procedure

The researcher got a letter from the department of educational management, policy and curriculum studies school of education Kenyatta University and proceeded to Ministry of Education where he got permit that allowed him to proceed to district education office Ugunja/Ugenya districts where he got permission to go to schools. The period of interview and questionnaires were scheduled between May 2011 and July 2011. The exercise was conducted by the researcher personally. Talked to respondents before giving the questionnaire and waited to collect immediately to avoid collusions among students in giving responses. He checked on the responses as the interviews continued and only any other observations were made on apparatus, charts, buildings posters or any other issues emerging in the resources. Secondary data were obtained from documents from DEO’s office e.g performance analysis etc and school education records.
3.9 Data Analysis

After collecting of the questionnaires, the researcher read through them to ascertain their numbers and saw how/if all the items were responded to. Descriptive statistics using frequencies and percentages were used to analyze the data. Descriptive statistics contain discrete numerical data (Mugenda and Mugenda, 1999).

Qualitative data on the other hand was generated from the open ended questions was organized into themes, categories and patterns pertinent to the study. As (Mugenda and Mugenda, 1999) observed this would entail creating a factual code, which would serve the purpose of identifying a fact of feeling or an attitude from the test. The scores in the interview schedule was analysed on the basis of the enumerated criteria and likewise tabulated using SPSS for purpose of comparison. The collected response in tables were compared to find out if the various respondents concur on various issues and if not the possible reasons for the observed discrepancies.
CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION:

4.1 Introduction

The purpose of this study was to investigate the impact of resource utilisation on the performance of physics in KCSE in public secondary schools. The study used questionnaires to collect data from physics teachers and form four students doing physics and from the principals through interviews.

This chapter therefore, descriptively reports and interprets the finding from the survey carried, which are discussed under the themes derived from the research questions of the study. The findings of this study were discussed under the following themes from the research questions below

1. Are there adequate human and physical resources for teaching in the district?
2. Do schools effectively utilize available resources in teaching physics?
3. What is the current status of resource utilisation in the district?
4. What strategies can be used to improve performance in physics?

The raw data is converted into ratios and percentages to ease the analysis and comparison.

4.2 Description of schools and respondents

Data was collected from three categories of respondents of the target population. These categories were students, physics teachers and principals in the sampled schools.
4.2.1 Schools

The study was conducted in 12 public secondary schools. Type of school

Based on gender of students, there were boys boarding, girls boarding and mixed day secondary schools

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Number of Schools</th>
<th>Sample Size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Girls</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Mixed</td>
<td>20</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
<td>12</td>
<td>46.15</td>
</tr>
</tbody>
</table>

4.2.2 Respondents

The total sample of the study had 228 persons, of these 12 were principals, 12 were physics teachers and 204 were students. Teachers were further categorised according to educational qualifications, teaching and marking experiences.

4.3 To determine the Availability of the required resources for teaching physics:

The research question to this objective is that: Are there adequate human and physical resources for teaching in the districts?

The survey around the schools in Ugunja/Ugenya districts showed most schools had one trained physics teacher per school irrespective of number of streams. Most of the teachers who teach physics also teach mathematics. In a double streamed school, the teacher has 16 lessons every week from form one to form four. In mathematics he has between 14 and 21 lessons per week so the total number of lessons ranges between 30 and 37. With large enrolments due to free secondary education, there cannot be effective teaching hence understaffing.
The professional qualifications of the teachers were showed in the table 4.1. Those with degrees were 53.3% diplomas were 26.7%. The total percentage is 80% which was relatively high.

**Table 4.2: Professional Qualification**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Degree</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

The same teachers when their experience was checked, those who had 2-5 years were 20% and above 5 years were 73.3%. The total percentage 93.3%. This is good enough to produce results.

**Table 4.3: Teaching Experience**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>2-5 years</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Above 5 years</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

The teachers with marking experience at district and national levels was 40% and those with no experience was 53.3%

**Table 4.4: Marking Physics**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>14</td>
</tr>
<tr>
<td>Missing</td>
<td>System</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>
This clearly showed that the difference of 13.3% should not impact negatively on the performance so much in the districts. Among other factors the researcher found out that very bright students were discouraged from taking physics so that they score highly to improve on mean grade of the school. The average and weak students were encouraged to take physics in such schools in the districts. The other reason was high enrolments due to free secondary education had overstretched the available resources especially understaffing of physics teachers due to freezing of employment of teachers in 1998. The employment at the moment is controlled by replacements of retirees and those who departed through natural attrition.

