IMPACT OF UTILIZATION OF PHYSICS LABORATORY EQUIPMENT ON STUDENTS' ACADEMIC PERFORMANCE ON PHYSICS IN USE SCHOOLS IN HOIMA MUNICIPALITY, HOIMA DISTRICT

BY

MUHUMUZA EDWARD

BSE/46366/151/DU

A RESEARCH DISSERTATION SUBMITTED TO THE DEPARTMENT OF PHYSICAL SCIENCE SCHOOL OF EDUCATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE BACHELORS DEGREE OF SCIENCE WITH EDUCATION AT KAMPALA INTERNATIONAL UNIVERSITY

MAY 2018

DECLARATION

This research report is my original work and has never been presented for a degree in any other university.

SIGNATURE:.....DATE:30th/04/2018

MUHUMUZA EDWARD

BSE/46366/151/DU

APPROVAL

This research project report has been submitted for consideration with my approval as the university supervisor.

SIGNATURE:..... DATE: 30/04/2018

NABISO SALIM

Lecturer, Department of Physical Science, School of Education Kampala International University

DEDICATION

This scholarly work is dedicated to my mother, Atuhairwe Beatrice and father Isingoma John for having struggled tirelessly in educating me to what I am. I am also deeply indebted to my friends Byabazaire Maxwell, Muchwezi Romlas, , sisters and brothers for their contributions in my study and in producing this work up to its completion.

May God reward all abundantly, Amen.

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 Nabiso Salim for offering me very useful advice and continued encouragement. His 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 father Isingoma john and my mother Atuhairwe Beatrice
Finally, my acknowledgements would be incomplete without thanking director, lecturers, fellow students, friends like Rotan Ivan Opiding Ben and colleagues who provided all kinds of support in my endeavor to climb this academic ladder.

ABSTRACT

The study sought to determine the available Physics Laboratory Equipment for the teaching and learning of physics in senior secondary schools in Uganda as well as the extent of utilizing the available equipment. The research design adopted for the study was descriptive survey. The sample consisted of nine hundred students who were randomly chosen and fifty Physics teachers who were purposively selected from five senior secondary schools in Hoima. Three instruments were used for the collection of data for the study. They are a self-designed questionnaire tagged "Physics Laboratory Equipment Questionnaire" (PLEQ) with reliability index of 0.72, a checklist of Physics equipment and Physics Achievement Test (PAT) to measure students' achievement. The objectives of the study included: To find out the impact of utilization of physics laboratory equipment on students' academic performance of physics in USE schools in Hoima municipality. To determine the availability of the required physics laboratory equipment for teaching physics. To find out the effectiveness of laboratory equipment in teaching physics. The results showed that the optimal utilization of physics laboratory equipment is effective in the teaching of Physics. The study concluded that science laboratory with adequate equipment is a critical variable in determining the quality of output from senior secondary school Physics.

LIST OF ABBREVIATIONS AND ACRONYMS

CATS	-	Continuous Assessment Tests
EFA	-	Education for All
USE	-	Universal Secondary Education
UCE	-	Uganda Certificate of Education
UNEB	-	Uganda National Examinations Board
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
PLE	-	Physics Laboratory Equipment

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of the study, statement of the problem, study purpose, objectives of the study, research questions, scope of the study, significance of the study, and the conceptual framework.

1.1 Background to the Study

Science is of great importance internationally for sustainable and socio-economic development as well as for technological advancement of nations. Knowledge of science and technology is therefore a requirement in all countries and needed by all people globally due to numerous challenges that are facing them. These challenges include emergences of new drug resistant diseases, effects of genetic experimentation and engineering, ecological impact of modern technology, dangers of nuclear war and explosions and global warming among others (Alsop & Hicks, 2001; Minishi, Muni, Okumu, Mutai, Mwangasha, Omolo&Munyeke, 2004). This had resulted to rapid changes taking place in medicine, industry, communication, and agriculture. Science as an agent of development plays an important role in bringing about these changes through technological advancement, national wealth enhancement, health improvement and industrialization (Validya, 2003), this is why scientific and technological breakthrough is usually the goal of any developing nation like Nigeria. Weham, Dorlin, Snell & Taylor (1984) opined that Physics is and will remain the fundamental science.

Physics is the bedrock of science and technology because many of the tools on which the scientific and technological advancement depends are the direct products of Physics. Physics is therefore a core subject in science and technology since it studies the essence of natural phenomena and helps people understand the rapidly technological changing society (Zhaoyao, 2002).

