

**EFFECT OF THE O' LEVEL EDUCATION SCIENCE POLICY ON SECONDARY SCHOOL
STUDENTS' ATTITUDE TOWARDS SCIENCES IN NAMA SUB-COUNTY, MUKONO
DISTRICT, UGANDA**

BY

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DECLARATION

I, Mugambwa Mulwanya Judah, Reg No: **2010/U/HD/032/MEPPM** declare that this work is my own and has never been submitted for an academic award in any institution of higher learning.

Signature

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APPROVAL

This is to certify that this research work of **Mugambwa Mulwanya Judah (student) Reg. No: 2010/U/HD/032/MEPPM** entitled **“The effect of the O’ Level Education Science Policy on students’ attitude towards sciences”** has been conducted under our supervision and is now ready for submission to the University’s Academic Board with our approval.

Signature

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DR. W.W. KAMUKAMA (Principal Supervisor)

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Signature

.....

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Date:

DEDICATION

This research report is dedicated to my father Mr. Mukasa Bwabye, my Grandmother M/s Nazziwa Elizabeth, my brothers, my wife and children, as well as my course mates, friends especially Mr. Kayizi Peter Lwanga and everyone who has helped me to achieve my goal.

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LIST OF ABBREVIATIONS

A' Level	:	Advanced Level
ABEK	:	Alternative Basic Education for Karamoja
DEOs	:	District Education Officers
EFA	:	Education for All
EPRC	:	Education Policy Review Commission
ESA	:	Education Standards Agency
ESSP	:	Education Sector Strategic Plan
FAWE	:	Forum for African Women Educationalists
ICT	:	Information and Communications Technology
MoEST&S	:	Ministry of Education Science Technology and Sports
MDGs	:	Millennium Development Goals
NAPW	:	National Action Plan on Women
'O' Level	:	Ordinary level
PGE	:	Promotion of Girls' Education
PSSI	:	Presidential Support to Scientists' Initiative
GWP	:	Government White Paper
PEAP	:	Poverty Eradication Action Plan
PHC	:	Primary Health Care
PWDs	:	Persons with Disabilities
SESEMAT	:	Secondary Science and Mathematics Teachers
SS	:	Secondary School
TDMS	:	Teacher Development and Management Systems
UACE	:	Uganda Advanced Certificate of Education

UCE	:	Uganda Certificate of Education
UNCST	:	Uganda National Council for Science and Technology
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
UNEB	:	Uganda National Examinations Board
UNICEF	:	United Nations Fund for Children

ABSTRACT

The study aimed at analyzing the impact of the O' Level Education Science Policy on students' attitudes towards studying science subjects. The study was guided by four objectives; to determine the impact of making sciences compulsory at O' Level on girls' and boys' attitudes towards studying sciences; to investigate the impact of Education science policy towards provision of school science facilities on O' level students' attitudes towards studying sciences; establish how provision of refresher courses to science teachers influenced O' level students' attitude towards studying science subjects and to explore strategies for improving the O' level Education science policy's ability to make students love studying science subjects. Literature was reviewed and gaps identified and the study filled those gaps. The study used a comparative cross sectional survey research design that included qualitative and quantitative data. The total sample of respondents sampled was 150. They comprised of 5 sub county officials, 5 Head teachers, 25 teachers, 75 students, 10 lab attendants and 30 parents. They were selected using purposive and simple random sampling techniques. Data collection Instruments included questionnaires, interview guide, documentary review, focus group discussion and observation guide. Quantitative data were analyzed by descriptive statistics while content analysis was used for qualitative analysis. The study showed that students' hated science subjects, Schools suffered from inadequate science facilitation. Schools lacked competent qualified teachers. The study recommended that government provides adequate science scholastic materials to schools, there should be training and recruitment of science teachers in schools and that MOESTS should allocate more funds to cater for sciences specifically.

CHAPTER ONE

INTRODUCTION

1.0. Introduction

This chapter presents the background of the study, statement of the problem, purpose and objectives. It further presents the research questions, significance and justification of the study, scope, theoretical and conceptual framework and lastly, the definition of key terms used in the study.

1.1. Background to the problem

The Ordinary Level Education science policy is aimed at enhancing the compulsory teaching and learning of science subjects at ordinary secondary schools, (O' Level). At this level, the science subjects considered are mostly biology, chemistry and physics. For purposes of this study, a policy refers to the way of doing something and the process of doing it to achieve a particular purpose. According to Owalabi (2005), policy refers to specific proposals or decisions which permit or require an activity to be done with an intention of achieving a particular purpose. According to Thorpe, (2000), a policy is a plan of action or measure developed in response to a perceived need in order to achieve a particular purpose.

On the other hand, Thorpe (2000), defined attitude as someone's opinions or feelings about something especially as shown by their behaviors. Since the study is about science, certain science facilities need to be looked at, for instance adequacy of laboratory

facilities, such as science chemicals, and apparatus, science reference text books, and science library as well as the teachers who direct the use of these facilities by students.

This study is very important because in Uganda particularly in Nama sub-county schools, the number of students offering sciences and related courses at advanced level and tertiary institutions are very few (Previous O' level results in selected schools). Uganda National Examinations Board (UNEB) Statistics of 2008 and 2009 indicated that at 'A' level only 18.92% and 20.2% offered sciences respectively while only 15% offered sciences and related courses at tertiary level and the rest offered arts subjects. This number is still unable to provide and create a force which could take active participation in the development of the country. Therefore, it is worthwhile to study the students' attitudes towards the science subjects.

In 2005, the government through the ministry of Education instructed that mathematics and science subjects become compulsory at O' level Schools were informed that with effect from 2006, all Uganda Certificate of Education (UCE) candidates were expected to sit for sciences especially Physics, Chemistry and Biology in addition to the other studied subjects. This move is aimed at upholding government's intention and resolve to modernize the economy of this country through an appropriate and responsive science education system, (Ministry of Education Science Technology and Sports, [MoEST&S] 2005). Despite the resolution to make sciences compulsory at O' Level, Uganda National Examination Board (UNEB) results of 2012 and 2013 indicate best overall passed subjects being Geography and English respectively which are arts subjects calling for special emphasis upon science subjects.

The content and guiding principles for the O' level science policy according to the Ministry of Education Science Technology and Sports (2005) are:

- (i) Science education is compulsory at O' Level.
- (ii) Each school must at least have one science teacher per science subject.
- (iii) Schools should have sufficient instructional materials and science equipments.
- (iv) Schools should each have a laboratory or a science room.
- (v) Promotion of practical education through demonstrations by both teachers and students.
- (vi) Science education should be linked to the global market demands; here students must be introduced to digital science and ICT.
- (vii) Curriculum reforms/review at primary and secondary education level.
- (viii) SESEMAT Programmes with Technical support from Japan International Cooperation Agency (JICA) be introduced.
- (ix) Encourages girl child to pursue science careers.
- (x) Increased intake of science students at Public Universities.
- (xi) E-learning/digital science project.

Owalabi (2005) observes that a policy must have a purpose clearly written or implied, which must be an achievable purpose. Therefore, the major aim of science education is to encourage pupils and students at primary and O' level secondary schools to think creatively and act as responsible scientists through providing opportunities for them to acquire knowledge and understanding of relevant concepts. Lyazi, the Assistant - Commissioner for Education (2004) stated that this is achieved through practicing the problem solving and practical skills associated with the scientific process of inquiry.

Arinaitwe (2007), observed that it was very important that African countries critically review their position, support and involvement in science and technology programs. One way to achieve these is by instilling and nurturing scientific skills in student's right from their early stages of learning. Arinaitwe (2007) stressed that it was better they are taught science education when they are still young with fresh brains to produce science problem-oriented and problem solving brains.

The acquisition and application of the knowledge of science and technology is very crucial for the development of Uganda's National wealth. The science policy should produce thinkers and innovators in sciences. Therefore, the O' Level science policy intervention is the government mission of transforming Uganda from a poor peasant society into a modern, industrial, united and prosperous skilled working and middle class society, as stated by the Ministry of Education Science Technology and Sports, (2005).

Due to the national demand and social dynamics, science and technology teaching must undergo reforms at all levels of education. The Kajubi Report, (1989) recommended that science and technology teaching must undergo reforms. The result of this was a Government White Paper (GWP), in 1992 that studied and analyzed the problems and many gaps in the education sector in Uganda. These problems included the curricular and science education and utilization of ICT, both in primary and secondary schools, which do not cater adequately for the social and economic needs of the country. The education system was not adequately equipping the individuals to become productive and self

reliant, and that the education system had not been fully focused towards scientific skills development which would result to national growth.

On the other hand, Uganda National Council for Science and Technology (UNCST, 2007) pointed out that students' attitudes about science policy may be affected by other factors, which include:

- (i) The social economic status of their families.
- (ii) The nature of the teacher who facilitates the learning process.
- (iii) The nature of the school where the student acquires the knowledge, that is rural or urban, boarding or day, mixed or single schools.
- (iv) Gender status of the students (male or female).
- (v) Age of the student.
- (vi) Parents and peers that the students associate with and others.

In the same UNCST (2007) report, it is, however, observed that adequate preparation of all the science teachers and head teachers for the proper implementation of the science strategy is so much necessary since science teachers and Head teachers are so vital and critical in the implementation of the science policy. Their role and perception are as well very important as far as this policy is concerned. Therefore, Head teachers and science teachers need to be mobilized so that they are part of the Ministry's policy for popularizing and emphasizing the teaching of science in schools (Ministry of Education Science, Technology and Sports, 2008), hence the success of the science policy in O' Level schools such as those in Nama sub-county.

There seems to exist an unclear relationship between the implementation of the O' Level Science Policy and students' attitude towards studying sciences.

1.2. Statement of the problem

The O' Level Education compulsory science policy is one of the means aiming at creating scientists and a critical mass of society with adequate science knowledge that will propel the country towards an industrialized and modern economy. This is intended to be in line with other policies, such as the Poverty Eradication Action Plan (PEAP), Vision 2025, Primary Health Care, Education Sector Strategic Plan (ESSP) all of which emphasize use of scientific knowledge for development and modernization of the economy.

Following the current technological trend of development in the world there is a need for scientists in any economy. The possibility of creating scientists has not been realized because many students ignore science subjects with an assumption that sciences are hard, meant for bright students, expensive and so on. Because of such assumptions, the students' attitudes have been greatly influenced in various directions and so government thought it wise to change such perspective by giving the students an opportunity to try them at least at O' level. Being compulsory, however, beats one's understanding since it is believed that one does something better if he/she loves it, Taylor (1985).

The problem therefore remains to ascertain how the implementation of the O' Level Education compulsory Science Policy impacts on the students' attitude towards studying sciences.

1.3. Purpose of the study

The study was intended to establish the effect of the compulsory O'Level Education Science Policy on students' attitudes towards studying science subjects.

1.4. Objectives of the study

Specifically the study sought to:

- i Find out how making sciences compulsory at O' Level has influenced girls' and boys' attitudes towards studying sciences.
- ii Investigate the impact of the compulsory O' level Education Science Policy of providing school science facilities to schools on O' level students' attitudes towards studying sciences
- iii Establish how provision of refresher courses to science teachers (re-tooling) has influenced O' level students' attitude towards studying science subjects
- iv Explore strategies for improving the O' level Education science policy's ability to make students love studying science subjects.

1.5. Research questions

- (i) To what extent has making sciences compulsory at O' level influenced girls and boys attitude towards studying science?
- (ii) To what extent has the provision of science facilities to schools influenced O' level students' attitude towards studying science subjects?
- (iii) To what extent has the provision of well trained science teachers' influence O' level students' attitude towards studying science?
- (iv) In what ways can the policy be empowered to improve O' level students' attitude towards studying science subjects?

1.6. Significance of the study

- (i) Schools will have an opportunity to learn better methods of teaching science subjects.
- (ii) The study will reveal the challenges students face while studying science subjects and so will provide possible means for better learning of sciences.
- (iii) Teachers' will identify their weaknesses and strength that shall later be worked on accordingly to enhance better presentation and subject deliverance to have effective student's attitude and learning.
- (iv) The study will indicate ways to boost students' attitude and love towards studying sciences. This shall in turn contribute to the overall government objective of increasing its population of scientists for technological development in the county.

1.7. Scope of the study

1.7.1. Geographical Scope

The study was carried out in both government and private aided secondary schools in Nama sub-county, Mukono District. These included mixed and single sex schools both boarding and day schools were consulted for the study.

1.7.2. Content scope

The study was limited to the science subjects, namely, physics, chemistry and biology which are taught in all of these schools. The study was specialized upon Ordinary level to establishing how making sciences compulsory at O' Level has influenced girls' and boys' attitudes towards studying sciences. It further investigated the impact of the Education science policy of providing school science facilities to schools and provision of refresher

courses to science teachers on O' level students' attitude towards studying science subjects and identifying strategies for improving the O' level science policy's ability to make students love studying science subjects.

1.7.3 Time scope

This study included schools started from 1930-2006 and their participation in O'level education science policy looked at from 2008-2015, covering a period of 7 years. This was when low performance was experienced by schools (Mukono District Committee Report, 2012).

1.8. Theoretical perspective and conceptual framework model

1.8.1. The process - based learning in science

Science is about understanding the world around and developing concepts that help this understanding (Jenkins, 2003). However, this takes place from within the learner and that new and useful knowledge is added to the already existing one in the pupils/students. This is consistent with the theory of "Constructivism" in which students' existing ideas are recognized and taken as the starting point for learning, and then these are related with the students' or pupils' experiences and observations [Mintzes et al, 2005].

1.8.2. Conceptual framework model

During policy implementation and evaluations, there are a number of groups of persons and other factors that interplay and influence the science policy as observed by Najam (1999). These variables influence the success of the compulsory teaching and learning of sciences in Nama sub-county.

From the general purpose of the study, it's observed that the independent variable indicators include:

Compulsory teaching and learning of sciences at O' level –i.e. all girls and boys study sciences at O' level, Provision of science facilities to all O' level schools, Retooling O' level science teachers, Availability of science equipments, School Inspection, Training of science teachers, availability of science Funding, Accommodation, Supervision and monitoring, Teachers salaries, Enforcement and implementation, Seminars and workshops, Provision of science facilities to all, O'level schools laboratories, textbooks, enough classrooms, Re-tooling of O' level science teachers, Recruitment of science teachers.

On the other hand, the dependent variable included a positive attitude towards the O' level science subjects evidenced through courage to study the subjects, friendship with subject teachers, Response to assignments, minimal science phobia among students especially girls, increase in the number of students taking science combinations at A' level, positive attitude towards science classes, better grades, High level of professionalism amongst teachers, High student grades at O' level and Science exhibitions.

Students' attitudes towards the study of science subjects may be positively evidenced through high scores in science subjects, acceptance of the policy, and vice versa negatively like non attendance in class.