### 4.3.2 The availability of physical Facilities and Apparatus

The availability of laboratories is over 90% but there is still poor performance in physics this could be an attitude problem by both teachers and students. Not many students take the subject up to form four. Adequate apparatus were available at ratio of 1:2 but very few were operational due to lack of maintenance. Therefore demonstrations and group experiments were common.

**Table 4.5: Presence of Laboratory in School**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid Yes</td>
<td>14</td>
<td>93.3</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### 4.4 To find out the extent of utilization of the available resources to enhance performance in KCSE physics.

The research question to this objective is: Do schools effectively utilize available resources in teaching physics?
Figure 4.1: Usage of Apparatus

![Figure 4.1: Usage of Apparatus](image)

Table 4.6 Usage of Apparatus

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Very often</th>
<th>Often</th>
<th>Not so often</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltmeters</td>
<td>53.3</td>
<td>33.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Ammeters</td>
<td>53.3</td>
<td>33.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Rheostats</td>
<td>40</td>
<td>33.3</td>
<td>20</td>
<td>6.7</td>
</tr>
<tr>
<td>Calorimeters</td>
<td>31.9</td>
<td>26.4</td>
<td>22.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Milliammeters</td>
<td>26.7</td>
<td>40</td>
<td>20</td>
<td>13.3</td>
</tr>
<tr>
<td>Switches</td>
<td>53.3</td>
<td>33.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Burners/heaters</td>
<td>6.7</td>
<td>13.3</td>
<td>40</td>
<td>6.7</td>
</tr>
<tr>
<td>Thermometers</td>
<td>20</td>
<td>53.3</td>
<td>20</td>
<td>6.7</td>
</tr>
<tr>
<td>Masses</td>
<td>53.3</td>
<td>33.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Springs</td>
<td>53.3</td>
<td>33.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Metre rules</td>
<td>73.3</td>
<td>13.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Micrometer screw gauge</td>
<td>26.7</td>
<td>40</td>
<td>20</td>
<td>13.3</td>
</tr>
<tr>
<td>Clamp stands</td>
<td>73.3</td>
<td>13.3</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Lenses</td>
<td>40</td>
<td>33.3</td>
<td>20</td>
<td>6.7</td>
</tr>
<tr>
<td>Glass blocks</td>
<td>46.7</td>
<td>40</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Mirrors</td>
<td>33.3</td>
<td>46.7</td>
<td>13.3</td>
<td>6.7</td>
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<tr>
<td>Prisms</td>
<td>26.7</td>
<td>40</td>
<td>26.7</td>
<td>6.7</td>
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<tr>
<td>Lens Holders</td>
<td>33.3</td>
<td>33.3</td>
<td>26.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Text books</td>
<td>73.3</td>
<td>6.7</td>
<td>-</td>
<td>20</td>
</tr>
</tbody>
</table>
Figure 4.2: Usage of Voltmeters, Ammeters and Rheostats

In the figure 4.1, the use of voltmeters and ammeters is the same percentage because of the readings which are recorded during the experiments. Most of practical questions set in electricity the two apparatus must be used to enable recording. Rheostats are not always used because other resistors can be used with specific values fixed.

**Key:** Very Often – 1, Often – 2, Not so often – 3 and Missing – 4

Figure 4.3: Usage of Burners/heaters, Thermometers and Masses
In the figure 4.2, burners/heaters are rarely used because KNEC rarely sets questions in this area. Thermometers usage is slightly higher because of measurements but a small section of the syllabus. The use of masses is high because several topics like forces, pressure, mechanics and heat involve masses.

**Fig 4.4: Usage of Springs, Metre rules and Micrometer Screw Gauge**

In the figure 4.4, springs can only be used with masses, hence same usage. Metre rules are used in nearly every topic in physics and so very often usage. Micrometer screw gauge is used only in measurement of very small objects therefore less usage.

**Figure 4.5: Clamp stands, Lenses and Glass blocks**
In the figure 4.5, clamp stands are used in mechanics, light and heat experiments hence frequent usage. Lenses play a big role in the experiments since most questions set by KNEC involve refraction and determination of focal lengths of the lenses and mirrors. Glass blocks are used only in refraction experiments.