The principle of Physics has been widely used for various economic, scientific and technological advancement such as in information technology, which has reduced the worldinto

a global village through the use of satellites and computers. Also, the knowledge of Physics had led to sustainable development in the area of industrialization for improvement of materials useful to the well-being of www.sciedu.ca/wje World Journal of Education Vol. 2, No. 5; 2012 Published by Sciedu Press 2 ISSN 1925-0746 E-ISSN 1925-0754 human race. Furthermore, Physics education enables the learners to acquire problem-solving and decision-making skills that pave way for critical thinking and inquiry that could help them to respond to widespread and radical changes in all facets of life. Despite the importance of Physics to the scientific and technological development of our nation, understanding of the subject had dwindled over the years and performance of the enrolled students had not been encouraging. Ho and Boo (2007) discussed that in many countries, there has been a decline in the number of students wishing to continue with physics. Ali (1990), Okebukola (1997), Nneji (1998), Ogunleye (2000) and Umeh (2002) were all of the opinion that students' performances in the science subjects were poor.

Also, previous study has shown that students who hold negative stereotype images of scientists, science and technology in society are easily discouraged from pursuing scientific disciplines and usually performed poorly in science subjects (Changeiywo, 2000). This situation does not favor Nigeria's move towards developing a scientific and technological nation. Furthermore, students shun sciences particularly Physics when given an option and this especially applies to girls (Aduda, 2003). This implies that given a choice, a student would rather drop Physics in favor of other science subjects. Improving the learning of Physics and achievement in it requires a lot of input from the teachers because the role of the teacher in the classroom is important.

The teaching approach that a teacher adopts and the available materials he/she teaches with are factors that may affect students' achievement (Mills, 1991). Therefore, the use of appropriate teaching equipment and teaching method is critical to the successful teaching and learning of Physics.

There are still much to be done in the area of effective utilization of available teaching equipment. Therefore, this study aimed at finding out the available and utilized Physics laboratory equipment and its effect on the students' achievements in Physics. More often than

not, unavailability or inadequacy of suitable teaching facilities is blamed for the poor performance among other factors such as the teacher competency, teaching methodology and the attitude of the students towards the subject. Using adequate and suitable laboratory equipment to teach Physics in secondary schools will help to improve the academic achievement of learners. This research study was therefore intended to fill this gap in the body of knowledge. The study provided empirical evidence on the utilization of suitable and available PLE and its influence on students' achievement in senior secondary school Physics.

1.2 Statement of the Problem

In spite of the desire for technological development, couple with the fact that Physics is a very vital subject for technological development and as such, its teaching and learning as well as students' poor academic performance have become a source of concerns to all stakeholders. The problem of the present study is to investigate the effects of utilization of physics laboratory equipment on the academic achievement of secondary school students in Physics, in USE schools within Hoima municipality, Hoima district.

1.3 Purpose of the Study

The purpose of this study was to establish impact of utilization of physics laboratory equipment on students' academic performance of physics in USE schools in Hoima municipality, Hoima District.

1.4 Objectives of the Study

The specific objectives of the study were;

i. To determine the availability of the required physics laboratory equipment for teaching physics.
ii. To find out the impact of practice with physics laboratory equipment on students' academic performance of physics in USE schools in Hoima municipality.
iii. To find out the frequency usage of laboratory equipment in teaching physics.

1.5 Research Questions

i) What is the relationship between utilization of physics laboratory equipment and students' academic achievement in USE schools?

ii) Do students practice with available physics laboratory equipment in teaching physics?

iii) What is the frequency of using laboratory equipment in teaching Physics in Hoima municipality?

1.6.0 Scope of the Study

1.6.1 Geographical Scope

The study covered USE schools in Hoima municipality, Hoima district, West of Uganda

1.8.2 Content Scope

Specifically, the study intended to investigate the effect utilization of physics laboratory equipment on students' academic achievement in Hoima municipality, Hoima district.

1.8.3 Time Scope

The study took a period between June 2017 and November 2017 while discussing the effect utilization of physics laboratory equipment on students' academic achievement in Hoima municipality, Hoima district.