Figure2: Conceptual framework

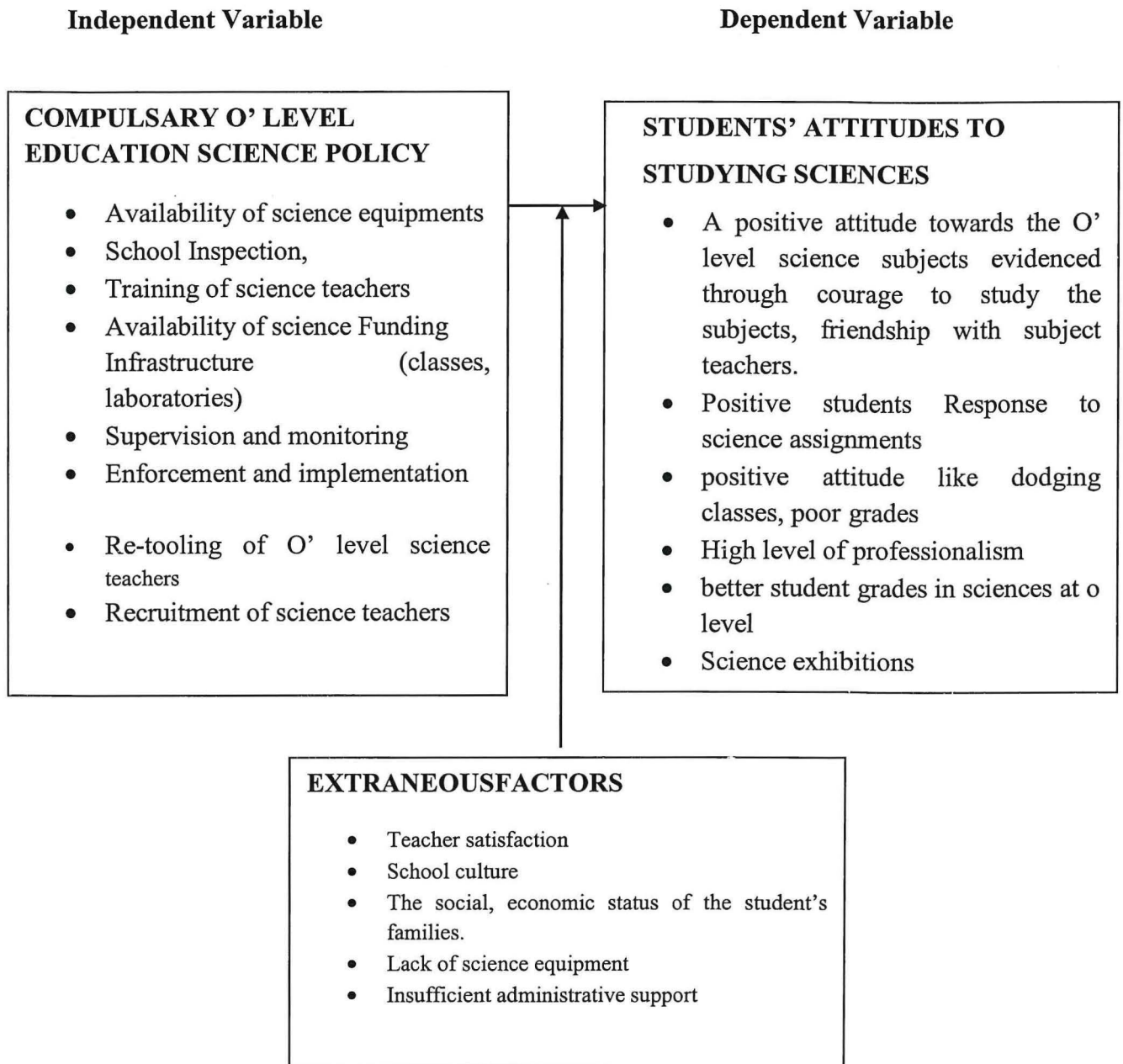


Figure 1.1: Modified conceptual frame work adapted from Mohamed. S, Pisapia J. and Walker, D.A (2009) optimizing state policy implementation

According to this frame, various aspects come into play in influencing the effect that O' level science policy has on attitudes of students on studying sciences for instance

instructing the science subjects to be studied on a compulsory basis, provision and availability of science facilities, gender of students. On the other hand, some extraneous factors like teacher satisfaction, school culture and student's family status. In this study extraneous variables were controlled by elimination. The research instruments focused only on the independent and dependent variables not extraneous variable. This was because they were not part of my study but the purpose was for me to be aware of them so that I could eliminate/control their influence.

CHAPTER TWO

LITERATURE REVIEW

2.0. Introduction

This chapter presents reviewed literature based on four themes indicated in the objectives.

2.1. Compulsory science policies and girls and boys attitude towards studying sciences

Generally science education provides all pupils and students with a basic understanding of physical and biological scientific phenomena and equips them with means of dealing with practical, social and economic issues. However, it has been noted that students have different attitudes towards the science education in Uganda and the world over, (UNESCO, 2001).

SESEMAT Report (2006) observes that the gender of the student contributes to the positive or negative attitudes towards the study of science subjects. Statistics show that 73% of students who sat UNEB science exams at A level in 2013 were boys leaving only 27% as girls. This indicates that there are more boys who love and pursue science related courses than the girls. However, this is contrary to students in single sex boarding schools, especially in the case of girls as these can perform really well in science subjects in these schools (Naturinda, 2012).

According to the Ministry of Education, Science, Technology and Sports (2006), more males (56.2%) in Uganda enroll in secondary schools than females (45.2%). UNESCO (2001), stressed that the education of girls and women at large has lagged behind than that of boys or men in Uganda, as well as in any other developing countries. This was attributed to a variety of factors like the tendency to think that science subjects and

courses can only be done by men, sexual discrimination, cultural diversities that presume that a woman is supposed to keep and maintain a home.

Jenkins (2003) indicates that the number of girls studying science and technology is low in African countries and it becomes lower as one gets higher in the education system. At the end of compulsory schooling, many girls developed a permanent resistance to science subjects and were not likely to pursue any further studies in these subjects. This was attributed to presumptions that scientific work was for heavy duties like engineering that women could not manage. This has actually been reflected in the teaching profession, where there are few female teachers qualified in science (SESEMAT, 2006).

SESEMAT, (2006) further stresses, much as science subjects have been made compulsory at O' level, still girls tend to lose interest, fear the subject, they are less active and as a result get less marks and hence poor performance in schools. The report further states that in fact, girls in some of these secondary schools are discouraged to continue with the science subjects at higher levels. There is generally lack of a conscious and concerted effort nationally to encourage girls to perform as well as the boys.

Now that science has been made compulsory what the girl's and boys' attitude towards the policy be?

In addition, UNESCO (1995) found that in broader terms boys achieve higher levels of performance than girls in all branches of science, and especially in physical science, the gap being greatest in physics and smallest in biology. In Canada, a survey showed that while boys did better than girls in practical tests that required the use of scientific equipments and laboratory techniques, girls out performed boys on practical items related to the environment. The girls are often cautious in their entry to a situation, wanting to

know how, why and whom it was for while the boys on the other hand seemed not able to start into an activity without knowing much but were only prepared to work without considering the whole situation, as observed by Murphy (1998).

There is an assumption that science subjects lead to jobs that are more of a physical nature than the Arts subjects. This in turn puts off some weak students who unwillingly opt to study disciplines they think are easier. However this assumption is not always true.

Ajuna (2012) further explains that because sciences are considered a boy's preserve, girls who venture to study them often find themselves in a hostile male environment. This creates a distasteful attitude to sciences. In view of this, there is need to launch a serious campaign to improve female students' perception of sciences; this can be done by nurturing a culture in them of embracing sciences at lower educational level, say at secondary schools; so that this undesirable bias can be eliminated to bridge the gender gap.

UNESCO Report (2001), argues that the obstacles to gender parity are embedded in the cultural norms and practices valued by the patriarchal arrangements of our society. Many science teachers, educators, text book writers and doctors are likely to be men; this brings a bias to girls and creates disadvantages to their decisions of being good scientists UNICEF (2005).

According to the UNICEF Report (2005) it's observed that many of the jobs after the science education seem to be masculine which mainly favors the boys for example handling machines in engineering. It further says that the science subjects are generally believed to be hard, complicated and abstract; whereas girls are more emotional, they are

related to those subjects that are emotional, such as history, while the boys are related to those that are strenuous. This affects attitudes in a way that compulsory studying leaves no room for optional choice but studying sciences for the sake of completing the exams.

In an effort to promote equality among both boys and girls, there was an inauguration of The Girls' Education Movement in Africa (GEM) which aimed at promoting gender parity in education through enabling girls to realize their rights to participate and enhance in the education issues. GEM specifically targets girls with special needs and creating awareness among the communities about the benefits of educating girls.

Ajuna (2012) explains that when you understand the topic, you get more interested in it and sciences as a whole. She further says sharing experiences between secondary school students and old girls as well as old boys, can help girls to improve and work hard on their science performance and have a good attitude towards the subject.

UNCST (2007) advised that students should be taught science subjects with plenty of practical applications if they are to appreciate and learn science easily. She also advises that teachers of sciences and mathematics should teach students, step by step, they should be grouped according to their learning abilities; that are the fast learners and slow learners.

Ajuna, (2012) explains that from early on, government sought to address the gender disparity in education as part of the broader women emancipation campaign by introducing a bonus of 1.5 points to the university entry in 1990. This would encourage and boost the performance of girls in sciences.

According to UNESCO (1998) there is low enrolment of girls for science subjects and this is attributed to the fact that teachers, parents and society at large usually use remarks which are both belittling and offensive to girls in regard to sciences among other challenges. On the other side boys are praised for studying sciences than women all impacting on the students' attitude.

Ajuna (2012), observed that the percentage enrolment for girls in the arts courses in Makerere University have increased tremendously, as signified by the data for the 61st and 62nd graduation ceremonies (2011) and (2012) respectively. However, for science courses, the situation is different. The data for the same graduation for the same institution reveals that the gender gap in science courses is still wide.

Out of 43,700 students that graduated in 2013, only 16400 were female. Of these, the total number that studied science related subjects were 14821 and of these 10070 (67.9%) were male while the women were 32.1%.

The Education and sports Minister Jesca Alupo (2012) noted that only 20% of the candidates usually sit for science and mathematics subjects, which she said must increase. She said that "several other students must sit for these subjects but if we are to go at this rate, the country will run the risk of missing science-based development programmes." She further explained that the government stopped sponsoring most arts courses over five years ago at public universities but it is sponsoring science courses, so it is better students improve in sciences right from O' Level and A' Level in order to benefit from this state scholarships. Statistics from the University admissions office show that several girls are losing out to boys on government scholarships for science courses.

Also in 2001, the Female Scholarship Initiative (FSI), a partnership between Carnegie Corporation and Makerere University was introduced. Its major aim was to support the poor female students who qualified for private sponsorship for science courses at the university but could not afford to pay tuition. The scheme was implemented for 10 years (from 2001-2010) and mainly targeted science students (girls) MOESTS report (2013)

Meaningful reallocation of resources to the secondary levels will be implemented, because, it is where the problem stems from. Since few students do science combinations at A' Level of which few female students form a small percentage, hence resulting into a small or low number of those who pass to join the University to do sciences.

In addition to the above SESEMAT Report (2006), recommends that girls/women can study and use the science subjects as well as boys/men. Therefore teachers must be properly trained to be sensitive to gender issues and must especially be sensitive to the needs of the girl child. The girl child should be adequately grounded before the adolescent stages. Women should be encouraged to take up the teaching of science subjects and thereby providing the role models. It further stresses that sensitization seminars for teachers and students (particularly the girl child) on attitudes towards science subjects should be regularly organized. Therefore special efforts should be made by the different stakeholders in encouraging and motivating girls in the studying of science subjects.

There are social-cultural presumptions that girls remorsefully accept to study science subjects but there are also boys who don't want to study sciences. Boys sometimes look at themselves as the brighter and opt for sciences even though not bright. Tendencies to

refer to good performers as bright students greatly impacts on students as boys are the ones expected to be brighter and supported by the girls (SESEMAT Report, 2006)

In conclusion, the implementation of the policy and the indiscrimination of both boys and girls in studying of science subjects need to be critically analyzed so that both girls and boys improve their attitudes. This gap is what is yet to be later on covered in the study.

2.2. Provision of School science facilities and students' attitudes towards studying sciences

Science and Technology in Uganda (2000-2005) observes that facilities in schools range from the basic infrastructural requirements like science laboratories, chemicals and apparatus, science libraries and science textbooks; classrooms and sanitation facilities as well as teaching aids such as electronic and science text books. The world is now undergoing a computer revolution and computers are now part and parcel of the basic science teaching and learning. All these and others have a direct impact on the performance of pupils and students. Presence of such facilities at school gives a direct exposure and practical touch which makes them gradually love the subjects.

SESEMAT Report (2006) observes that the resources and facilities are in constant short supply while others are very expensive only being affordable by few schools and students in urban areas. The report further notes that laboratories are rare while those available may not be of the required standards for instance, some are too small, lack necessary working tables, water facilities, ventilation mechanisms, while others may not have equipments or chemicals to use. There may also be poor utilization of the available

resources where they exist. For instance, some teachers may not be using them for practical experiments. It was also observed in the report that where some libraries exist they are empty rooms without the facilities. In some schools, there is overstocking of some chemicals and equipments, but unfortunately, some teachers do not have the technical knowhow or knowledge to use them; others are just reluctant or lazy and thus rendering students a disservice not to acquire practical skills. In some other cases some of these chemicals get expired without being used. The tendency to safeguard the apparatus limits the students' exposure offers them a disservice. This also brings out the assumption that these equipments are too expensive to waste and if found with them all the time, you may be forced to buy them. This affects the students' attitude towards sciences.

SESEMAT Report (2006) further notes that most of the science text books on the market and in schools are imported and very expensive to be afforded by a few students. Some of these text books do not have the recommended quality work; others contain abstract information for the students. Therefore, government should ensure that there is provision and adequate use of these resource facilities in schools and colleges to ensure effective teaching and learning of the science subjects.

A report of the Ministry of Education, Science, Technology and Sports' Planning Department (2010) indicates that the education system, especially in the secondary schools, is characterized by teaching a wide range of subjects in the ordinary level (up to 19 in some schools). This leads to a more theoretical coverage of the science subject

materials. This situation is not improved by the low teacher to student ratio, especially in most of the public schools.

Jenkins (2003) supplements that there are few science laboratories in secondary schools; and where they exist, they are ill equipped. In fact most private schools do not seriously handle science disciplines. All these do not only deny the students the chance to acquire scientific practical skills, but also kills their interest in science disciplines. Once someone loses interest, then it may be hard to do it well even if forced. Such a similar situation happens even to the students demoralizing their attitude despite the compulsory obligation.

There is misappropriation of funds by people in positions that are meant to foster science education, research and technology. Shoddy laboratories, library, classroom building works have been constructed and stocked with faulty apparatus, and expired reagents. This is not helped by lack of vigilance, on the government side, in combating such behaviors.