**Figure 4.6: Usage of Mirrors, Prisms and Lens Holders**

![Bar chart showing usage of Mirrors, Prisms, and Lens Holders](chart.png)

In the figure 4.6, mirrors, prisms and lens holders covers all the experiments with light which is just one of the topics in the whole syllabus.

The usage of the apparatus in the laboratories is good but I strongly feel, it is group practices and therefore minimal individual participation. When it comes to final examinations then it is reflected in performance.

Principals get direct reports from stores requisitions and laboratory experiments record book 67% and other reports directly from teachers and students 33%.

During meetings with heads of departments monthly, they reported performance in CATS/Examinations as at 50% and requisition of relevant materials/documents is
50%. Very few trained laboratory technicians and understaffing in sciences do a lot of havoc.

**Figure 4.7 Usage of calorimeters, milliammeters and switches**

The usage of calorimeters is minimal because it is rarely set in the final examinations. Switches are frequently used in all electricity experiments and milliammeters are used when ammeters are not required or very small readings of current are required. Calorimeters-31.9%, burners/heaters-16%, micrometer screw gauge-26.7% and milliammeters-26.7%.

The effective utilization of the resources can be monitored by close supervision of the human resources(teachers) and benchmarking with other schools by doing joint examinations and comparison of the results. The principals should hold frequent meetings with the staff for updates of the progress. The frequent checks on records of ordered materials and records of their usage in the laboratories through experiments is very important. Finally checks on records breakages/losses and how fast they are replaced. These properly implemented will ensure good performance physics in the districts.
4.5 To determine the current status for effective utilization of resources in teaching physics?

The research question to this objective is: What is the current status of resource utilization in the districts?

Direct purchase is about 80% since I strongly feel this occurs when the requirements are needed for internal and external examinations. The principals’ interview supports direct purchases by 50% for one it is very fast and motivates the teacher since any delays could stagnate the curriculum implementation. Tendering is expensive and slow. Therefore it is not popular but government procurement procedures favour it and quotations unless otherwise

<table>
<thead>
<tr>
<th>Table 4.7: Acquisition of apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Valid</td>
</tr>
<tr>
<td>Tendering</td>
</tr>
<tr>
<td>Direct purchase</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4.8: Replacement of lost or broken apparatus</th>
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</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Valid</td>
</tr>
<tr>
<td>Within a term</td>
</tr>
<tr>
<td>After 1 year</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

It takes one year and this encourages group work and hence less participation by majority of students because of few apparatus in good working condition are available.
The principals’ reaction to replacements/losses was OFTEN which was 40% and VERY OFTEN was 30%, NOT OFTEN was 20% and NOT AT ALL was 10%. Sometimes it was dictated by availability of funds and matters of priority in administration. Sometimes it was the delay in the reporting by the teachers/laboratory technicians to the principals. The penalty was not directed to students who do damages or losses because if they were forced to buy the materials and brought it would be faster.

Reaction of principals to issues covering physics is very fast but there must be delay from teachers and laboratory technicians to report.

**Table 4.9: Reaction of Principals to Issues Covering Physics**

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very fast</td>
<td>3</td>
<td>20.0</td>
</tr>
<tr>
<td>Fast</td>
<td>11</td>
<td>73.3</td>
</tr>
<tr>
<td>No action at all</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The understaffing of physics teachers in schools in the districts is acute and needs to addressed urgently. Lack of sufficiently trained lab technicians should be taken seriously to improve on performance in physics. Lack of resource centres with apparatus which are not readily available in most schools or cannot be afforded. Buying of sub standard apparatus which do not last and cannot be repaired easily create artificial shortages of apparatus which could be avoided.

**4.6 To determine strategies in improving performance in physics**

The question to this objective is: What strategies can be used to improve performance in physics?
Table 4.10: Suggestions to Assist the Principals to Act on Effective Teaching of Physics

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparatus</td>
<td>11</td>
<td>73.3</td>
</tr>
<tr>
<td>Motivation</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>Training</td>
<td>1</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

Motivation of teachers should be given priority and employment of more teaching staff. The laboratory technicians should be trained and more should be employed to improve on effective utilization of physical resources. In-servicing of employed lab technicians to be updated with emerging technological changes. The teachers are undergoing SMASSE training as in-service for teachers. The need to buy more apparatus to accommodate high enrolment rates due free secondary education is 73.3% as shown in the table above. The immediate replacements of broken/lost apparatus. More workshops/seminars should be organized for teachers to increase interactions with other schools and districts to benchmark for better performance in physics. Organize for more symposia for students to motivate them for competition to achieve good results.
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the research findings, conclusions and recommendations. The chapter further gives suggestions for further studies.