1.7 Significance of the Study

The study may help school managers to appreciate the influence of utilization of physics laboratory equipment on students' academic achievement

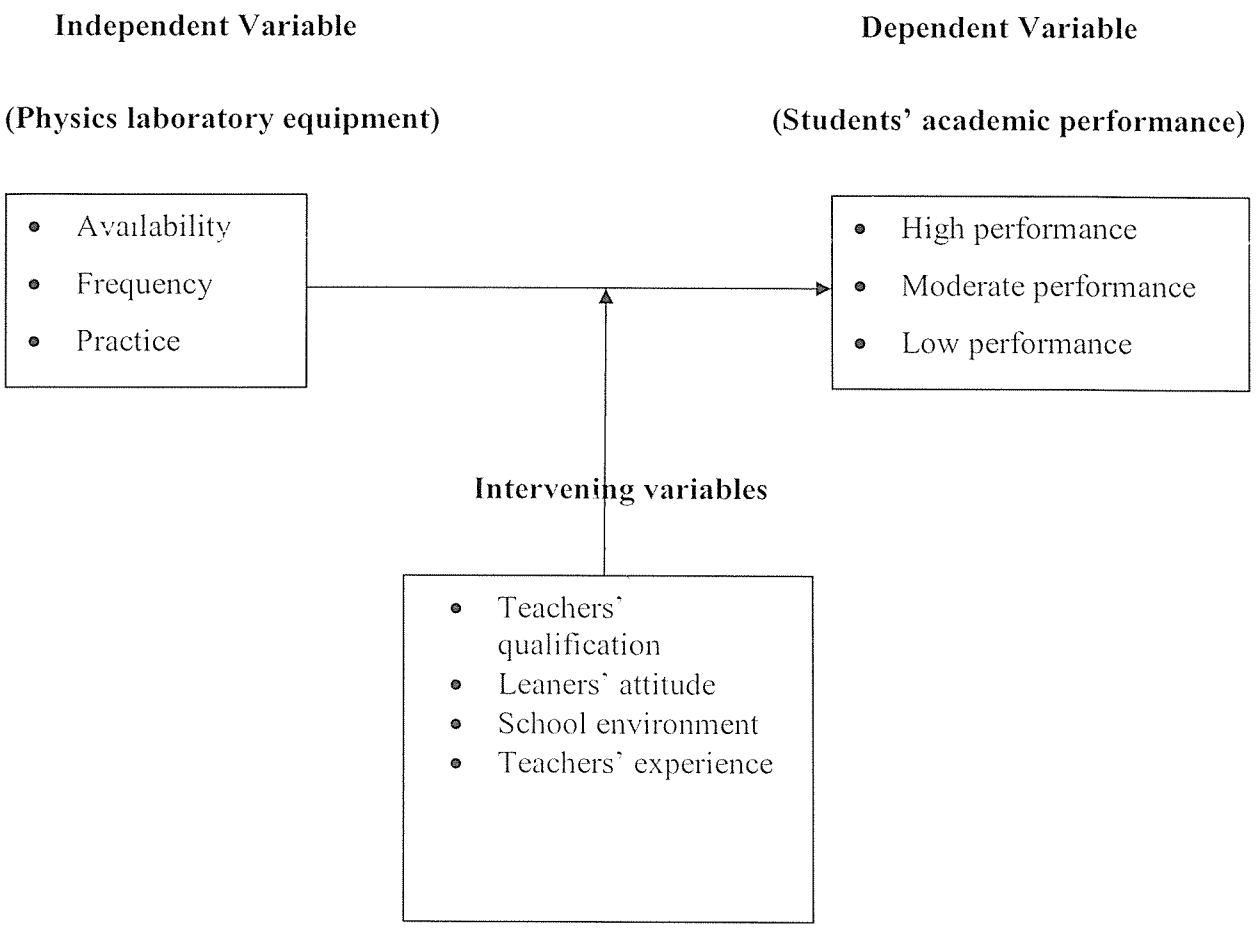
The study would provide information to policy makers and relevant stakeholders on the need to avail resources for the improvement of performance in physics.

The 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 for students in learning the concepts.

The teachers would most likely be motivated to use practices effectively to teach physics.

1.8 Conceptual Framework

The conceptual framework below relates aspects of physics laboratory equipment and students' academic achievement.



Source: primary data

The framework above suggests that the independent variable, physics laboratory equipment is conceptualized in terms of availability, utilization and improvisation, while the dependent variable, students' academic performance is conceptualized as high performance, moderate performance, and low performance.

1.9.1 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

1.9.2 Delimitations of Study

i) The locale of study is Hoima municipality, Hoima District since it was a familiar area of study for the researcher making it suitable for the researcher to mobilize the resources.