In most cases, there are still limited resources available for science instructions in most of the schools within the country. Whereas some children make it to the good schools, most of which are privately owned, the majority of the Ugandan children are from poor families and can only access public schools which are less equipped with laboratories, library, reagents, computers among others, to cater for the large numbers of students. Therefore in such situations the development of scientific skills is crippled. This at times causes the children from poor/ humble background to think that science is not meant for them but for those in better schools. This gradually affects their self-esteem and self-actualization thereby being negative to the compulsory study of sciences. (Opio, 2011)

Also there is lack of up-to-date and reliable data on which employment and career opportunities are science based. The text books used do not possess simple languages and vocabulary needed to express scientific concepts, so learners or students are still disturbed with the hard languages used in the text books.

2.3. Provision of well-trained Science teachers and students' attitude towards studying science subjects

Much as the government advocates for the policy, less can be done without teachers and their characters.

Ajaja (2007) denotes teacher's qualifications to teach the science subjects, their regularity or availability at school for the students, the methods they use to deliver the scientific concepts to the students and their way of evaluating the students at the end of teaching and learning process and the relationship with the learners and fellow teachers. Good teachers know how to boost their science classes for their students and likewise poor teachers demote their students' attitude towards sciences.

Ajaja (2007) further supplemented that apart from the poor state of infrastructure which has negatively influenced the teaching of science subjects in schools, the science teachers themselves are not well positioned to teach science effectively. Their deficiencies range from the use of inappropriate teaching methods for teaching sciences, to having less or no required qualifications. Teaching is largely teacher-centered dominated by factual materials, obstruction, dictation of notes and some few demonstrations. Furthermore teachers hardly draw in the needs, preferences, differences and experiences of the learners. Lessons are also overloaded with materials which make the subjects appear abstract.

Munene et al, (2001) conducted a study on teachers work experience and students experiences as determinants of achievements in schools. They reported among their findings that teachers are unkind, abusive, unfair, uninterested in teaching, paying attention only to those bright enough to follow, collect exercise books for marking but do not mark them or some time take long to mark and return them. They also observed that in classroom some teachers teach without instructional materials especially in poor performing schools and mainly give out notes to students to copy. This deprives the students of the creativity I class with exposure of apparatuses and other practical science skills.

Further, it was observed by Munene et al, (2001) that lessons were heavily teacher-centered with minimal students' participation. In general teachers used chalk and talk method in the classroom and dominated the class; they did not feel confident in using innovative teaching methods such as practical work, role play, using local environment or improving on the teaching materials. Cases where students were involved yielded enthusiasm among them that they could do the same while in the field in the world of work. This was already a motivator to study sciences even without making sciences compulsory.

Mwanamoiza (2001) also noted that teachers are not well trained in more student centered and interactive styles and strategies. They do not feel confidence in using innovative methods. Little time is given to experimentation or practical approach in science subjects. He noted that teachers are trained using no better methods than those they use in schools that is to say teacher-centered methods. He noted that many teachers have poor attitude towards teaching science subjects. Teachers use text books approach,

they use examples and exercises containing data which is not from their environment. He further noted that most teachers are not properly nurtured in solving science problems especially problems requiring cognitive and discovering approach. Teachers of this nature evade teaching certain things that appear difficult to them even though seem useful in the future. The challenge with this practice happens when students come across the earlier avoided topics in future. These topics or areas of study then appear hard and demoralize the students' attitudes. This challenge requires a revision of as to whether the teachers cover all the content expected of the science syllabus as it is designed to lay a good foundation for the student.

Most teachers do not have adequate science background and tend to stick to what they know best but not proposing any changes in the academic syllabus. According to NCST (2000) report on science, it was observed that few science teachers are being trained to meet the expanding demand for them in the increasing number of schools. A large number of students admitted in teachers' training colleges and other tertiary institutions come in with poor grades in sciences. The training has relatively little science content but more of training in teaching methodology and so recommended a revisit. Also noted in the report was that the conditions of service of the teachers are not conducive to good performance in that their professional growth has not been clearly established.

2.4. Ways of empowering the policy to improve students' attitudes towards studying science subjects

2.4.1. Education Reforms and the empowerment of the compulsory science policy

New reforms in the delivery of secondary education have been made by the Ministry of Education, Science, Technology and Sports. The designed reforms include making core

science subjects compulsory in addition those offered at O' Level making the minimum number of subjects offered at O' Level to be 10 out of 22. Restructuring the School Inspectorate Department which inspects schools to assess the level of teaching and learning activities. These are coordinated by the Education Standards Agency (ESA) under the Directorate in the Ministry of Education Science Technology and Sports. There is also assessment of the academic achievements currently done by the Uganda National Examinations Board (UNEB). The Board sets standards. This is a direct implementation of the O' level science policy hence boosting the morale and attitude of the students. UNESCO (2000), observed that science subjects in Italy and Russia were compulsory at secondary school levels. The state gives adequate grants to science students, also brighter students from middle class families get admitted to science classes and they are sponsored by government. This empowers the policy and improves on the student's attitude towards studying science subjects.

2.4.2. Improvement of ICT in Science and the empowerment of the compulsory science policy ability to motivate students to study science subjects

The effective use of Information and Communication Technologies (ICT) is very important as far as the promotion of teaching and learning of science subjects are concerned. This involves ICT literacy; where teachers and students in secondary schools are prepared in the use of ICT. This is done by learning the basic computer skills and some principles of the computer operations. This empowers the policy to boost students love for sciences since they see the applicability of computer skills in to today's world. Examples of computer applicability are the facilitation of research using the internet, data storage and communication among others.

ICT programs are being used in secondary schools to learn science and mathematics. Teachers and students use ICT facilities like the computer, the internet programs such as the World Wide Web (www) as a learning device to learn science and mathematics. Using these technologies teachers has global access to scientific information, data bases, teaching materials and resources such as museums and science centers. Through the web, they can also communicate rapidly with teachers in other parts of the world about certain topics of particular interest or concern or difficult in teaching science.

At the same time students can benefit in similar ways for instance down loading data or photographs or completing a certain project on a topic. Also using the programs of ICT like the internet, students find some scientific concepts simplified with better illustrations or examples as well as simplified topics in text books which would otherwise be simplified topics in text books which would otherwise be hard without the internet as explained by UNESCO report (2000). Much science can be studied on line. In Namibia, computer science is only taken by students of mathematics (Khatis, 2012). In Uganda, the introduction and improvement of ICT in secondary schools would very much help in the implementation of O' Level Science Policy. This becomes possible as use of these for scientific machines attracts students' love for sciences.

UNESCO (2003), further explains that in practice, how science or technology is taught is strongly influenced by how and what has to be taught, by what is assessed, by the resources available, by the teachers own academic and professional background and by the cultural and social norms. However, there is shortage of science teachers who can deliver such. In addition, some science teachers sometimes teach subjects for which they

have no training, and science itself is sometimes taught by teachers without any scientific qualifications.

2.4.3. Effective teaching and the empowerment of compulsory science policies to motivate students to study science subjects

Literature from SESEMAT (2006) reveals that for improved performance to be attained in the science subjects it requires the understanding of the students need so that teachers can support them. The teaching and learning process should be based on a strong foundation of encouragement through positive attitude of the teachers and the learners.

It further explains that an effective way of learning science and mathematics is by inquiry, investigation, problem solving, and experimentation and interact. These will promote learner's understanding of science, mathematics and technological concepts and skills.

A lesson should have appropriate act using the available resources to assist the learners in achieving the set objectives. These activities should be interesting to the learners and within their ability in order to assist them concretize the science concepts and arouse their curiosity.

It is also important that learners are given an opportunity to think of all the alternatives to help them deepen their understanding of the concepts. To achieve this, the learner must be encouraged or motivated to learn how to learn.

In Japan, the Ministry of Education (1995), observes that science and mathematics are compulsorily taught in secondary schools.

According to Ochan (1995), it was noted out that motivation is very paramount in the teaching and learning of all science subjects. Motivation influences better performance

in the teaching and learning of science and mathematics. Therefore, strategies that influence motivation of both teachers and learners must be developed. There is no reason for making a science class dull and uninteresting. The task of stimulating children to learn lies squarely on the teacher.

First of all, know your students well; by names, their strength weaknesses, interests, ambitions, interests in classroom. Secondly, the environment in which the students is emerged pleasant and supportive to learning, classroom should be kept clean, desks and chairs neatly arranged and relevant pictures or visual aids neatly displayed on the walls.

Be well prepared for the lessons. Be energetic and enthusiastic in what you are going to teach. Use interesting strategies or methods such as experimentation, real discussion and role playing, simulations, games and others. Ensure that the learner knows what to do, when and how to do it.

Students should be told the usefulness of now or in future of what they are learning by studying the science subjects. Treat your students as responsible beings; be friendly, personable and understanding.

UNCST (2007) reveals that the nature of science and mathematical assignments and exercises determine the students' opportunities for having improved performance, good innovative tasks provide stimulus for students to learn science subjects and develop skills for applying them in solving specific problems. Teachers should therefore develop worthwhile tasks and materials that will develop positive attitude towards science and mathematics. These activities will improve the students' attitudes positively towards studying the science subjects.

2.4.4. Guidelines on a Science for all curricula and the improvement of students' attitude towards studying science subjects

Science and mathematics are now compulsory subjects in secondary schools and with the growing number of students at secondary school education levels have resulted into different abilities and future aspirations and automatic promotion. Therefore with this rapid increasing numbers of students, there is more need for continued science education; hence there is a need for the O'Level Science Policy. In line with worldwide trends, scientific literacy needs to be developed for the majority of the students especially at secondary levels in order to enhance its relevance. This can be done in terms of curriculum development, provision and implementation.

In USA, the impact of the industrial revolution led to the compulsory teaching and learning of science subjects from 7-17 years of age as observed by UNESCO (2000), science report.

According to Opiro (2011), the government would obtain its policy objectives in increasing the number of scientists in the future; it should cater for the following;

- (i) It should be based on daily life experiences of the learner's needs, relate to the resources of their real world, and have applications in their work.
- (ii) It should enable learners to acquire and master useful skills.
- (iii) It should make the learners recognize and appreciate the importance of science and technology in the national development.
- (iv) It should enable the learners to utilize wisely the resources in the environment and to live more harmoniously with nature and society.
- (v) Students must understand and feel confidence with the science they are studying.

Secondary school programs should aim at providing a broad base of scientific literacy to all students and should aim at motivating interested students to pursue in-depth science studies. They should pay more attention to generating curiosity and creating enthusiasm in science and helping students to understand scientific phenomenon in the world around them.

Trowbridge et al (2004) suggested that there is need to make the curriculum more responsive to the local needs or issues such as environmental degradation, low agricultural production, high infant mortality rates, HIV/AIDS epidemic and others, as observed by Report State of Science in Africa. It further stresses that, create better curriculum balance by providing more emphasis on skills to solve real life problems in syllabi and including more life-related examples and applications in text books.

Therefore the teaching and study of sciences should have clear visions on what society-related needs are. Say it should prepare them for future employment; address social economic problems, student related needs say, developing personal skills and subject related needs (preparing for higher education levels). In this way the students are empowered to appreciate the use of science application hence improving on the students' attitude towards science subjects.

Jenkins (UNESCO, 2005) explains a number of strategies on gender issues as concerned with scientific and technological education. These include; efforts are made to make clear policies on gender issues for schools and other institutions concerned with the scientific and technological education.

Every effort should be made to ensure that curriculum content, school text books and other curriculum materials are available to make it possible for adapting courses to

accommodate issues that girls are likely to find relevant. Opportunities should be provided to develop girls' confidence in handling equipment and apparatus, including computers.

Role models are important for girl students, say, encourage other women scientists and technologists to discuss with the fellow girl child, say using radio, television and print media.

SESEMAT (2006) recommends that science teachers should be encouraged to make use of the available resources and some chemicals and apparatus this can be shared. There is a need to guide the newly recruited science teachers by the head of departments on the selection of contents and appropriate methods of teaching science subject. Learners with teachers should be encouraged to create positive attitude towards science subjects using the learner- centered teaching methods rather than the teacher-centered approaches that involve the just dictation of notes.

This develops girls' attitude towards compulsory learning of science subjects hence improving the policy.

CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter presents the study design, study area, study population, the sampling strategy, data collection instruments, testing for the validity and reliability of research instruments. It further indicates the procedure of data analysis and then the probable limitations of the study.

3.1. Research design

The researcher used a cross sectional survey design because this measures the extent of change over a given period of time (Amin, 2005: Croswell 2009 & Kumar 2011). Studies of this nature can also be more productively undertaken and data can be collected from a population in a short period of time and then results generalized to represent the entire population of the study (Amin 2005). The study employed qualitative methods to address the gaps left by quantitative data (Nassozi, 2010).

3.2. Study area

Nama sub-county in Mukono district was considered for the study because the performance of schools in science subjects is very poor just like elsewhere in the country UNEB (2012). Nama County is boarded by kyampissi in the north, Kyabakadde in the west, Nagojje in the south and Mukono central in the east.

3.3. Study population

The study population included 5 sub county officials, 5 head teachers, 25 teachers, 75 students 10 laboratory attendants and 30 parents totaling to 150 sample sizes. These

respondents were considered because they are directly involved in the implementation of the education activities Education act (2008).

3.4. Sample and Sampling strategy

The study involved 150 respondents. This involved 75 students as these were the ones largely affected by the policy implemented, and policy implementers who included 25 teachers, 5 head teachers as well as some district and sub county education officials, parents. Policy implementers were included as these greatly determine the success of a teaching or learning program.

The study was conducted in selected secondary schools in Nama Sub-County. A total of 150 respondents were selected to participate in the study. Table below shows the breakdown of the sampling strategy.

Table 3.1: classification of respondents

S/N	Category of respondent	Target Population	Sample size	Percentage sample	Sampling techniques
	schools	7	5	71%	Stratified sampling
	Sub county officials	10	5	50%	Simple random
	Head teachers	7	5	71%	Purposive sampling
	Teachers	100	25	25%	Simple random
	Students senior (3& 4)	750	75	10%	Simple random
	Lab attendants	14	10	71%	Purposive sampling
	Parents	210	30	70%	Simple random
	Total		150		

Source: Morgan and kruijie 1970

Stratified random sampling was applied in choosing schools from the only two sub counties of Nama County. Simple random was applied to students, teachers, sub

county officials and parents and it gave everybody chance to be considered for participation in the study (Amin 2005).

Purposive sampling; this was defined by Gay et al (2003) as one which involves selecting a sample based on experiences or knowledge of the group to be sampled and the subject matter. This was applied to Head teachers because of their positions that they hold, the researcher believed they had experience and information about education science policy in O level.

3.5. The research instruments

The instruments which were used in this study included questionnaires, interview guides, documentary review, observation checklist and focus group discussions. The researcher was concerned about collecting views, opinions, perceptions, feelings and attitudes of the respondents.

3.5.1. Questionnaires

Questionnaires were designed purposely to cover a large sample of respondents and make the study more generalized. The questionnaires were made for teachers, students and laboratory attendants. These instruments were made of four sections with the first part covering demographic data while the other three sections covered at least an objective of the study. Scales used included Strongly Agree (SA), Agree (A), Disagree (D), strongly disagree (SD), and Not Sure (NS) purposely to give respondents the freedom to express their degree of consent.