5.2 Summary

The purpose of the study was to investigate the impact of resource utilization on the performance of physics in secondary schools so as to determine the optimum use of the resources to realise good results in the performance.

The study was a descriptive research design that was conducted in Ugunja/Ugenya districts in Nyanza province. The study targeted all the twenty six secondary schools in Ugunja/Ugenya districts.

The schools comprised three boys boarding, three girls boarding and twenty mixed day schools. The study targeted all the twenty six principals, physics teachers and all form fours who do physics.

Random sampling was employed to select the sample from the target population. This resulted in a sample of twelve schools with sample of twelve principals and twelve physics teachers and two hundred and four students. The study utilised questionnaires administered as data collection instruments.
5.2.1 Availability of Required Resources

The study sought to investigate the current status of physical and human resources in terms of adequacy, inadequacy or non availability. The study found out that staff shortage in physics was high since the automatic employment by TSC was stopped by government in 1998. The advertised posts for selected schools is dictated by the availability of funds from the government and regional balancing was taken into consideration before selected schools were identified. (The 200000/= for laboratory apparatus to be purchased).

5.2.2 Extent of utilisation of available resources

The study sought to investigate how the available resources are effectively utilised. It was found out that the laboratories were adequate and the apparatus were adequate, the practical were done frequently but the results were not impressive. This could be as a result of few apparatus which are functional hence encouraging demonstrations or a few students handling apparatus during group work. Many students end up not being able to handle apparatus effectively during the examinations. The teachers not trained by KNEC for marking might not be competent enough to identify the areas that earn marks.

5.2.3 Current Status of the Resources

The study found out that there was adequate textbooks in the schools, chemicals and apparatus were also adequate.

But there was serious understaffing of physics teachers, lack of trained laboratory technicians to prepare practicals in advance to enable overloaded teachers perform
practicals in time. There were no resource centres with apparatus which can be borrowed by schools which cannot afford to buy for experiments.

5.2.4 Strategies to improve performance in physics
The study sought to investigate the strategies which could improve the performance in physics in the districts. It was revealed that the principals considered cost instead of necessity of the resources and the urgency. If it was for examinations it was bought immediately but if it was for practicals in the class during lessons it could delay or not bought at all.

The main strategies were how the teachers could be motivated to encourage more students to take physics for better careers in life.

This could be done by allowing them to attend more seminars, workshops and organize symposia for students. The principals to encourage more interactions with other performing schools for benchmarking from other districts.

Adequate staffing to reduce workloads and encourage effective teaching process.
The inservice of all teachers through SMASSE for current updates in technology by availing internet facilities in the schools. Finally the employment of more trained laboratory technicians.
5.3 Conclusions

Based on the study findings, the researcher concludes that:

1. Most practical lessons were either ignored or not properly organized to perform an experiment, discuss results and conclude because of inadequate time available and the physics teachers’ workloads.

2. The available apparatus are usually in favour of past examinations not syllabus. So most of apparatus in topics which were rarely set by KNEC are not available. But if they were available, they were rarely used because the teacher had no time to set a practical question but is ready to pick a past question paper and give.

3. Apparatus were used mostly for class demonstrations to save time.

4. Teachers were unable to complete the syllabus due to heavy workload and some extent inadequate resources.

5. Due to price fluctuations in the market, the quality of the apparatus bought for practical were compromised and were not durable or could not produce accurate results for the experiments.

6. Necessity of resources was not taken into consideration from requisitions but instead urgency and cost was most considered.

7. Due to free secondary education high student enrolments affected negatively on the provision of adequate resources due to inadequate funds from the government and high inflation rates.

8. Lastly, most principals are not science oriented teachers so they don’t cooperate in terms of promoting the proper teaching of the subject. They don’t source for well trained teachers and also drag their feet in the purchasing of laboratory equipment. They also don’t follow up whether the subject is being taught properly interms of
syllabus coverage and examination. But SMASSE training of principals is gradually changing the trend.