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

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

CHAPTER TWO

LITERATURE REVIEW

2 .0 Introduction

This chapter introduces the literature reviewed as the current study emanates from various studies, and works of educationists committed to the proper planning and continuity in the use of the physics laboratory equipment.

2.1 Meaning of physics laboratory equipment

Laboratory equipment refers to the various tools and equipment used by scientists working in a laboratory: Laboratory equipment is generally used to either perform an experiment or to take measurements and gather data.

Various authors have defined physics laboratory equipment. For example, Obanya (1989) viewed them as didactic material things that are supposed to make learning and teaching possible. According to Abdullahi (1982), physics laboratory equipment, are materials or tools locally made or imported that could made tremendous enhancement of lesson influence if intelligently used. Ikerionwu (Isola, 2010) referred to them as objects or devices, which help the teacher to make a lesson much clearer to the learner. physics laboratory equipmentare also described as concrete or physical objects, which provide sound, visual, or both to the sense organs during teaching (Agina-obu, 2005).

2.2 Availability of physics Laboratory Equipment.

Availability of Laboratory Equipment according to Njeri (1996)is the quality of being able to obtain the physics laboratory equipment to enhance learners' interest, comprehension, retention and concreteness of the physics subject matter.

Learning of physics takes place more effectively when appropriate laboratory equipment fitting the curriculum is used.The physics laboratory equipment required for teaching physics are standardized and expensive but improvisation is allowed to make students understand the concepts properly. Under SESEMAT training, improvisation is allowed to make students understand the concepts in physics clearly. This is student

centered learning process, which is practical oriented. Learning resources enables students to understand better with more than one sense.

Research by Douglass (1994) 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. Un-conducive 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.

2.3 Practice and academic performance

According to Onyango (2001) utilization is the action of making practical and effective use of laboratory equipment while teaching and learning.

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 endeavor 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 laboratory equipment for both.

2.4 Frequency and academic performance

Effectiveness means adequacy of physics Laboratory Equipment to accomplish the purpose of teaching and learning, producing the intended or expected result from the learners and the lesson, using effective teaching methods and effective steps towards lesson delivery.

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.

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 innovative 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).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the design, population, sample, 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.

3.1 Research Design

Research design is a master plan specifying the methods and procedures for collecting and analyzing the needed information. It specified the framework or blue print for the research.

The proposed design took place a quantitative paradigm in that it will be based on variables measured with numbers and analyzed with statistical procedures (Creswell, 2003). In particular the study was a co-relational, cross-section survey. It was a co-relational in that it was interested in relating each of the various aspects of utilization of physics laboratory equipment to students' academic achievement (1995).

3.3. Study Location

The study was conducted in Hoima municipality, Hoima district found in western Uganda. Hoima District is bordered by Buliisa District to the north, Masindi District to the northeast, Kyankwanzi District in the east, Kibaale District to the south, Ntoroko District to the southwest and the Democratic Republic of the Congo on the west.

3.4. Study Population

The population for the study was USE schools in Hoima municipality. These schools included; Bwikya Muslim, Duhaga, Kitara, Buhanika Seed, and Premier S.S.

Table 3.1: Targeted Study Population

Schools	Enrolment in form four
Bwikya Muslim	250
Duhaga	80
Kitara	190
Buhanika Seed S.S	50
Premier S.S	230
TOTAL	**820**

***Source: Raw* Data**

3.5 Sample and Sampling Techniques

Stratified random sampling and saturated sampling techniques were used in this study. Purposive sampling technique was used to select head teachers, all physics teachers in public schools with single streams and schools with 10 to 20 form four physics students because the numbers are manageable.

3.6.0 Research instruments

3.6 Questionnaire

The use of questionnaire in this research was important in obtaining information from the head teachers, teachers and students from various schools. The importance of using questionnaires was because they were useful in reaching a large group of respondents within a short time with little cost.

(a) Physics teachers questionnaires

The teachers' questionnaire consisted of two sections of closed and open ended questions seeking to establish the experience in teaching physics, and marking of examinations at district and national levels and professional qualifications. The questionnaires exhaustively captured the direct practical scenario in the laboratory as far as curriculum implementation is concerned. The questionnaires was given to the physics

teachers individually and given one hour time to fill, and then 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 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 utilization of physics laboratory equipment. The duration of filling in the questionnaire was one hour and then collected.

3.7 Pilot Study

Piloting or pre-testing was carried out with at least thirty students from senior four 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.