3.5.2. Interview guide

Semi structured interviews were conducted with relevant educational personnel, such as the Head teachers, sub county officials and laboratory attendants. Respondents were met

at their respective work places i.e. the school, and sub county offices and their responses were recorded on paper as they responded which enabled the researcher to elicit the opinions of the participants on the school science policy.

3.5.3. Focus group discussion guide

Focus group interviews were used upon the randomly selected students and parents. Focus group discussions were used due to the big number of students yet here was a short period of time. This enabled the students to debate and discuss on the science policy as guided by the questions set.

3.5.4. Observation checklist

For purposes of observation, an observation checklist was used. The researcher observed certain aspects for instance the existence of science laboratories with necessary adequate laboratory equipments. Certain aspects of girls and boys attitude could be seen through the way the students talk about the subjects and their attendance in class among others

3.6 Procedure for data collection

The researcher obtained a letter from the Dean graduate school introducing him to the respondents in Mukono district to permit him collect data about their schools. The letter was presented to each category of the respondents that were involved in the study. Their consent was obtained to participate in the study. In the collection of data, anonymity and extreme confidentiality was observed while handling the responses. Information was availed to the respondents that the research would not endanger them directly or indirectly and that participation was voluntary.

3.7 Data quality control

3.7.1 Validity of the instruments

Validity refers to the accuracy of instrument used in research to collect meaningful and right data (Amin 2005). Content validity literally means the amount of substance in the study (Enon, 2002). The instruments had adequate traits due to consultations with the supervisor, colleagues and the research expert. The research expert helped in strengthening the validity of the research instruments and calculation of the content validity, CVI. The test of content validity was established through inter judge with two research consultants. The formula was

$$CVI = n/N.$$

Where n is = number of items related as relevant and N= total number of items in the instrument.

The CVI for the interview guide and questionnaire to be regarded as valid was accepted at above 0.7. This is because Amin (2005) suggests that in a survey, the least CVI recommended in a survey study should be 0.70 or 70%. Some adjustments were made to make the questions more valid. The results are presented in table 3.3.

3.7.2 Reliability

Reliability refers to the degree of consistency in which a measuring instrument yields when the entity being measured has not changed (Leedy& Ormond, 2001).reliability refers to how consistent a research procedure or instrument is (Abuja, 2005). The strategies that were used to obtain reliability are peer debriefing, prolonged engagement and audit trails. Peer debriefing involving the researcher working with colleagues to examine the instruments and giving their views about their correctness. With prolonged

engagement, the researcher spends sufficient time in the field to learn or understand the social setting while audit trials involve a thorough collection of information regarding all aspects of the research. Data was systematically checked focus maintained and there was identification and correcting errors (Morse et al, 2003). This helped to ensure establishment of accuracy of data collected. Reliability for quantitative data was obtained by carrying out a test of reliability analysis scale (Alpha-coefficient) using SPSS 17.0. the instruments were found valid at a (alpha) above 0.7. A reliability of 0.70 indicates 70% consistency in the scores that are produced by the instrument (Siege, 2002). The use of SPSS was because of its being easy to apply and fitting a two or more point rating scale. Results of Cronbach are presented below in table 3.2.

Table 3.2: Reliability and Content Validity Index

Items	Content validity index	Cronbach alpha (a) value
Lab equipment	0.86	0.792
Assignments	0.80	0.755
Availability of science teaching aids	0.83	0.682
ICT challenges	0.79	0.751
Student performance	0.70	0.791

3.8 Ethical Considerations

To be ethical is to conform to accepted professional practices (Webster's Dictionary, 1968). Before interviews and administration of questionnaires the researcher fully

explained the objectives of the study to all the respondents. In addition, their consent was sought and their right to confidentiality assured before interviewing and distributing questionnaires. Furthermore, the researcher fully observed their right to privacy and anonymity by not asking them to write or mention their names and names of the schools. The researcher also thanked the respondents for their participation in the study.

3.9 Data analysis

Data was presented in tables. Qualitative data was analyzed using content analysis while quantitative data was analyzed in percentages and frequencies, and statistical figures. Data was analyzed to present referential meaning to research objectives for instance proportion of students passing sciences, availability and easy access to science instruments, and experience and qualification of science teachers.

3.7 Limitations of the study

The study was limited to a representative sample due to high expenses that were involved in terms of preparation of research instruments for everybody, time and funds to analyze the findings. However, this was overcome by consent with the respondents and getting a bank loan to finance the research activities.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0. Introduction

This chapter presents the findings of the study. The study was about the effect of the O' level Education compulsory science policy on Students attitudes towards Sciences in Nama Sub county. It was centered on the responses to the three research questions. The findings were presented in tables. Therefore, this chapter was divided into two (2) sub sections namely response rate, and research questions that the study sought to answer.

4.1. Bio data and Demographic information

The study included the different types of respondents used. This was relevant for knowing what category of respondents the researcher dealt with. The details of stratification of respondents for each category were as shown in table 4.1 below.

Table 4.i: Category of respondents

Category of Respondents	No. of respondents	No. of Schools	per Total	Percentage
Sub county officials	5		5	3%
Teachers	6	5	30	20%
Students	15	5	75	50%
Parents	5	5	25	16.7%
Lab Attendants	2	5	10	6.7%
Head teachers	1	5	5	3.3%
Total			150	99.7%

Source: Primary data

The table above presents the different categories of respondents who participated in the study. 50% were students, 3% were sub county officials, 20% were teachers, 16.7% were parents, 6.7 laboratory attendants and 3.3% were head teachers. All these respondents took part in the study

4.1.1. The different age groups of respondents

The study involved the identification of different age groups of various respondents which assisted to analyze their capacity to evaluate the problem and issues as related to the study. The ages of the various respondents were therefore summarized within categories as shown in the following table.

Table 4.ii: Age of respondents

	10-14		15-19		20-24		25-29		30-34		35-39		40 & above	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Students	12	16%	53	70.7%	10	13.3%	-	-	-	-	-	-	-	-
Teachers	-	-	-	-	4	13.3%	8	26.7%	3	10%	7	23.3%	2	26.7%
Parents	-	-	-	-	-	-	-	-	3	12%	5	20%	17	68%
Lab attendants	-	-	-	-	2	20%	-	-	1	10%	5	50%	4	40%
Head teachers	-	-	-	-	-	-	-	-	-	-	2	40%	3	60%
Sub. County officials	-	-	-	-	-	-	-	-	1	20%	2	40%	2	40%

Source: Primary data

In table 4.ii above, students were the youngest with majority of them (71%) being between 15-19% years followed by 16% being between 10-14 years of age with a few (13%) being above 19 years. Among the teachers, the number of teachers who were between 25-29 years was the same as that of 40 and above each with a percentage population of 27%. The overall observation was that 40% of the teachers were the only ones below 30 years while the rest were above. Most of the parents and head teachers were between 40 and above. All in all, the respondents were between 15 - 40 above.

4.1.2. Summary of background information of the teachers that were used in the study

Table 4.iii is a summary of teachers' characters covering the time they had spent teaching and how long they had worked in the schools where they were working in terms of their presence on the pay roll, as well as their teaching qualifications. Response to this was obtained and summarized in the table below.

Table 4.iii: Response upon teachers' characteristics

School	A		B		C		D		E	
Response	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Duration as a teacher										
0-4yrs	1	16.7%	2	33.3%	2	33.3%	1	33.3%	3	50%
5-9yrs	2	33.3%			4	66.7%	4	66.7%	1	16.7%
10-14yrs	3	50%	2	33.3%	-	-	-	-	1	16.7%
14&above	-	-	2	33.3%	-	-	-	-	1	16.7%
Years worked in this school										
0-5 yrs	4	66.7%	2	33.3%	6	100%	3	50%	4	66.7%
6-11yrs	-	-	2	33.3%	-	-	3	50%	4	66.7%
12&above	2	33.3%	2	33.3%	-	-	-	-	-	-
Presence on Gov't payroll										
Yes	6	100%	5	85.3%	6	100%	4	66.7^	2	33.3%
No	-	-	7	13.3%	-	-	2	33.3%	4	66.7%
Highest academic qualification										
PHD	-	-	-	-	-	-	-	-	-	-
Masters	1	16.7%	1	67.7%-	-	-	-	-	-	-
1 st Degree	3	50%	3	50%	1	16.7%	1	16.7%	-	-
Diploma	2	33.3%	2	33.3%	2	33.3%	2	33.3%	3	50%
Any other	-						3	50%	3	50%

Source: Primary data

Key: Letters stand for schools

The information in table 4.III above reveals that some others were neither degree nor diploma holders. These were asked to state their A-level and got the chance to teach, while others had academic certificates but not related to the teaching professional

(education) as reflected by the 50% “of others” in the section of highest academic qualification in the table.

It can be concluded that majority of teachers were diploma holders. Besides this, majority of the teachers were in the teaching profession for about 10 years but had spent 5 years in the schools they were found in at the time of the study. The average number of years worked in the schools explained why most of them were on the government payroll.

In general, none of the respondents in the teaching profession had a 3rd degree (PHD); only two (2) out of 30 (7%) had a master’s degree. In addition, interviews revealed that those with a master’s qualification were head teachers of school A and B; majority of teachers had at least attained a Diploma Certificate in education.

The implication of this is that most of the teachers could have enough time to study their students and assess their attitude towards studying science subjects. Besides this, the long duration spent in the teaching profession gives them an extra edge over quick psychological study towards what pleases the students and what creates an unpleasant environment.

4.1.3. Sex of the respondents

Sex of respondents was captured since the study involved establishing the influence of the policy on O’ level girls’ and boys’ attitude towards studying sciences. The overall gender consideration for all respondents was therefore as shown below.

Table 4.iv: Sex of respondents

Category	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
Students	35	46.7%	40	53.3%	75	100%
Teachers	15	60%	10	40%	25	100%
Parents	11	36.7%	19	63.3%	25	100%
Lab attendants	10	-	-	-	10	100%
Head teacher	5	100%	-	-	5	100%
Sub County Officials	4	80%	1	20%	5	100%
Total	81	54%	69	46%	150	100%

Source: Primary data

According to table 4.IV above, majority of students (53%) were female while 47% were male. Teachers had a 60% population as male while female teachers were 40%. The sub county officials had 80% as male and only 20% being the females. It was only lab attendants and head teachers who were one sex (men) only. In conclusion, an overall bigger percentage (54%) was male while (46%) were females.

The implication of this finding is that the existence of a slight difference between the male and female population indicates an equal distribution of sex across the study. This created a uniform platform for both male and female to comment on the new science policy. The study was therefore not biased by sex.

4.2. Results of Research question one

The following section presents empirical data question by question and the findings are presented according to individual tools that is questionnaire, interview guide, focus group discussion and observation guide.

Research question one stated, “To what extent has the policy of making sciences compulsory at O’ level influenced girls’ and boys’ attitude towards studying sciences?”

To accomplish the requirements of this objective, respondents were asked to affirm the acceptance or disagreement with the learning of science subjects on compulsory basis while at O’ Level, issues about gender, students’ response as to how they feel about gender influence towards the science study.

Questionnaire findings

The following findings presented were those collected by the questionnaire and the responses are contained in tables 4.vi to 4.vii

4.2.1. How different respondents look at the issue of making science subjects compulsory for students

The science policy directs that science subjects be made compulsory. The respondents were asked to state the relationship between gender and students attitudes towards the science policy. Response to this was indicated according to the degree of consent whether strong or weak as in the table below.

Table 4.v: Acceptance to making of studying science subjects compulsory at O. Level

Category	SA		A		NS		D		SD	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Student	15	20%	18	24%	4	5.3%	25	33.3%	13	17.3%
Teachers	4	13.3%	10	33.3%	3	10%	7	23.3%	6	20%
Parents	3	12%	4	16%	8	32%	5	20%	5	20%
Lab attendants	-	-	7	70%	-	-	2	20%	1	10%
Head teachers	-	-	3	60%	-	-	2	40%	-	-
Sub County Officials	2	40%	1	20%	-	-	2	40%	-	-
Total	24	16%	43	28.7%	15	10%	43	28.7%	25	16.7%

Source: Primary data

Key: SA- Strongly Agree, A- Agree, NS- Not sure, D- Disagree, SD-Strongly Disagree,

The findings shown above revealed that 44% of students agreed that making sciences compulsory at O' level was necessary as opposed to 56% of the respondents who disagreed. This means that majority of the students don't see sense in making sciences compulsory at O' Level.

The interviewees reported that the boys were performing better than girls in sciences because majority had interest than the girls. The implication is that majority of the girls still have less interest/ attitude towards sciences than boys.

Among the teachers, 47% agreed while 43% disagreed. Ten percent were not sure. Findings indicate a small difference of 3% between 47% and 43% which implies that the

margin of acceptance is not so significant enough to rule that all teachers were supportive of the policy implementation.

As to whether parents accepted to make science subjects compulsory at O' level, 28% accepted as opposed to 40% who objected. Another 32% were not sure. This implies that majority of parents did not support the view of making science subjects compulsory for their children since the difference between 28% and 40% was 10% which was significant given the addition of 32% who were not sure.

Research revealed that 70% of laboratory attendants agreed that making the study of science subjects compulsory was fine as opposed to 30% who disagreed. This implied that laboratory attendants supported the practice of making the study of sciences compulsory since no one was not sure of his/her response and the difference between 70% and 30% is 40% which is so significant.

For Head teachers, 60% agreed as opposed to 40% who refuted. This showed a significant difference of 20% implying that majority of head teachers welcomed the policy recommending science subjects to be made compulsory.

The sub county officials were also asked to give their view as to whether science subjects should be made compulsory at O' level; 60% agreed while 40% disagreed. This showed a significant difference of 20% implying that sub county officials recommended it and were in support of the policy.

In conclusion, parents and students were the only ones who had slightly objected to making science subjects studied on compulsory basis otherwise majority of the rest of respondents had consented to the policy implying that the policy had better chances of

success and only needed implementers to address it well to the students (both boys and girls) for a full positive response and the parents to be supportive. This is observed in Table 4.V; page 36, where 40% of parents disagreed while 28% agreed and 51% of the students disagreed while 44% agreed with making of studying science subjects compulsory.

4.2.2. Analysis of gender influence towards the students' attitude in learning science subjects

The study went ahead to identify the gender influence towards the students' attitude in learning science subjects and the responses given by teachers are given in table 4.VI below rated from Strong agreement to strong disagreement as well as those not sure.

Table 4.vi: Issues about gender

Category	SA		A		NS		D		SD	
	F	%	F	%	F	%	F	%	F	%
Boys should have compulsory study of science subjects in O' level	20	26.6%	7	42.7%	32	9.3%	6	8%	10	13.3%
Girls should have compulsory study of science subjects in O' level subjects	25	33.3%	10	13.3%	15	20%	15	20%	10	13.3%
Compulsory teaching and learning of science subjects in O' level has not improved boys' attitude towards studying sciences	10	13.3%	30	40%	15	20%	11	14.7%	9	12.7%
Compulsory teaching and learning of science subjects in O' level has not improved girls' attitude towards studying sciences	25	33.3%	17	22.7%	15	20%	7	9.3%	11	14.7%

Source: Primary data

On whether boys should have compulsory study of science subjects in O' level, 69% of the respondents agreed while 21% disagreed, 9% was not sure this implies that it seconded true since the difference between 69% and 21% was a significant one (48%) yet only 9% was not sure of their response.