5.4 Recommendations:

This study has identified the current status of the extent of utilisation of the human and physical resources in secondary schools. Based on the research findings, the following recommendations were made:

- As the country waits for economic recovery from high inflation rates and the weakening of the shilling against the dollar, more resources (financial) should be mobilized and sent to schools to support and sustain the effective use of the laboratories and direct employment of more teachers to boost the learning process. Currently the DEB selects two schools to benefit from the 200000/= to purchase the apparatus and chemicals but if more funds were available then most if not all schools will benefit. The mobilization of more resources can be made by diverting some resources from for example general administration expenditure to support secondary school programs. The available resources within the ministry of education should be relocated within the education subsectors to support the teaching of sciences in secondary schools in order to achieve vision 2030.

- Schools depending on the existing circumstances, should start alternative and sustainable ways of raising funds for the provision of physical facilities. Such activities as farming e.g. planting maize and beans to reduce costs in boarding schools then the funds saved can be used in the acquisition and maintenance of resources.

- The government alone cannot be able to provide for all the educational needs of her people. More emphasis on cost sharing in the provision of resources is very
important. The parents should hire more teachers paid by BOG while awaiting the deployment by the TSC.

- In order to meet and cater for the needs of the schools the BOGs and parents should sponsor more teachers to seminars and workshops. This will motivate the teachers and inject professionalism, more critical capacity building at all levels and serious planning in the implementation of the curriculum thus improved.

- There is need for a responsive national sensitization and public education program on free secondary education at all levels to sensitize parents and communities about Free secondary Education. This will clear the notion that currently surrounds Free secondary program as far as cost and financing of the program is concerned. It is not the responsibility of the government alone with the rising cost of living, the parents must subsidize to help it succeed.

- The quality assurance and standards department should employ more and train staff on how to monitor all the facilities in all secondary schools and advice as well as report to ministry headquarters.

With the increasing numbers of students in enrolments the facilities always seem inadequate. This should be countered by other sources of funds to purchase the facilities.

5.5 Suggestions for Further Research:

- A similar study needs to be carried out in private secondary schools to investigate the extent of effective utilisation of resources.

- This study was conducted only in Ugunja/Ugenya districts. Future research should be carried out in other districts.
• Due to rapid technological changes globally research should be conducted to update the existing resources to relevant requirements for industrial development to meet vision 2030 goals.
REFERENCES


Darling – Hammond, 2000; Marzano, 2007


The launch of continent wide physics society in Dakar Senegal Jan 12, 2010.

APPENDIX A: PHYSICS TEACHER'S QUESTIONNAIRE

SECTION A: GENERAL INFORMATION

Tick in where appropriate in the box

Questionnaire number

1. Category of the school: Boarding
   Mixed
   Boys
   Girls

2. Demographic information
   Gender: Male Female

   Age: 20 years
   21-25
   26-30
   31-35
   36-40
   Above 40

3. Professional Qualification: None Diploma Degree

4. How many Trainings on Teaching Physics you attended

   

Teaching Experience

5. How long have you been a teacher: Less than 1 year 2-5 years Above 5 years

6. (a) How long have you been teaching physics in this particular school

   

   (b). Are you involved in marking physics.

   Yes
   No.
7. For how long have you been marking physics Exam at the
   (a). National Level
   ____________________________________________________
   (b). District Level
   ____________________________________________________

Section B: Resource Availability and Utilization

1. Do you have a laboratory in the school
   Yes                      No
   ________________________

2. Tick appropriately the use of the apparatus/Textbooks/ bellow as it applies to your school.

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Frequency of Usage/term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantity</td>
</tr>
<tr>
<td>Voltmeters</td>
<td></td>
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<tr>
<td>Ammeters</td>
<td></td>
</tr>
<tr>
<td>Rheostats</td>
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<tr>
<td>Calorimeters</td>
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<tr>
<td>Millimeters</td>
<td></td>
</tr>
<tr>
<td>Switches</td>
<td></td>
</tr>
<tr>
<td>Calorimeters</td>
<td></td>
</tr>
<tr>
<td>Burners/heaters</td>
<td></td>
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<tr>
<td>Thermometers</td>
<td></td>
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<tr>
<td>Masses</td>
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<tr>
<td>Springs</td>
<td></td>
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<tr>
<td>Metre rules</td>
<td></td>
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<tr>
<td>Micrometer</td>
<td></td>
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<tr>
<td>Screw gauge</td>
<td></td>
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<tr>
<td>Clamp Stands</td>
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<tr>
<td>Lenses</td>
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<tr>
<td>Glass Blocks</td>
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<tr>
<td>Mirror</td>
<td></td>
</tr>
<tr>
<td>Prisms</td>
<td></td>
</tr>
<tr>
<td>Pins</td>
<td></td>
</tr>
<tr>
<td>Lens holder</td>
<td></td>
</tr>
<tr>
<td>Text Books</td>
<td></td>
</tr>
</tbody>
</table>
3. How do you acquire the apparatus used in teaching physics
   Quotations □ Tendering □ Direct purchase □