3.8 Validity

Validity of research instrument was the degree to which an item measured what it was purported to measure. 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.

3.9 Reliability

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

3.10 Data Collection Procedure

The researcher got a letter from the department of education Kampala University and proceeded to the Municipal education office Hoima municipality, Hoima District where he got permission to go to schools.

3.11 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.

Qualitative data on the other hand was generated from the open ended questions was organized into themes, categories and patterns pertinent to the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION:

4.0 Introduction

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 What is the relationship between utilization of physics laboratory equipment and students' academic achievement in USE schools?

2 Do students practice with available physics laboratory equipment in teaching physics?

3 What is the frequency of using laboratory equipment in teaching Physics in Hoima municipality?

3.1 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.

4.4 To find out the extent of practice with available physics laboratory equipment

The research question to this objective was: Do schools effectively utilize available laboratory equipment in teaching physics?

Figure 4.1: Usage of Apparatus

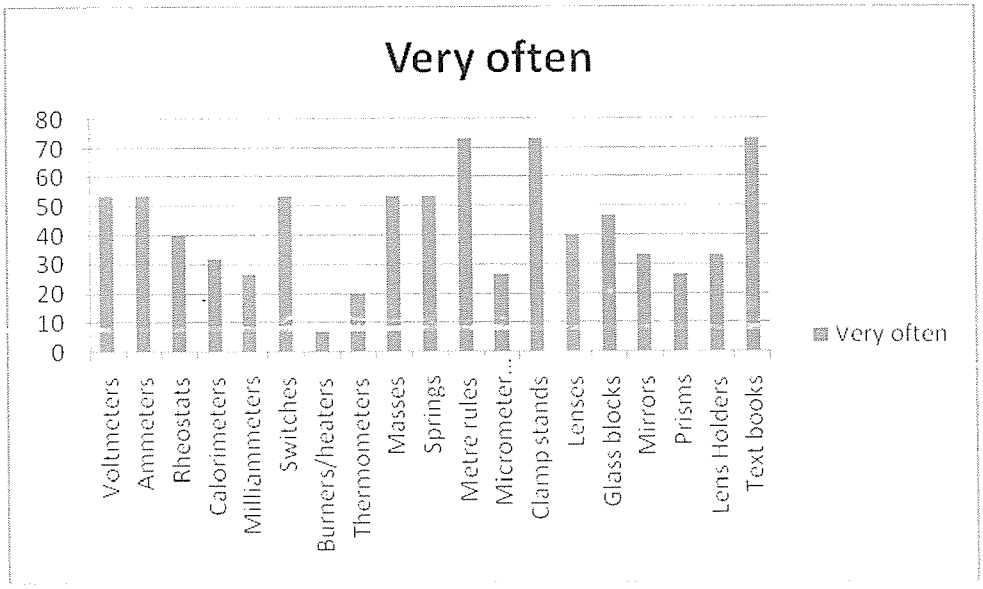


Table 4.6 Usage of Apparatus

Apparatus	Very often	Often	Not so often	Missing
Voltmeters	53.3	33.3	6.7	6.7
Ammeters	53.3	33.3	6.7	6.7
Rheostats	40	33.3	20	6.7
Calorimeters	31.9	26.4	22.2	1.4
Switches	53.3	33.3	6.7	6.7
Burners/heaters	6.7	13.3	40	6.7
Thermometers	20	53.3	20	6.7
Masses	53.3	33.3	6.7	6.7
Springs	53.3	33.3	6.7	6.7
Metre rules	73.3	13.3	6.7	6.7

Micrometer screw gauge	26.7	40	20	13.3
Clamp stands	73.3	13.3	6.7	6.7
Lenses	40	33.3	20	6.7
Glass blocks	46.7	40	6.7	6.7
Mirrors	33.3	46.7	13.3	6.7
Prisms	26.7	40	26.7	6.7
Lens Holders	33.3	33.3	26.7	6.7
Text books	73.3	6.7	-	20