Concerning whether girls should have compulsory study of science subjects in O' level, 47% accepted while 33% disagreed. Twenty percent were not sure. This showed a fairly significant difference of 14% indicating that boys were not much entitled to study sciences than girls in science subjects.

Concerning whether girls are often lesser than boys in science classes, 24% agreed as opposed to 53% that disagreed while 24% were not sure. This implies that girls were not necessarily less in the science classes since the difference in opposition (30%) was a significant one.

When respondents were asked whether girls could perform as well as boys, 53% agreed while 27% disagreed. 20% were not sure. This left a significant difference between 53% and 27% that implied that girls could seriously perform well just like the boys.

As to whether student attitudes greatly determined the success of compulsory science teaching, 57% agreed while 25% disagreed. Seventeen (17%) were not sure. This implied that students' attitude had a serious influence upon the success of compulsory teaching of sciences since the difference was a significant one at 26%.

In conclusion, female students can perform sciences as much as the boys, however there is a stigma among people in society that girls cannot be as perfect as boys, this has widely affected the population of female students in the science classes. This is observed in table 4.VI, page 38 that 47% of the girls agreed, while 33% disagreed with the compulsory

study of science subjects. However, it was discovered that making sciences compulsory for all students irrespective of their sex has helped reduce the girls' stigma fearing science subjects.

4.2.3. Students' response about gender's effect on the policy's ability to improve girls' and boys' attitudes towards learning science subjects

Just as teachers, head teachers, sub county officials and parents responding objectively to various aspects of the study, even students had the opportunity to give their side of the coin. The following was the students' response towards considering gender as one of the determinant factors upon students' attitudes towards studying science subjects after the introduction of the policy as shown in the table below.

Table 4. Vii: Students' response concerning how they feel about gender and its influence towards science study

Category	SA		A		NS		D		SD	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
I support the compulsory teaching and learning of science subjects in O' Level schools	12	16%	15	20%	17	22.7%	25	33.3%	6	8%
The girls in the science class fear science subjects most	15	20%	18	24%	-	-%	20	26.7%	22	29.3%
The girls in the science class are more active than boys	10	13.3%	30	40%	-	-	22	29.3%	13	17.3%
Making science subjects compulsory has motivated me to love science subjects.	4	5.3%	20	26.7%	5	6.7%	16	21.3%	30	40%

Source: Primary data

On whether students supported the compulsory learning of science subjects at O'Level, 36% agreed as opposed to 41% who disagreed. Twenty three percent were not sure. Since the difference between 36% and 41% is small (5%) it implies that the objection to the policy is not significant and especially given that 23% were not sure.

As to whether girls feared science subjects most, 44% agreed as opposed to 56% who objected. This implies that girls almost treat Arts and Sciences equally because the difference between 44% and 56% is significant which implies that girls were not so confident as compared to boys while learning science subjects.

Looking at whether making science subjects compulsory has motivated students to love science subjects, 53% of the respondents agreed while 47% disagreed. Since there is a slight difference of 6% it implies that boys are moderately motivated as compared to girls.

Results of item four in the table reflect that 32% agreed that students have a positive attitude towards the study of sciences as opposed to 61% who disagreed. This implies that generally, students do not like the study of sciences.

The general implication is that girls were not as confident as the boys in learning science subjects even though they were moderately active in class. It further shows that not all students were supportive of making science subjects compulsory. Never the less, boys had fewer objections than the girls to making science subjects compulsory. This is observed in table 4.vii, page 40 where 53% of the students agreed while 38% disagreed that girls were more active in class. This was because girls wanted to make sciences optional as before since their attitude was not all positive.

(i) Focus group discussion findings

Besides questionnaires, FGDs were used to enrich information on gender impact on science learning. When students were asked to give their opinion, majority of them stated that making science subjects compulsory was not the best option but were of the view that there should have been put incentives to attract students and more so the girls to drive them to love and learn the science subjects.

Students were further asked why girls did not perform as fairly well as boys. The response obtained was that girls sometimes feared the science subjects on assumption that these were for the boys because they assumed that they led to doing physical jobs after completion of studies. Some students were of the view that science jobs were normally blue collar jobs and not white collar jobs. Because of this assumption girls feared to take them on just because of the natural dislike of appearing dirty.

According to the results from the interviews, there was a general dislike of science subjects by the girls as compared to the boys with assumptions like sciences were harder to pass, and yet led to blue collar jobs which most girls disliked according to their feministic character.

In comparison to results of the first tool (questionnaire) information collected was relatively similar in a way that even though questionnaires indicate girls were moderately active in class there was a slight dislike of learning science subjects on compulsory basis. Focus group discussions held upon students added some information to the above. Students were asked to state whom they thought performed better of the girls and the boys; response obtained revealed that boys performed better than the girls. When asked to state the subjects that they felt were harder in sciences many students pointed at

chemistry and biology because of their harder scientific terms and language in chemical equations and classification of living organisms.

Students were also challenged to assess their attitude towards having sciences studied on compulsory basis, and the response obtained was mainly negative. This is because there was a very small percentage (about 30%) that was positive of the policy. In defense of this, the students who were negative to the opinion stated that it would be burdening one to forcefully learn things out of his/her passion. On the other hand, students who were positive to the policy stated that students sometimes made subject selection choices that might not be beneficial to their future and so felt it wise to dictate their destiny at this stage in life. They added that the freedom would be better to come at a later stage when one had obtained a fair knowledge on a variety and relevance of different subjects.

In conclusion, information obtained out of Focus Group discussions held with students revealed that majority of students disliked the policy's ruling that science subjects were made compulsory. It was showed that boys were better performers in science subjects than their female counterparts. Harder subjects showed included chemistry and biology just because of their technicality in scientific language used in them.

(ii) Observation results

Using the observation guide, the researcher observed that attendance in the science classes was sufficient in all schools. It was, however, observed that the general liveliness in classes was not as sufficient as expected to be conducive for effective learning, which was worse in schools A & E where students needed to work upon themselves if they are to achieve something.

When students were asked to state what they felt about making science subjects compulsory for them, most of them responded with signs that showed negativity for instance nodding their heads, laughing to show that they had nothing to say but to abide, while some others were not decided but ready to go with what is instructed. This was done irrespective of being boys or girls.

In conclusion, both boys and girls had no option but to study sciences at O' level. This affected the attitude of boys positively as they were not as negative as the girls. It is also that girls were not as confident as the boys in learning science subjects even though they were moderately active in class. It further shows that not all students were supportive of making science subjects compulsory. Comparing the results of focus group discussion to the previous tools, there was a correlation that the policy to have science subjects learnt on compulsory basis was not fully welcomed by the students hence leading to a poor attitude to the sciences. For example, according to table 4.vii, page 40 there is 41% students who disagree with the policy compared with 36% who agreed. Though boys were shown to be generally better in sciences there were cases of exceptional excellent performance by girls over boys as long as the girls had decided to concentrate on the sciences.

4.3. Results for Research question two

Research question two Stated, "How has equipping schools with science facilities influenced O' level students' attitude towards learning science subjects?"

To fulfill the requirements of the objective, respondents were asked to ascertain the impact of school science facilities and students' attitudes, as well as students' response upon the use of science facilities towards the compulsory learning of science subjects.

(i) **Questionnaire findings**

The responses gathered by the questionnaires are contained in tables 4.vii to 4.ix.

4.3.1. The impact of science facilities on students' attitude towards science subjects

The study on objective two began with asking respondents the impact of science facilities on students' attitudes towards the learning of science subjects. The responses obtained were summarized and presented in the table below.

Table 4.viii:

Relation of school science facilities and student attitudes

Category			SA		A		NS		D		SD	
			F	%	F	%	F	%	F	%	F	%
School science facilities contribute positively to students' attitudes towards the study of science subjects			9	12%	23	30.6%	11	14.7%	17	22.7%	15	20%
Our school has adequate science facilities needed by all students in O' Level			5	6.7%	15	20%	7	9.3%	23	30.7%	25	33.3%
Laboratory facilities exist in O' Level but are in poor conditions and not fully utilized			26	34.7%	30	40%	-	-	19	25.3%	-	-
Practical lessons on science are only conducted in Senior four classes			-	-	13	17.3%	17	22.7%	25	33.3%	20	26.7%

Source: Primary data

According to findings in the table, 42% of all respondents agreed that science facilities contributed positively to students' attitudes towards the study of science subjects while another 43% disagreed. Fifteen (15%) were not sure. This implied that the science facilities were relatively an influential factor determining students' attitude towards studying science subjects as the percentage of those agreeing is equal to that disagreeing. Concerning whether schools had adequate science facilities needed by all students in O' Level, 27% agreed as opposed to 64% who disagreed while 9% were not sure. Since there exists a significant difference of 37% it implies that most schools do not have adequate science facilities that are necessary for proper use by students while in science classes. This henceforth fractures the willingness to try out sciences by a big number of students.

As to whether schools had laboratory facilities that are in good conditions and can often be utilized by students, 75% of respondents involved agreed as opposed to 25% who disagreed. Since there exists a significant difference of 50% between 75% and 25%, it implies that schools have laboratory facilities in place but are in most cases in poor conditions and so not fully utilized.

Concerning whether practical lessons in science were only conducted in senior four classes, 17% agreed as opposed to 60% who disagreed while another 23% were not sure. The implication of this is that teachers try what they can to have practically done even by lower classes and not only in senior four classes. This further implies that students at lower classes have less hours to be practically exposed to science facilities than those of advanced classes (S3 & S4). This affects the students' morale to quickly adopt and love sciences.

The general implication is that most schools do not have adequate science facilities that are necessary for use by students, while those which have them are mostly in poor conditions and so not fully utilized. For example in table 4.VIII, page 44, it is observed that 64% of the students disagreed while only 27% agreed with the presence of adequate science facilities. The observation to this is that once a student has full exposure to science facilities and use of laboratories, then love for science subjects would gradually develop. This reduces the excitement and ethicizes the students to opt to investigate so many things which is the intention of the policy in the long run.

4.3.2. The use of science facilities and Students' attitudes towards learning of science subjects

Having established the impact of science subjects, the researcher tried to get the students' responses on the use of science facilities towards the learning of science subjects. The responses obtained were as given in the table below.

Table 4.ix: *Students' responses on the use of science facilities towards the compulsory learning of science subjects*

Category			SA		A		NS		D		SD	
			Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
The modern science laboratory library boost students 'attitude towards sciences			-	-	10	13.3%	16	21.3%	35	46.7%	14	18.7%
The adequately equipped science facilities and laboratories boost morale			5	6.7%	26	34.7%			32	42.6%	12	16.7%
Science practical lessons in the science subjects are always conducted in our class			18	24%	22	29.3%	-	-	35	47%	-	-
Existence of science textbooks enhances scientific research			10	13.3%	17	22.7%	10	13.3%	23	30.6%	15	20%
Our school is well facilitated with computers which are used for electronic science learning			8	10.6%	15	20%	10	13.3%	25	33.3%	21	28%

Source: Primary data

Key F = frequency

According to the findings in the table, 13% of the students agreed that their schools had a modern science laboratory and science library as opposed to 65% who objected while 21% were not sure. This implies that schools that have well equipped laboratories easily

boosted students' attitude towards studying science subjects. Unfortunately most of them in Nama Sub County do not have science laboratories that are up to date as well as well stocked laboratories.

As to whether well-equipped laboratories boosted students attitude towards study of sciences, 41% agreed as opposed to 59% who disagreed. The existence of 18% between 59% and 41% is significant enough to imply that well build and stocked laboratories greatly influence students love for sciences. Unfortunately majority of schools do not have adequate facilities within their laboratories.

As to whether practical were always conducted in science classes 53% agreed while 36% disagreed. The existence of a fairly small difference of 17% implies that practical lessons were sometimes held and sometimes not done within science classes.

When students were asked whether there were enough text books available to boost their further reading and research for use for the science classes, 36% accepted as opposed to 51% that refused. Another 13% were not sure. This implies that books that could be used for reference during science lessons and study were not enough as compared to the student population. This is more so according to the existence of a relatively small difference (15%) in opposition coupled with the 13% that was not sure.

As to whether schools were well facilitated with computers which could be used for electronic science learning, 31% of the respondents agreed as opposed to 62% who disagreed as 13% were not sure. Since there exists a significant difference of 31% and the 13% who were not sure of the computer facilitation, it implies that schools need to increase the facilitation of computers to their students so that electronic learning can be possible.

The general observation here is that students looked at having science facilities with great concern in a way that science facilities including science text books were not as adequate as ought to be, limiting students' exposure to practical applicability of sciences. This greatly affected students' attitudes towards on their interest to learning science subjects.

(ii) Interview findings

Like in the first objective, interviews were used. When teachers were asked to comment on the state of science facilities available for students use in science classes, they complained of the inadequacy of equipments and laboratories that could accommodate a bigger number of students at a time. They revealed that the use of these facilities was supposed to be done sparingly since they were expensive. Science teachers complained that some schools rarely considered sciences seriously and so stocked less facility thereby using the procured facilities for illustration purposes and not for hands on for all students. Because of this, students from lower classes were limited in number of times to access the laboratories so as to create time and space for upper classes especially the candidate classes (S.4).

One respondent interpreted the inadequate exposure to science facilities and use of laboratories as *"indirectly giving less time to the lower classes yet attitude needed to be built immediately one goes to a secondary school."* This was in the open questionnaire and group discussion.

In a nut shell, the science facilities were hardly supplied in most schools which in turn limited their use and exposure to the students. The schools which had some science facilities were old and expired and were inadequate compared to the number of students involved in studying sciences.

This is observed in table 4.ix, page 46 that 59% of students disagreed while 41% agreed about the presence of science facilities. This affected the building of attitude by the students towards science subjects.

(iii) Focus group discussions

Through the use of FGDs, students explained that they rarely had facilities used as and when needed. They further added that even when they went to the laboratories, the available facilities were shared among four to six students implying that they were inadequate, which made some students look on just as their colleagues carried out the experiments as though they were not in the laboratory with apparatus to their exposure.

One respondent is quoted to have said, *`most of the times we are studying theories we rarely have practical lessons, we always get them towards UNEB exams and from the neighboring school which has science laboratory with facilities'*

Another one said, `teachers are ever complaining that there is very little money allocated for science practical lessons therefore in such a circumstance what do you expect students to love sciences?'

The implication of this is that students never often visited the laboratories and even when they went there, they were just watched their teachers and or laboratory attendants carry them out thus making the science classes more theoretical. This directly reduced the exposure of students to touch and feel science facilities which indirectly affected their applicability of science in practical day to day life.