4. How fast do you replace lost/broken apparatus?
   Within 1 Week □ In 1 Month □ Within 1 Term □
   After 1 year □

5. How fast does your principal react to issues covering physics
   Very Fast □ Fast □ Slow □ Very Slow □
   No action at All □

6. What would you suggest should be done by your principal to enhance your effective teaching of physics in this school. 
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   What should policy makers and planners do to improve performance of physics in this district. 
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   Any other suggestions to improve teaching of physics.
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
APPENDIX B: STUDENTS QUESTIONNAIRE

SECTION A: TICK IN WHERE APPROPRIATE IN THE BOX

Questionnaire number ____________________________________________________________

1. Category of the school: Boarding                                  Mixed

   Boys  Girls

2. Gender Male          Female

3. Form 4

SECTION B:

1. Tick(✓) appropriate availability and use of the following apparatus in your school

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Quantity</th>
<th>Very often</th>
<th>Often</th>
<th>Not so often</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltmeters</td>
<td></td>
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<td>Ammeters</td>
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<td>Rheostats</td>
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<td>Millimeters</td>
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<td>Calorimeters</td>
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<td>Burners/heaters</td>
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<td>Thermometers</td>
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<td>Masses</td>
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<tr>
<td>Springs</td>
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<tr>
<td>Metre rules</td>
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<tr>
<td>Micrometer Screw gauge</td>
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<td>Clamp Stands</td>
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<td>Glass Blocks</td>
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2. How frequently do you do experiments in the lab.

   Once a week  Once a month  Once a term

   ☐           ☐               ☐
3. Do you do Practical Exams in your school?  Yes  ☐  No  ☐

4. If yes do the teacher include practical marks in your final physics grade.
   Yes  ☐  No  ☐

5. What motivated you to choose physics in this school?
   Encouragement by Peer.  ☐
   Encouragement by Teacher.  ☐
   Self Motivation.  ☐
   Others.  ☐

6. When doing practical in physics, is it through
   Demonstration  ☐
   Group practical  ☐
   Self practical  ☐

7.(a). Do you have a lab. Technician in your school?  Yes  ☐  No.  ☐

   (b). If yes does he/she prepare the required apparatus for physics Exp adequately
   before the practical lesson.  Yes  ☐  No  ☐

8. During your physics practical lesson, is your physics teacher available to instruct you a
   adequately?  Yes  ☐  No  ☐

9. Any suggestion to improve your grades in physics.

________________________________________________________________________
________________________________________________________________________
APPENDIX C: INTERVIEW SCHEDULE FOR PRINCIPALS

1. In which ways do you ensure that the required resources for teaching physics are made available in your school?

2. How do you ensure that the available resources are effectively utilised to enhance performance in KCSE physics in your school?

3. How do you ensure that there is effective teaching of physics in your schools?

4. What strategies are you using to ensure improvement in performance in physics in your school?

5. How often do you take physics teachers to workshops, seminars, SMASSE trainings?

6. Do you recommend some physics teachers to mark KNEC examinations?

7. Do you have trained laboratory technicians?

8. How frequently do you do purchases for physics apparatus?

9. What should policy makers and planners do to improve performance of physics in this district?

10. Give other suggestions to improve teachings of physics.
APPENDIX D: UGUNJA/UGENYA DISTRICTS IN SIAYA COUNTY
APPENDIX E: SIAYA COUNTY IN THE MAP OF KENYA
APPENDIX F: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss. BENEDICT KONYANGO
of (Address) KENYATTA UNIVERSITY
BOX 43844 NAIROBI
has been permitted to conduct research in
Location. UGUNJA/UGENYA
District. NXANZA
province.

IMPACT OF RESOURCE
UTILIZATION ON THE PERFORMANCE
OF PHYSICS IN KCSE IN PUBLIC
SECONDARY SCHOOLS IN UGUNJA/UGENYA
DISTRICTS, KENYA.

for a period ending 31ST JULY 2011

Research Permit No. NCST/RRT/12/1/SS-011/755
Date of issue 27/5/2011
Fee received KSHS.1000

Applicant's Signature

Secretary
National Council for Science and Technology