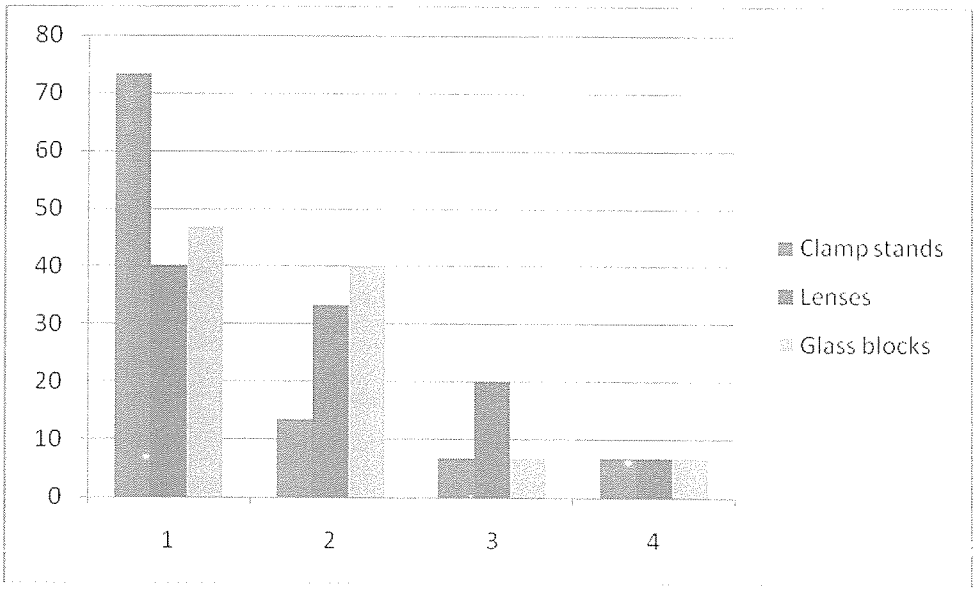
Figure 4.2: Usage of Voltmeters, Ammeters and Rheostats

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.

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

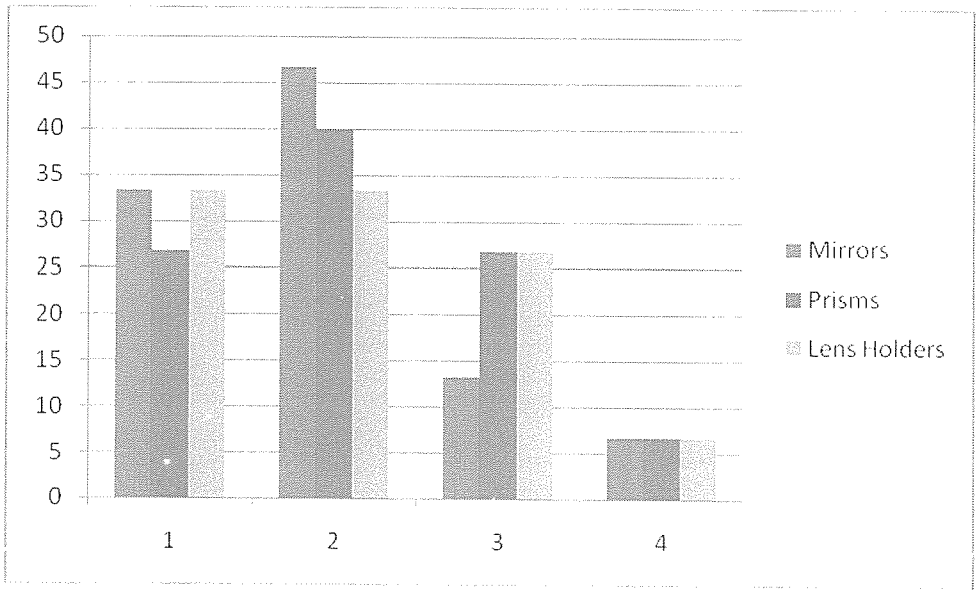
In the figure 4.4, springs can only be used with masses, hence same usage. Metre rules are used in nearly every topic in physics and so very often usage. Micrometer screw gauge is used only in measurement of very small objects therefore less usage.

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 UNEB 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



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.