In comparison of findings from focus group discussion to those of previous tools, it was revealed that existence of science facilities in school made great impact to students'

attitude towards learning sciences. This is achieved when every student has access to personally touch and use the facilities which was not the case always.

(iv) Observation findings

In an effort to gather conclusive information, observations were also used.

Observations indicated that the schools had sufficient preparation and working tables but with less laboratory rooms to accommodate all students.

Laboratory tools/ equipment were favorably sufficient in school B but insufficient in the remaining schools. Sufficiency to this was drawn in proportion to the number of students in the school/ class. Schools B, C, and D were lively during their lessons unlike those in Schools A and E, indicating that the general liveliness in class was not sufficient.

Arrangement of notes in science books was averagely done due to teachers' individual effort to prepare students in advance even though not well qualified.

Furthermore, observation revealed that majority of science laboratories were in sorry state where the apparatus in place were mainly for illustration purposes by the teacher but not enough for practice by the students.

Availability of science facilities was inadequate and unsatisfactory in three schools i.e. A, C & E; schools B & D had enough science facilities though not fully utilized. This happened in a way that school B was so conservative on ground that facilities are so expensive and need to handle them sparingly with care while school D never had enough staff to have the recommended teacher- student ratio with the assistance of the laboratory technician.

In conclusion, most schools had laboratory rooms serving more so as stores for equipments than laboratories for practical study. This implied that equipments and facilities had to be carried to classes for students to use them. This means that the carried facilities serve as illustrations and not for practical.

The general conclusion about the impact of science facilities upon students' attitudes towards science attitudes is that most schools did not have adequate science facilities that were necessary for use by students, while those which had them were mostly in poor conditions and so not fully utilized. This is observed in table 4.ix, page 46 that 59% of the students who responded disagreed while 41% agreed with the use of science facilities.

In conclusion the results from all the research instruments involved in the study did not differ from one another, they all produced similar findings on this objective.

4.4. Results of question three

Research question three Stated, “To what extent do science teachers’ characters impact on students’ attitudes of learning science subjects?”

To cover the requirements of this objective, the respondents were required to ascertain the impact of teachers’ characters on students’ attitudes towards the compulsory learning of science subjects.

(i) Questionnaire findings

The responses as obtained from questionnaires are contained in tables 4.x to 4.xi.

4.4.1. Impact of the science teachers’ nature on students’ attitude towards the learning of science subjects

Because teachers were believed to have more time with the students at school, respondents were asked to state the way they felt in response to the way teachers behaved and its impact on students towards learning science subjects. The responses were shown in the following table.

Table 4.x: Teachers' characters in relation to students' attitudes towards learning science subjects

Category	SA		A		NS		D		SD	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
There are enough science teachers in O' Level schools	-	-	10	13.3%	23	30.7%	30	40%	12	16%
Science teachers are qualified and competent in their profession	8	10.7%	11	14.7%	20	26.7%	26	34.7%	10	13.3%
Science teachers use the appropriate technology and evaluation methods in delivering science concepts to the students	-	-	23	30.7%	20	26.7%	22	29.3%	10	13.3%
Science teachers exhibit better relationship with the students and other fellow teachers	15	20%	35	46.7%	5	6.7%	14	18.7%	6	8%
Availability of teachers at school motivates students to study science subjects	9	12%	14	18.7%	18	24.4%	29	38.7%	5	6.7%

Source: Primary data

Concerning whether there were adequate science teachers in O' Level schools, 13% accepted as opposed to 56% who disagreed. Another 31% were not sure. Since there exists a big difference of 43% and yet another 31% were not sure, it is so significant to imply that science teachers were not enough at schools and more so in O' Level classes.

As to whether science teachers were qualified and thereby competent in their teaching profession, 25% accepted while 48% refused. This left a percentage of 27% not sure. Due

to the existence of a significant difference of 23% between 48% and 25% in opposition it implies that the qualification of the science teachers was not all that reliable as a bigger percentage was not satisfied with the teachers' competence. Once there is no confidence in a teacher, then it's more likely that even what he/she teaches shall be doubtable. This directly affects the students' attitude towards that subject being taught.

When respondents were asked whether science teachers used the appropriate technology while evaluating and or delivering the science concepts to their students, 31% agreed as opposed to 43% who disagreed. Another 12% were not sure of the science teachers' delivery and evaluation methods. Findings indicated that science teachers' evaluation and delivery methods were not all up to date as appropriate basing on the not so significant difference of 12% between the 43% agreeing and the 31% disagreeing.

Concerning whether science teachers exhibited better relationship with the students and other fellow teachers, 67% agreed while 27% disagreed. Another 6% were not sure. The difference of 40% between 67% and 27% was so significant to rely on implying that science teachers' relationship with others including students was at least fine.

Results concerning whether teachers were are always available for lessons at schools indicated a 31% accepting as opposed to 45% who disagreed while another 24% were not sure. The existence of a slightly big difference of 14% between 45% and 31% as well as having the 24% not sure is a significant ground to imply that science teachers were not always at their schools.

The general implication of this is that reliable science teachers who can competently make good research and presentation preparations for lessons are not enough in schools. This means that even though their relationship with students and fellow teachers was fine,

students were not so much satisfied with their delivery skills which indirectly influenced their attitude towards the learning of science subjects. Good quality teachers naturally attract students to undertake science subjects since they already exhibit pride in all that they say and do. It further happens that the students also love to be like them hence not feeling the study of science subjects as a burden or a compulsory policy.

4.4.2. Impact of science teachers' characters on students' attitude

Likewise students were asked to give their views in relation to the science teachers' characters and their responses were summarized in the table 4.XI below.

Table 4.xi: Students' response towards science teachers' characters

Category	SA		A		NS		D		SD	
	F	%	F	%	F	%	F	%	F	%
Our science subjects teachers are qualified and competent for their professions	-	-	20	26.7%	23	30.6%	16	21.3%	16	21.3%
Our science teachers always dodge our classes	7	9.3%	12	16%	20	26.7%	22	29.3%	14	18.7%
Science teachers' interaction with learners and the use of student centered methods in their lesson delivery motivated O' level students in this school to study science subjects.	8	10.7%	23	30.7%	-	-	26	34.7%	18	24%
Planning and preparations by the science teachers before their lessons has motivated O' level students in the school to study science subjects	13	17.3%	10	13.3%	25	33.3%	15	20%	12	16%
The innovativeness of science teachers, developmental and cooperation with their fellow teachers as well as the head teachers has motivated us students to love science subjects	13	17.3%	15	20%	20	26.7%	15	20%	12	16%

Source: Primary data

Key: F- Frequency

When students were asked to give comment as to their teachers' qualification and competence according to the way they teach them as well as their interaction, 27% agreed as opposed to 43% who disagreed while another 30% were not sure. There existed a fairly significant difference of 16% between 43% and 27% implying that the qualifications and competence of the science teachers were doubtful.

Concerning the teachers' presence at the school for lessons, 25% of the student respondents agreed that science teachers always dodged their classes as opposed to 48% who objected. Twenty seven (27%) were not sure. Findings indicate a significant difference of 23% between 48% and 25% in objection that implies that science teachers were available during time for science lessons.

When students were asked about the interaction of the science teachers with others, 41% agreed that these teachers freely interacted with others while 59% objected to this. This indicates a 17% difference in objection which implies that science teachers did not interact maximally with others inclusive of their students.

As to whether planning and preparations by the science teachers before their lessons has motivated O' level students in the school to study science subjects, 31% accepted while 36% opposed this. Thirty five were not sure. Since there exists an insignificant difference of 5% between 31% and 36% yet there exists 35% not sure whether teachers make enough preparations implies that there is not enough evidence pertaining teachers' preparations for the lessons.

The innovativeness of science teachers, developmental and cooperation with their fellow teachers as well as the head teachers has had a low influence upon students to love science subjects. This is evident from table 4.xi, results above where 37% agreed while

36% disagreed. Another 27% was not sure of their teachers' status. This difference implies that the teacher's innovativeness is below standard/ average such that it cannot be noticed.

Generally this implies that the qualifications of some of the science teachers were doubtful where some were qualified but not competent to teach. This was supplemented with the documentary evidence upon teachers qualifications found at the work premises and in office in charge of education. Despite the availability of science teachers in class to teach the students as and when they were supposed to, they rarely made satisfactory lesson preparations before going to classes.

The overall implication to this objective is that not all science teachers are qualified, competent and reliable in availability to help students all the time they need them. The relationship between the science teachers and students as well as fellow teachers was fine but not satisfactory to reflect their competence and practical innovativeness within the science field. This character therefore indirectly influenced the way students perceived their teachers and hence an impact on the attitude they have towards the learning of science subjects. Students who had a strong reading culture would be the ones to carry out their own research in the libraries and seek guidance and help from the various sources for example laboratory attendants and special revision among students themselves.

Interview findings

From the Interviews carried out to generate information to this objective. Teachers were asked to state whether they were always available at schools. In response to this not all of them could be there all the time. As stated in table 4.xi, page 54 that 48% of the students' response disagreed, while 25% agreed that some teachers always dodged classes. Reasons given in support of this were the low payments forcing them to try other means so as to boost their income, and having more than one school they teach in. Teachers claimed to have challenges with science classes in a way that some head teachers who did not have interest in sciences and so relocated funds to other disciplines other than sciences. As a result laboratories ended up having less or no facilities to use while teaching their subjects. The relationship of science teachers to students and fellow teachers was fairly good creating room for constructive discussion with each other for the betterment of their subjects. This is observed in table 4.xi, page 54 that 37% of the students agreed, while 36% disagreed with the cordial relationship.

In addition, documentary evidence upon teachers' qualifications revealed that the qualifications of the science teachers were not uniform; not all of them were qualified and competent to teach science subjects. This highly influenced the quality of the subject matter and presentation skills before students in class. With an exception of some few teachers, the students had to rely on the substandard notes given to them by the unqualified staff. The effect of this is the poor attitude towards sciences. The opposite was true for students in schools that had good qualified and experienced teachers

In conclusion, well qualified science teachers were not fully available and so had less time with students as they were always on demand in many part time schools yet the qualifications and competence of the other teachers were not satisfactory. This is observed in table 4.xi, page 54 that, 43% of the students disagreed while 27% agreed about the qualifications and competences of the science teachers.

In relation to information gathered from the questionnaire, there was similarity that not all teachers were well qualified and competent to handle the subject content satisfactorily, hence affecting the science policy negatively.

iii, Focus group discussion

From the Focus group discussions were also used to generate information to this objective.

Students were asked to express the extent to which they interacted with their teachers and the response to this was that this was always possible as long as the teachers were available for example, its observed in table 4.xi, page 54, that 59% of the students disagreed while 41% agreed that teachers interact with the students positively. Unfortunately, they were not fully available for their assistance. Students commented on the qualifications and competence of their teachers in a way that they had some teachers whom they regarded as good and others bad.

In summary of this, teachers were readily supportive of students learning but the only problem with this was that they had more work to be done since they were few in school. The interaction between teachers and students was limited to solve students' challenges

but had less time to convincingly resolve everything. This left the students in suspense to effectively learn and love the subjects.

A student said that, *'some of our science teachers misses lessons and instead comes towards the end of the day when we are tired and learning levels/morale is low. Some of them don't guide us yet we the school does not have laboratory technician, we are left to learn without teachers guidance'*

In relation to the findings resulting from questionnaire and interviews, the problem of incompetence among teachers was stressed alongside the insufficiency of teachers needed to handle the students' population in science classes in the schools.

iv) Observation

Observation was another method used to gather information related to teachers' characters. This supplements the earlier findings that some schools lacked qualified staff basically for chemistry and Biology. The result of this was employing S.6 vacationists who studied Biology at A level to teach their lower classes. It was observed that other subjects were taught by at least older teachers but science subjects had young teachers as compared to those of the other subjects.

Comparing findings of observation to the previous information, it can therefore be ruled that reliable science teachers who can competently make good research and presentation preparations for lessons are not enough in schools.

According to the results from all the tools used, it can be deduced that the overall implication to this objective is that not all science teachers are qualified, competent, reliable and always available to help students all the time they need them. This is observed in table 4.xi, page 54 that 42% of the students disagreed with the qualification

and competence of the teachers while 27% agreed. The relationship between the science teachers and students as well as fellow teachers was fine but not satisfactory to reflect their competence and practical innovativeness within the science field. This character therefore indirectly influenced the way students perceived their teachers and hence an impact on the attitude they have towards the learning of science subjects.

4.5. Results for research question four

Research question four Stated, “In what ways can the policy’s ability to increase students’ interest in studying science subjects at O’ level be improved/ enhanced?”

To accomplish the requirement of this objective, respondents were asked to propose measures/ ways they thought would help to improve the learning of science subjects and data on this question was mainly obtained through interviews, focus group discussions and observation with the help of an observation guide. Never the less there was some data gathered through questionnaires. Respondents proposed these measures/ ways by giving a list of other factors that influence the students’ attitudes towards learning science subjects. The results of the research instruments follow here below.

Questionnaire findings

The questionnaire generated the following information. Teachers and Students were asked to explain their perception of making the studying of science subjects compulsory- majority of them said it was wrong since everybody had his/her choice of subjects and future aspiration. They however appreciated the knowledge they get from studying sciences. Forcing students to study science was appreciated by some students who thought were weak students. These surprisingly performed well due to the tireless effort they put in arising out of the assumption that whether you want or not, you have to study

sciences. They further commented that science facilities were few (not enough) for instance an apparatus could be used by more than four students in a practical lesson hence limiting the chances of technical exposure and hands on that equipment.

In conclusion to this, the students hence suggested that schools should either stock the laboratories with sufficient facilities and or increase on the time allocated to students to use the laboratories since the laboratories are few. Concerning the students' attitude, students attributed the lack of a positive attitude to their teachers and requested them to use student friendly approaches since sciences are not always easy to all as expected. This is observed in table 4.xi, page 54 that 59% disagreed while 40% agreed with the teacher friendly approach to the students.

V) Interview findings

From the interviews, suggestions by Head teachers, laboratory attendants and sub county officials established that students should first be taught the relevance of studying science subjects and thereafter these students would come in with receptive hearts.

The interviewees reported that equipping the laboratory with chemicals and lab facilities would ease studying sciences and make them part of the daily usable things among others. This was observed in table 4.viii, page 44 that 64% disagreed while only 27% agreed about the adequacy of science facilities in schools. One respondent was quoted to have said,

“for sciences to be effectively and efficiently performed well in schools there is need for provision of science equipments mostly for practical sciences like equipping science laboratory and recruitment of science teachers to handle the subjects”

Majority of the interview respondents suggested that there is need for bursaries and scholarships to students like orphans and those from poor backgrounds. This will make them attend school daily which will better their attitudes towards science subjects. They said these would include things like half bursaries for good performing science students, cash prizes just like those awarded to sportspersons excelling in a given sport.

In another incidence, a member of staff said;

“We are ready and more willing to spend more time with students if at all we have enough laboratory equipments and reading materials to keep these students busy.” As observed in table 4.ix, page 54 that 31% agreed while 36% disagreed with the planning and preparations that teachers make. One teacher from school B explained. This manifested itself as a serious problem/ challenge barring the science teacher’s whole heartedness to the policy implemented.

In conclusion, interviews revealed that students should first be taught the relevance of learning science subjects and not just forcing them to study the subjects as well as setting up laboratories and stocking them with relevant and sufficient science facilities.

In comparison to the findings from the questionnaire, there was a likely agreement. For instance, when asked what should be done to empower the policy’s ability to make students love science subjects, the findings coincided with results from questionnaires. It was observed that majority of respondents said the challenge depended upon the teachers to use student friendly teaching methods as to deliver subject matter in simplistic ways for easy grasping. This was observed in table 4.ix, page 54, which 37% agreed while 36% disagreed with the innovativeness of the science teachers. Students also proposed that they preferred to be informed of the next lesson’s topic so that they could prepare ahead

through research. This implies that there was further reading as there was inadequate stocking of the school library with enough science books.

vi, Focus Group discussions

According to Focus Group discussions, some respondents especially the students were cautious of science facilities as they said the apparatus used were new to some students as they did not use them often. This appeared so because some schools limited these facilities to S.3 and S.4 students than S1 & S2 students. This is observed in table 4.ix, page 46 that 53% agreed while 47% disagreed about the conduction of science practical in upper classes but not in lower classes.

Students cited Biology & Chemistry as the hardest subjects due to the complicated terminologies like balancing equations and formulae in chemistry and biological names and terms in Biology. Biological complications increased in classifying living objects into classes, phylum, order, species, and so on.

In conclusion, Focus group discussion revealed that overall performance in science was biased to boys leading the girls with exceptions of a few girls who exceptionally outcompeted the boys. This much relied on the negative attitude girls originally had on such subjects that they necessitate more physical energy and so are for boys.

When findings of focus group discussion are compared to those of other tools, it can be observed that respondents proposed that there should be incentives for those who pass sciences well like free scholarships, bursary as it sometimes is to those who are talented in other aspects like sports, athletics or music, dance and drama. This was an addition to proposals to improve sciences by spending more time with their teachers.

vii, Observation findings

Using the observational guide, different facilities were physically observed by the researcher and the degree of presence/ sufficiency in various schools was noted. This especially was for physical things like existence of laboratories, how equipped they were, facilities available, and so on.

Observation further revealed that boys performed better than girls UNEB (2013) and school report documents. This observation was possible through checking of mark sheets in tests and exams as well as O' Level results of the science subjects for the previous years. Despite this observation, teachers were asked to give a professional view as to why this was like so. Teachers related this to the uninformed children upbringing/ background that prepared work to boys. Further preparations of girls into marriage material seriously affected the girls' performance for sciences as hard subjects.

In conclusion, mark sheets presented a fair picture of performance where the boys were seen performing better than the girls.

The overall conclusion about the policy is that parents and students were the only ones who had slightly objected to making science subjects studied on compulsory basis. This is observed in table 4.v, page 36 that 51% of the students and 40% of parents disagreed, while 49% of the students and 60% of the parents agreed with the policy. Otherwise majority of the respondents had consented to the policy implying that the policy had better chances of success and only needed implementers to address it well to the students for a full positive response and the parents to be supportive.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

In this chapter, the findings of the study were discussed after which the conclusions and recommendations were drawn. It was arranged by these contents and then by the four research objectives that the study sought to find out. Thus the chapter was divided into subsections namely, discussion which is related to the theoretical frame work and the literature review, conclusions and suggestions.

5.1 Discussion of study findings

The discussion was arranged according to the four objectives of the study which included; Making sciences compulsory at O' Level has influenced girls' and boys' attitudes towards studying sciences, Investigate the impact of the science policy of providing school science facilities to schools on O' level students' attitudes towards studying sciences, Establish how provision of refresher courses to science teachers (re-tooling) has influenced O' level students' attitude towards studying science subjects and exploring strategies for improving the O' level science policy's ability to make students love studying science subjects specifically in Nama sub county, Mukono district.

5.1.1 The relationship between making sciences compulsory at O' level and girls and boys

Attitude towards studying science subjects

Female students were seen to perform sciences as much as the boys, despite the existence of a general stigma among people in society that girls cannot be as perfect as boys. Girls were not as confident as the boys in learning science subjects even though they were

moderately active in class. It further shows that not all students were supportive of making science subjects compulsory.

Relating this to gender, the boys loved science subjects more than girls. However it was observed that when a girl decided to concentrate on science subjects, she would exceptionally perform better than the boys.

This matches with what Opiro (2011) stated that no one can be a failure in anything unless he has not paid full attention. He added that girls only needed career counseling to switch their attention and love towards sciences so that they can necessarily perform above self.

According to the UNEB results and newsletter science subjects have always been done poorly as compared to arts yet it is believed that sciences can be done better. Much as boys are more active than girls in science, girls can perform better. Having less or more girls in a science class at O' level does not depend upon gender because all students (both boys and girls) are entitled to study it. (Ref: Table 4.vi). What matters a lot is the attitude towards taking on sciences after O' Level because this seriously affects the effort invested in by the students that is to say- studying a subject just to finish exams or studying it because he/she loves it.

In addition to this, more girls feared chemistry than boys but loved biology as a subject. Surprisingly, it was showed that once a girl accepts to undertake science subjects they can perform better than a boy. Such status has been the result of observation of the student enrolment in secondary schools where education of girls and women at large lagged behind (UNESCO, 2001). However, the policy encouraged that both girls and boys should study sciences without any discrimination.

Such findings validate what Jenkins (2003) indicated in literature that the number of girls studying science and technology is low and it gets lower as one gets higher in the education system. This is supplemented by the observation that forcing one to study sciences may not yield returns immediately but later in adult stage when one admits the practical application of sciences.

5.1.2 Relationship between school science facilities and students' attitudes towards compulsory teaching and learning of science subjects

The major findings were that school facilities contributed a great impact to students' attitudes towards studying science subjects if at all they were available and fully utilized by the students. Unfortunately, these were not adequate in proportion to the number of students in a science class/ practical session.

Such findings match with UNEB revelations published in the UNEB report on work of candidates (UCE, 2012) during validation visits made to schools earlier in the year. The report highlighted that although most schools (especially the USE schools) averagely had adequate laboratory chemicals and apparatus; the laboratories were more of stores than rooms for science practical work. The non-use of these facilities results in lack of practice by the candidates which affected performance in science.

Belief of having inadequate materials leads to a setback in student's attitude towards studying science subjects. This belief was aggravated by students' confirmation that apparatuses were inadequate yet science textbooks were also inadequate.

The finding that schools have inadequate materials confirmed the SESEMAT Report (2006) that observed in literature that resources and facilities are in constant short supply

while others are very expensive. This makes these science facilities affordable by very few schools and students in urban schools. Besides this, text books are not readily available since they are very expensive. This limited the research that students would make in the interest of learning sciences.

In addition, some teachers were ready to properly teach sciences to students more practically but were cut short by the absence of adequate facilities in the science classes.

The impact of availability of science equipments can hence be realized when each and every student can have access and ample time to utilize and personally experiment with the facilities with assistance from the teachers and laboratory assistants/ technicians.

5.1.3 Impact of science teachers' characters (nature on students' attitude towards studying science subjects.”

It was discovered that science teachers were not always available at their schools. There are few science teachers being trained to meet the expanding demand for them in the increasing number of schools. Teachers' presentation skills were fairly good with majority of teachers trying their endeavoring to deliver their best irrespective of their level of education/ qualification.

Because of the different behaviors of teachers, the students are forced to judge the presentation skills other than looking at the subject matter of the presentation. Qualified Good experienced teachers were available but were on demand in many schools for part time programs which reduced the amount of time such teachers had for their students.

Reliable science teachers who can competently make good research and presentation preparations for lessons are not enough in schools. This means that even though their

relationship with students and fellow teachers was fine, students were not so much satisfied with their delivery skills. This dissatisfaction indirectly influenced the students' attitude towards the learning of science subjects. This affected student's attitude in a way that should the students love is influenced by the quality and competence of his or her teacher. Once a student is taught by a well-qualified and competent teacher, then there are higher chances that the student will pick interest.

Only 10.7% of the teachers had teaching experience of over 14 years. 36.7% were between 5-9 years. This is a good picture that majority (48%) of teachers at least had a good teaching experience. The ones who had lower teaching experience were the young teachers between 20-29 years old.

Though experience is good, SESEMAT (2006) recommended that teachers should be encouraged to continuously make use of available resources, chemicals and apparatus to develop further and enrich their performance. The report added that there was need to guide the newly recruited science teachers in the selection of content and appropriate methods of teaching science subjects. With this the teachers' impact would greatly be seen and felt by the students who would move at par with the method of teaching used.

Such a teaching experience of over 10 years would carry meaning if at all teachers valued the teaching profession seriously. This is possible when a teacher does not only hold title in the profession but takes time to continuously add something to his or her knowledge by doing research related to the subjects he/she teaches, presentation skills, evaluation and counseling and guidance availed to students.

Concerning this, Trowbridge et al (2004) warned that should you fail to work upon competence, you only remain with qualifications which yet count less than 60% in the

quality of work performance. This can then be looked at as spending time in service but with less or no personal development. This is very risky because a time comes for one to retire without happily testifying of any achievement. The impact of situation to the policy is that students cannot pick interest to studying sciences subjects thinking that they may end up like their teachers without anything in the long run.

The relationship between science teachers and students as well as other subject teachers was good but the only problem was that the science teachers' were not as fully available at school as other subject teachers. This is because a science teacher has more than two schools to teach leading him/her to have less time for his students. It is because of this that a teacher is forced to give students a lot of assignments even in some untaught topics. Though this looks good, its goodness is again determined by the teachers' presence to evaluate and go through the assignments he/she had left behind. By the mere fact that the teacher had no time and so resorted to giving assignments, he may still have no time to effectively pass through and discuss the assignments.

This left the students with no one to run to for assistance when faced with challenges within the subjects. The end result was to first put it aside and deal with other arts subjects which gradually increases their attitude more towards arts and less of sciences.

As earlier shown in findings (table 4.11) a bigger percentage 30% was not sure of the teachers' qualification. This is true because rarely do teachers introduce themselves deeply other than just telling their names and subject they are going to teach. On top of this, no student agreed that their teachers were qualified and competent. The research findings creating room for students to doubt their teachers' ability to deliver makes them

lose the zeal to study science subjects. This is a great impact upon a student's attitude towards studying sciences.

This doubt was further revealed by the fact that science teachers had innovated and developed less even amongst themselves as teachers and head teachers. Despite the above, students affirmed that their teachers used student-friendly approaches during lesson delivery.

Teachers who have taught a specific subject for a longer time tend to think they know each and every thing about that subject and need not make lesson plans and preparation. This is wrong since we are in a dynamic and challenging world more so with science and technology. This dismisses Mwanamoiza's observation (2001) that teachers are not well trained in more student centered and interactive styles and strategies and so were not confident to use innovative and experimental methods suitable for students learning.

Other factors including absence of teachers at school, teaching in more than one school, less preparation indicate lack of self-motivation, negative attitude and poor commitment to the teaching profession. Teachers have had poor mastery of content, inadequate practical skills and innovativeness, as well as use of theoretical and teacher-centered approaches in delivery of their lessons instead of student-centered approaches.

All these factors are part of what Ajaja (2007) listed in his identification of teachers' characters in contribution to success and quality of teaching. However, such behaviors have causes like poor pay treatment at school by their administrators and so on. The impact of this upon students' attitude was that students would like to have good and successful teachers as their mentors but should their teachers behave otherwise, the students too would shy away or pick less interest.

5.1.3 Ways of empowering the policy's ability to make students love studying science subjects.

It was discovered that students' livelihood and attendance in science classes were to be improved by teachers using student friendly approaches while teaching. Recommendations drawn by respondents were that teachers should use student friendly approaches in teaching science subjects, and students should spend more time with their teachers. Findings also indicated that students should first be taught the relevance of studying science subjects than forcing them to learn things that are out of their passion.

Findings showed that a bigger percentage of respondents were supportive of the policy to teach science subjects on a compulsory basis. Compulsory teaching was not appreciated by students. This made the students have no option but to learn the subjects, this would however work out provided the approach used was student friendly to make the student like the subjects. This would boost the students' zeal to love sciences even without reminding them that they are compulsory at O' level. To ensure this, Trowbridge et al (2004) advised that sciences should be embraced by all students as they open up equal opportunities for a wider variety of people. This would make them even opt for sciences at higher level of learning.

Many of the teaching staff recommended that students be taught the relevance of studying science subjects. Murphy and Alexander (2006) supported the idea of teaching the relevance of a subject that it is easier to pay attention and double the effort on something which has a value well known to you. Head teachers looked at the issue administratively and so needed funds. Head teachers of private schools opt to increase

tuition so as to get good science teachers. On the other hand, those in government aided schools attribute the challenges to less funding thus delaying procuring of necessities e.g. the chemicals, reagents, and apparatuses and of necessities e.g. the chemicals, reagents, apparatuses and construction of well stocked laboratories.

The respondents further revealed that mass sensitization of the public about the importance/ relevance of science in the practical world is relevant towards effective and efficient implementation of the O' level science policy in secondary schools.

Effective science teaching requires understanding the learners' needs so that teachers can support them. It is mostly the role of the teachers to identify and address the learners' prior knowledge and misconceptions to know where to begin from and help students for effective and efficient learning of science. The learners' curiosity should be an entry point that enhances the learning of science. Proper guidance enables learners to relate their current knowledge of science to everyday life experiences. Through group discussions, learners are able to plan, solve problems, make decisions and apply the scientific content to new situations.

This is in support of SESEMAT (2006) revelation that improved performance can be attained after teachers have understood their students' potentials and weaknesses to serve as a foundation to build on scientific approaches.

Since the issue to raise attitude of students towards sciences was highly attributed to teachers, there is need to boost the morale of these teachers. Once these have been motivated, then their love for work would be high. (Thorpe, 2000). This teacher motivation in the end would create more time and adequate preparation for their classes. By having teachers' morale boosted, they shall also have more time to help the students

and build their love and appreciation to science subjects. With this, the policy shall have achieved some of its objectives to create more scientists in the near future.

5.2 Conclusion

The following are the conclusions drawn from the study.

Generally, students did not like the making of science subjects compulsory and girls feared science subjects more than boys on assumption that sciences were naturally hard for them.

Schools had less science facilities hence limiting students' access to these equipments and a lot of teaching was theoretical incapacitating the morale and impact of hands-on practical experience. Students therefore looked at science equipments with fear and or excitement when they touched them. This made them opt for the much easier things to use other than the sophisticated apparatuses.

Qualified and experienced science teachers were not always available at their schools, which greatly affected the competence of their work and attitude to students learning science subjects.

Lastly, it was revealed that schools increase exposure of students to science facilities so as to cause the students to love the subjects practically as part of daily life. Teachers were also recommended to undertake further training and refresher courses to update their skills

5.3 Recommendations of the study

Government should continue putting up incentives to boost the girl child's learning of science subjects and encouraged their parents and teachers as career guiders to help students take on sciences as their core subjects.