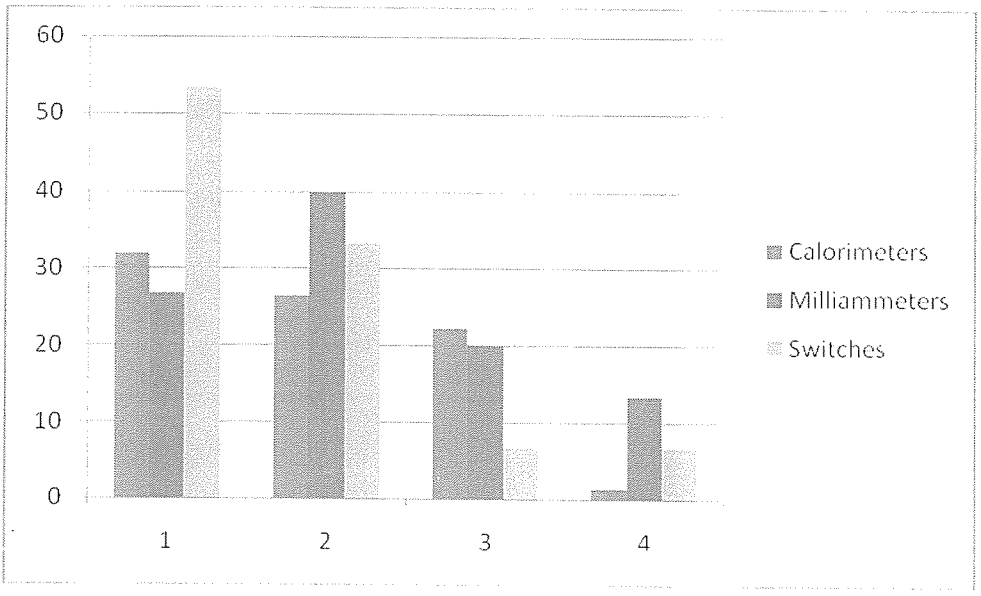
The usage of the apparatus in the laboratories is good but I strongly feels, it is group practices and therefore minimal individual participation. When it comes to final examinations then it is reflected in performance.

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 are 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 are very important. Finally checks on records breakages/losses and how fast they are replaced. These properly implemented will ensure good performance physics in the municipality.

4.5 To determine the frequency usage of laboratory equipment in teaching Physics

The research question to this objective is: What is the extent of the effectiveness of laboratory equipment in teaching Physics in Hoima municipality?

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 favor it and quotations unless otherwise

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.

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

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.

5.1 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 realize good results in the performance.

The study was a descriptive research design that was conducted in Hoima Municipality Hoima District s in Western Uganda. The study targeted all the four secondary schools in Hoima Municipality.

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 utilized questionnaires administered as data collection instruments.

5.2 Availability of required physics laboratory equipment

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.

5.3 Extent of practice with available physics laboratory equipment

The study sought to investigate how the available resources are effectively utilized. 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.

5.4 Current Status of physics laboratory equipment

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

5.5 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 practical 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 head teachers to encourage more interactions with other performing schools for benchmarking from other districts.

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

5.6 Conclusions

Based on the study findings, the researcher concludes that:

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.

The available apparatus are usually in favor of past examinations not syllabus. So most of apparatus in topics which were rarely set by UNEB 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.

Apparatus were used mostly for class demonstrations to save time.

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

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.

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

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.

Lastly, most head teachers 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 in terms of syllabus coverage and examination.

5.7 Recommendations:

This study has identified the current status of the extent of utilization 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.

5.8 Suggestions for Further Research:

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

This study was conducted only in Hoima district. 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

A. A. Oseko, (2010). Management of Physical and Material Resources in Secondary Schools in Kenyenya Division, Gucha District Kenya.

Aloo, J. O. (2009). Impact of the school based teacher recruitment policy on the distribution and retention of public secondary schools in Nyando District, Kenya Thesis.

AssaOkoth, (1972). A history of Africa Vol. 1.

Bakhda, S. (2004). Management Education of Schools, Oxford University Press Nairobi.

Douglass, H. R. (1964). The high School Curriculum 3rd Edition, New York Ronald.

Ellen, I. (2009). Secondary School. Vaughan, Steven Winter Associates, Inc. USA.

Nwangwu, N. A. (1997). The Environment of crisis in Nigerian Educational System Co-Cooperative Education, Nigeria.

Oketch, O. M. and Rolleston, C. M. (2007). Policies on Free Primary and Secondary Education in East Africa.

Maeke, E. M. (2003). Secondary School Dropout in Kolome Division, Makueni District Kenya. Unpublished M.Ed Thesis, Kenyatta University.

Savoury, N. J. (1958). "Visual aids in teaching History." West African Journal of Education, Vol. 2 No1 Pg 5-9.

Shen Yuan-hua. Fudan University Press (2004). South Africa: Physics Conference in August 2010.

Darling – Hammond, 2000; Marzano, 2007

UNESCO: Education and training of optics and photonics 2005 MinellaAlourcon.

Orodho, J. A. (2005). Elements of Education and Social Science Research Methods, 1stEdition, Masola publishers, Nairobi.

Republic of Kenya, (2005): Sessional Paper No. 1 2005.

The launch of continent wide physics society in Dakar Senegal Jan 12, 2010. KNEC Act 1980 cap 255A revised in 1981.

Sounders, D. J. (1974). Visual Communication Handbook, Teaching and Learning usingsimple visual materials, the Trinity Press, London.

Chimombo J. P. Issues in Basic Education in Developing Countries. An Exploration of Policy Options for improved delivery CICE Hiroshima University, Journal of International Cooperation in Education Vol. 8. No. (2005).

Court, D. &Kinyanjui (1985). Education in Sub-Saharan Africa. The Educational System Working Paper No. 421 Nairobi University. University of Nairobi Institute of Development Studies.

Idiagbe, J. E. (2004). Relationship between Education facilities, Teachers qualifications, school location and academic performance of students in Secondary Schools in Delta State. Unpublished PhD Thesis. Delta State University, Abraka.

Kurian, J. V. (2008). Management Strategies to improve academic Performance of Previousby disadvantaged Secondary Schools. http/hdl.handlenet/10210/922.

Munavu R. N. and Ogutu D. N. and Wasanga P. N. – (1988 – 2008): Beyond Primary education, challenges and approaches to expanding learning opportunities in Africa.

Njeri, J. G. (1990). A Study of the Utilization of Learning Resources in the Teaching of Christian Religious Education in Embu Kenya. Unpublished M.Ed Thesis, Kenyatta University, Nairobi.

Olel, M. A. (2000). Optimum Utilization of financial resources in public secondary schools, Kisumu district.

Olutola, K. S. (2000). Relationship between Educational Facilities performance of students in Anambia. State Journal of Nigeria Educational Researchers and Academic Association.

Onyango, G. A. (2001). Competences needed by secondary schools head teachers and implications for pre-service and in-service education: A case of Nairobi and Kakamega Districts (Kenya). Unpublished Phd Dissertation. Kenyatta University Nairobi.

Uwheraka, T. (2005). Analysis of Space Dimensions and Physical Facilities in Senior

Public Secondary Schools. Unpublished M.ed Dissertation Delta State University Abraka.

APPENDICES

APPENDIX A

Dear Respondent, I am Muhumuza Edward carrying out a research study intended to collect data from head teachers, teachers and students on the influence of physics laboratory equipment on students' academic achievement. You have been identified as a respondent and you are kindly requested to complete the questionnaire as illustrated in each section. Kindly answer the questions as honestly as possible and the information you give will be kept confidential and used for academic purposes only.

SECTION A: PHYSICS TEACHERS' QUESTIONNAIRE

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

.....

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.

	Frequency of Usage/term				
Apparatus	Quantity	Very .often	Often	Not so often	Not at all
Voltmeters Ammeters Rheostats Calorimeters Switches					
Calorimeters Burners/heaters Thermometers					
Masses Springs Metre rules Micrometer Screw gauge Clamp Stands					
Lenses Glass Blocks Mirror Prisms Pins Lens holder					
Text Books					

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 ☐ within1 Term ☐

After 1 year ☐

5. How fast does your head teacher react to issues covering physics

Very First ☐ First ☐ Slow ☐ Very Slow ☐

No action at all ☐

6. What would you suggest should be done by your principal to enhance you effective teaching of physics in this school.

.....

.....

.....

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

.....

.....

.....

8. 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

	Frequency of Usage/term				
Apparatus	Quantity	Very often	Often	Not so often	Not at all
Voltmeters Ammeters Rheostats Calorimeters Milliometers Switches					
Calorimeters Burners/heaters Thermometers					
Masses Springs Metre rules Micrometer Screw gauge Clamp Stands					

Lenses Glass Blocks Mirror Prisms Pins Lens holder					
Text Books					

2. How frequently do you do experiments in the laboratory?

Once a week ☐ once a month ☐ once a term ☐

3. Do you do Practical Exams in your school?

Yes ☐ No ☐

4. If yes does 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 Experiment adequately before the practical lesson? Yes ☐ No ☐

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

9. Any suggestion to improve your grades in physics.

_____

_____

APPENDIX C: INTERVIEW SCHEDULE FOR HEADTEACHERS

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 utilized to enhance performance in UCE 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, SESEMA Ttrainings?
6. Do you recommend some physics teachers to mark UNEB 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.