The Ministry of Education, Science, Technology and Sports in conjunction with the schools should design strict measures and fully implement them to ensure that all schools have science teachers who stay in their schools to dedicate enough time for students to comfortably learn science subjects.

Teachers and parents should also encourage students, especially girls, to take on sciences; since the majority of students taking on sciences are boys. Science can be studied easily if students can see the practical side of it.

School Administrators should motivate teachers to boost their interest towards guiding learners in science subjects.

5.4 Suggested areas for further research

The study recommends further research to be done to analyze the quality of science facilities available in schools in relation to easiness and boosting students' love for sciences, improving on school inspection and advisory work upon secondary schools to ensure that the science curriculum is followed as designed. And family background in determining the choice of career for their children

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APPENDICES

APPENDIX I

QUESTIONNAIRE FOR TEACHERS AND LABORATORY ATTENDANTS

I am Mugambwa Mulwanya Judah a final year student pursuing a Masters \Degree of Education policy planning and management of Kyambogo University.

This questionnaire serves to gather data concerning the impact of the O' Level Science Policy upon students' attitude towards studying science subjects.

I therefore request you to offer a helping hand by either ticking or filling as guided by the instructions. Data gathered shall be kept with utmost confidentiality for academic purposes and probably the betterment of our education system.

PART I Background Information

(Please tick)

1. (a) What is your age in complete years?
19-24 ☐ 25-29 ☐ 30-34 ☐ 35-39 ☐ 39 and above ☐
(b) Gender: Male ☐ Female ☐
2. (a) How long have you worked as a teacher?
(i) 0-4 ☐ (ii) 5-9 ☐ (iii) 10-14 ☐ (iv) 14 and above ☐
(b) How many years have you worked in this school
0-5 ☐ 6-11 ☐ 12 and above ☐
(c) Are you on the Government Payroll?
Yes ☐ No ☐
3. (a) What is your highest academic qualification?
Diploma. ☐ 1st degree. ☐

2nd degree. ☐

3rd degree. ☐

Any other ☐

(b) if any other please specify

PART II:

SECTION A: Gender and students attitudes towards compulsory study of science subjects.

(Please put a tick or a circle around the response that best suits your perception). Probable answers are given using numbers ranging from 1 (one) to 4 (four) with the following meanings

1. Strongly agree 2. Agree 3. Not Sure 4. Disagree 5. Strongly Disagree

1. Boys should have compulsory study of science subjects in O'level.

- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

2. Girls should have compulsory study of science subjects in O'level.

- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

3. Compulsory teaching and learning of science subjects in O'level has not improved boys' attitude towards studying sciences.

- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

4. Compulsory teaching and learning of science subjects in O'level has not improved girls' attitude towards studying sciences.

- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

5. School science facilities contribute a lot to students' attitudes towards the study of science subjects

1. Strongly Agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Disagree

6. Our school has adequate science facilities needed by all students in O' level.

1. Strongly Agree 2. Agree 3. Not sure
4. Disagree 5. Strongly Disagree

7. School science laboratory facilities exist in O' level but are in poor conditions and not utilized properly.

1. Strongly agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Agree

8. Practical lessons on science subjects are only conducted in senior four (4) classes.

1. Strongly agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Disagree

9. There are enough science teachers in O' level schools.

1. Strongly Agree 2. Agree 3. Not Sure

4. Disagree 5. Strong Disagree

10. Science teachers in O' level schools are qualified and competent for their profession.

1. Strongly Agree 2. Agree 3. Not Sure

4. Disagree 5. Strongly Disagree
11. Science teachers use the appropriate methodology and evaluation methods in delivering the science concepts to the students.
1. Strongly Agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Disagree
12. Science teacher exhibit better relationship with the students and other fellow teachers, plus the head teacher.
1. Strongly Agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Disagree
13. Science teachers are always available for lessons at school.
1. Strongly Agree 2. Agree 3. Not Sure
4. Disagree 5. Strongly Disagree

Section D: For the following questions, you are requested to fill in the space provided

14. What other factors do you think affect the students' attitude towards studying science subjects?
-
15. How do you think the above factors affect the students' attitude?
-
16. What do you think can be done to improve students' attitudes towards science subjects?
-
-
17. What comments do you draw upon the implementation of the programme/ policy?
-

-
18. What suggestions can you give in order to successively achieve the objectives of the policy?
-
-

Thank you for participating

APPENDIX II

QUESTIONNAIRE FOR STUDENTS

This questionnaire serves to gather data concerning the impact of the O' Level Science Policy upon students' attitude towards studying science subjects.

I therefore request you to either tick or fill as the response that best suits your view. Data gathered shall be kept with utmost confidentiality for academic purposes and probably the betterment of our education system.

PART 1: Background Information

(Please put a tick)

1. (a) What is your age bracket?
12-14 ☐ 15-19 ☐ 19 and above ☐
(b) Gender: Male ☐ Female ☐
2. (a) State the class you belong to
Senior three ☐ senior four ☐
(b) Which school are you? (*Please put a circle*).
A. Government Secondary School. ☐
B. Private Secondary School. ☐

PART II: SECTION A

The policy and boys' and girls' attitude towards studying science subjects

Please put a tick or a circle around the response that best suits your perception. Probable answers are given using numbers ranging from 1 (one) to 4 (four) with the following meanings

1.Strongly agree 2. Agree 3.Not Sure 4.Disagree 5. Strongly Disagree

1. The girls in the science class are more active than the boys.

- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |
2. Making science subjects compulsory has motivated me to love science subjects.
- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

SECTION B: perception on school science facilities and students attitudes towards the compulsory teaching of science subjects in O' level schools

3. The school science laboratories and library are equipped with modern science equipments and text books.
- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |
4. The available science facilities in our O' level science laboratories motivate students to study science subjects.
- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |
5. Science practical lessons in the science subjects are always conducted in our class.
- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |
6. The available science text books which are always available for us to read have motivated O' level students to study science subjects.
- | | | |
|-------------------|----------------------|-------------|
| 1. Strongly Agree | 2. Agree | 3. Not Sure |
| 4. Disagree | 5. Strongly Disagree | |

Section D: For the following questions, you are requested to fill in the space provided

12. What do you think of the policy of forcing all O' Level students to study science subjects?

.....

13. What are the effects of making sciences compulsory at O' level on girls and boys attitude towards studying science subjects?

.....

14. What do you think can be done to enable the policy motivate students to love science subjects?

.....

Thank you for participating.

APPENDIX III

FOCUS GROUP DISCUSSION GUIDE FOR STUDENTS

The focused group method will be applied to some students of S.3 and S.4 classes on the O' Level Science Policy and students' attitudes towards the compulsory teaching of science subjects at ordinary level".

I would like to know the following information from you please.

1. How old are you?
2. Which class are you?.....

Compulsory teaching and boys and girls attitude towards studying science subjects

3. Has the policy of making science subjects compulsory at O' level motivated girls to study science subjects?
.....
4. Has the policy of making science subjects compulsory at O' level motivated girls to study science subjects?
.....
5. Comment on the difficult level of science subjects in this school.
.....
.....

Compulsory teaching at O' level and science facilities

6. Among the girls and boys who perform better than the other in science subjects and why?
.....
7. Do you have enough science facilities and are they utilized maximally?
.....

8. Have the available science facilities in this school motivated O' level students to study science subjects?

9. Give reasons for your answer in 8 above.

.....
.....

Science teachers and students attitude towards studying science subjects

10. Do you have enough qualified science teachers?

11. Does your school have teachers who teach science subjects at O' level well?

.....

12. How do you interact with your science teachers?

.....

Ways to improve the policy so that students attitude towards love studying science subjects increases

13. How can science subjects be made lively for you to like them?.....

14. How can the policy of making sciences compulsory at O' level be improved so as to motivate more students to positively study science subjects?

.....

Thank you for participating.

APPENDIX IV

INTERVIEW GUIDE FOR TEACHERS, HEAD TEACHERS AND LABORATORY ATTENDANTS

1. What attitude do you have towards the compulsory teaching and learning of science subjects?
2. What sex performs well than the other and how has the policy of compulsory teaching impacted on this?
3. Does your school have qualified science teachers?
4. Are the science teachers always available for the students in classes?
5. Has the science policy made any impact on the teaching of science subjects?
6. How do the science teachers relate with the students and other fellow teachers?
7. What comments would you like to give about the state of science laboratories in your school?
8. Is the time allocated on the time table to teach science subject lessons enough for you?
9. What major problems do you face in the teaching of the science subjects?
10. What do you think should be done to improve student attitudes towards science subjects?
11. Where would you like to have some improvements so that the policy improves students' attitude towards studying science subjects?

Thank you for participating.

APPENDIX V

INTERVIEW GUIDE FOR PARENTS, AND SUB COUNTY OFFICIALS

1. Should science subjects be made compulsory for both boys and girls at O' level?
2. Which sex performs better in science subjects?
3. Why do you think the sex chosen performs better?
4. How do you judge the teachers 'characters in relation to mentoring students towards love for science subjects?
5. What is the impact of availability of science facilities upon students' attitude towards studying science subjects.
6. What do you propose upon the policy as to improve students' attitude towards sciences?

APPENDIX VI

THE OBSERVATION GUIDE

The researcher will use the observation guiding tool for the following.

1. In here the researcher will observe a science teacher conducting lessons in any of the classes say S.3 or S.4 in any science subject.
2. Observe his techniques during delivering of the specific subject content to the students.
3. Will also observe the dominating sex in the classes visited.
4. Will also have to check their science books, for notes, exercise, marks and organization of the notes.
5. Will also observe students' performance list for the current students in S.3 or S.4.
6. Will observe the livelihood of teachers, and students while in a science class

Alongside the above, the researcher will analyze the availability of the following

Item		Availability		
Sufficient text books		N.A	S	N.S
Preparatory and working laboratory rooms				
Preparatory and working tables				
Laboratory tools and equipments	Test tubes			
	Chemicals and reagents			
	Science charts and models			
	Microscopes			
Qualified teachers				
Class size				
Liveliness of students while in class				

N.B: key to initials used

N.A - Not Available - Sufficient N.S - Not sufficient

There shall also be a documentary analysis for certain things like O' level performance in previous years and academic qualification of science teachers.

Thank you for participating.

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www. Kyambogo.ac.ug

Department of Educational Planning Management

Date: 01 August 2014

TO WHOM IT MAY CONCERN

This is to certify that **MUGAMBWA M Judah, Reg. No. 2010/U/HD/032/MEDPPM**, is a student in our department pursuing a Master's Degree in Education in Policy Planning and Management. He is carrying out research as one of the requirements of the course. He requires data and any other information on this topic entitled:

The Effects of National School Science Policy on Students' Attitudes Towards the Studying of Science Subjects. A Case of Nama Sub-county Mukono District.

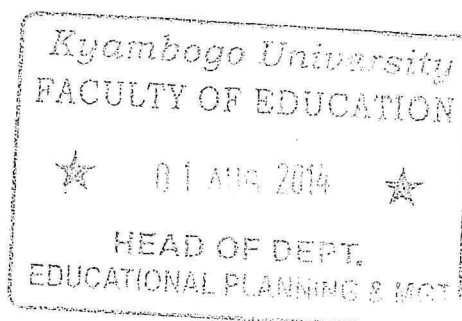
Any assistance accorded to him is highly welcome. He is strictly under instructions to use the data and any other information gathered for research purposes only.

Thank you

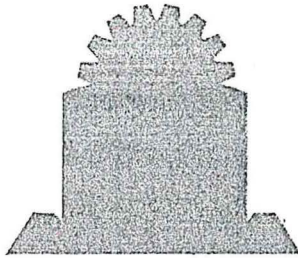
Yours faithfully

L Komba

Leticia Komba Rwakijuma (Mrs.)
HEAD OF DEPARTMENT



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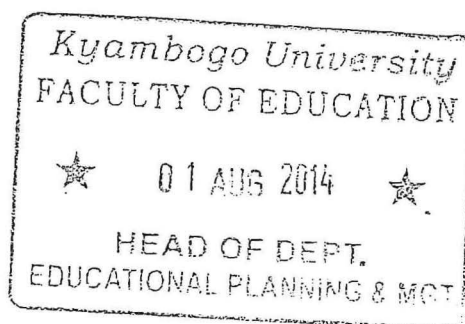
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Thank you

Yours faithfully

Komba

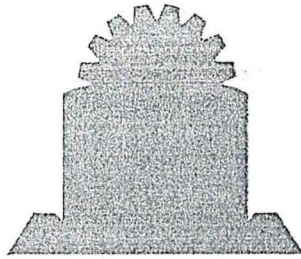
Leticia Komba Rwakijuma (Mrs.)
HEAD OF DEPARTMENT



This is to certify that Mr. Mugambwa carried out his research in Mt. St. Henry's High School by use of questionnaires which were filled by the students in S2, S3 & S4.

[Signature]

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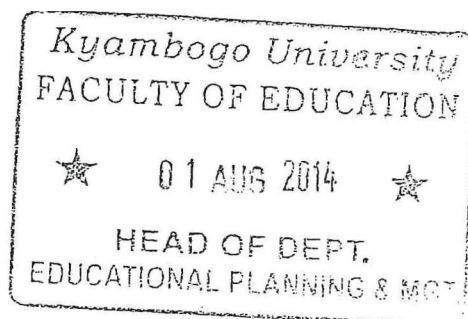
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Thank you

Yours faithfully

Komba

Leticia Komba Rwakijuma (Mrs.)
HEAD OF DEPARTMENT



Mugambwa Judah has been allowed to collect data from our school

03/08/14



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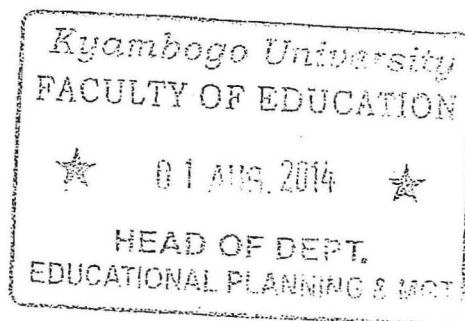
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Yours faithfully

Komba

Leticia Komba Rwakijuma (Mrs.)
HEAD OF DEPARTMENT



received and assisted



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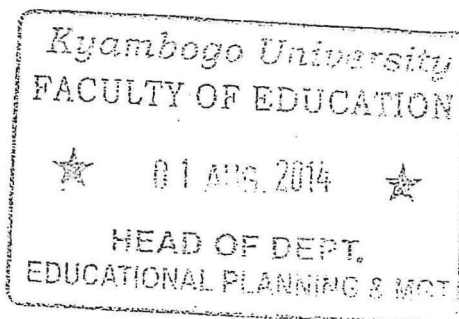
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Thank you

Yours faithfully

Komba

Leticia Komba Rwakijuma (Mrs.)
HEAD OF DEPARTMENT



Served by
SSE RWAJUMA BEN
CAO NAMA S/C
[Signature]
05/08/2014

