

**DETERMINANTS OF IMPLEMENTATION OF NEW  
ECONOMIC PARTNERSHIP FOR AFRICA DEVELOPMENT E-  
SCHOOLS PROJECT IN WESTERN KENYA: A CASE OF  
SELECTED NATIONAL SECONDARY SCHOOLS**

**BY**

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## **DECLARATION**

This research report is my original work and has not been submitted for examination in any other university.

.....

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**L50/65386/2013**

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Date

This project has been submitted for examination with my approval as the university Supervisor

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## **DEDICATION**

I dedicate this project to my mum Marciana Libendi Ateya for nurturing me and for all the sacrifices she made that have shaped me into whom I am today. My husband Vitalis Kangayia for the encouragement and support both morally and financially and my children Mercy Corazzone and James Austin for their patience and understanding.

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## **ABBREVIATIONS AND ACRONYMS**

**DSTV** – Digital Satellite Television

**ICT** – Information Communication Technology

**KESSEP** – Kenya Education Sector Support Programme

**MOEST** – Ministry of Education Science and Technology

**NEPAD** – New Partnership for Africa`s Development

**OECD** – Organization for Economic Co-operation and Development

**PPP** – Public Private Partnerships

**SSA** – Sub Saharan Africa

**VSAT** – Very Small Aperture Terminal

## ABSTRACT

An e-school is a learning institution with basic digital equipment that is internet enabled to facilitate teaching. E-schools were introduced in selected Kenyan national secondary schools. However, the implementation of the project had challenges particularly in Western Kenya. They were lack of internet connectivity, the training given to the teachers was not sufficient; the ICT equipment was not adequate and of the expected quality and it was not followed by monitoring and evaluation to ensure that the quality of teaching and learning is enhanced. To establish the determinants of implementing this project in selected national secondary schools in the Western region of Kenya, this research adopted the following objectives: to establish how funding, teacher training, leadership and ICT facilities determine the execution of the project. The researcher employed the descriptive survey research design. This study was supported by the Constructivism theory a school of thought guided by the principles of scientifically observing the ways in which people acquire knowledge or skills. Two from schools were included in the study. The target population was 3,121 respondents who included 2 principals, 147 teachers and 2,972 students. The sample size for this study was 341 drawn from the target population. Data was collected using questionnaires, interview schedules and through observation. To ascertain the reliability and validity of the research instruments, a pilot study was done in Menengai high school one of the e-schools in Kenya. To analyse the data, descriptive statistics that involved frequencies and percentages and the findings presented in tables. Major findings were 54% of the respondents indicated that funds were inadequate. 50% suggested there was no transparency in the management of funds. 52% responded there was no accountability of funds. On teacher training 55% of the respondents indicated the training was not sufficient, 52% disagreed training had given them the confidence while 52% responded training had not given them knowledge and skills. On leadership 52% of the respondents disagreed there was an ICT policy in place, 55% responded there was no national structure for coordinating the implementation of the project while 55% indicated there was no monitoring and evaluation mechanism. On ICT equipment 89% responded the equipment was inadequate. 50% indicated there was no maintenance of ICT equipment and renewal plan for the project. Conclusions based on the findings were; funding towards the project was not sufficient, the training given to the teachers was inadequate, leadership was not streamlined and the ICT equipment was not adequate and of the expected quality. The recommendations of the study were: there is need for the government to prioritize funding for ICT in education in Kenyan secondary schools and equip the e-schools laboratories with adequate and modern ICT equipment. Recommendations for further studies were a similar study covering other regions to be done.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background to the study**

The medium of instruction in e-schools is through the use of computers connected to the internet alongside other tools like smart boards, projectors and television sets among others. In developed countries like the US, it is considered as a deliberate teaching-learning situation where a broad assortment of digital technology is used in the classroom.

Finland is the world leader in ICT integration in education. It embraced integration of ICT in teaching and learning during the 1980s however the infrastructure was not adequate then. However, by the 1990s ICT integration in education was implemented nationally (Bollersler, 1998). This was followed by a massive investment in Information Technology after the economic depression of the early 1990s which has culminated into the government of Finland's vibrant commitment agenda to develop the use of ICT. Kozma (2005) argues that main objective for Finland's incorporation of ICT into its national policies is to transform education as well as other sectors of society.

In the third world countries, digital technology is in the early stages of utilisation and the challenges that these countries have to grapple with vary from those of the advanced nations (Bhuasiri et al; 2012). Bangladesh for instance with a GDP of about 6% wanting infrastructure in technology similar to other developing countries (Islam & Selim, 2006). Bhuiyan (2011) in recent years, Bangladesh has endeavoured to improve the use of Information Technology in its public sector though it was ranked as one of the lowest performers in South Asia by the UN e-government report survey of 2008. However, with a view of developing the quality of education system in order to strengthen the training of teachers and students, Bangladesh has given importance to integration of technology in education through 'Vision 2021'.

ICT integration in Kenyan schools is rather recent, limited and based on new ideas. The government however appreciates the fact that digitalization of secondary school education will lead to generation of knowledge, sharing of information and

communication amongst the community in schools. The ICT policy was adopted in Kenya in January 2006. Its main objective is to ensure that there is an effective ICT service delivery, and to enhance the quality of teaching, integration of ICT in education will be supported in all institutions across the country by the government.

Farrell (2007) these plans are meant to enhance the advancement of e-learning facilities; enable Public-Private Partnerships (PPP) to ready equipment to promote ICT in education; and support distance education and institutions of virtual learning, especially universities. Other countries have attained over 41% implementation of ICT in secondary schools, whereas the percentage remains lower in Kenyan schools (Laaria, 2013).

The study in Western region has been prompted by the failure of the project against the investment by the government and public Private Partnerships (PPPs). A lot of resources were invested to improve the teaching and learning process. A monitoring and evaluation report in 2013 revealed that the project had stalled in five out of the six schools hence the study to investigate determinants of implementation of this project in selected national schools in Western Kenya.

## **1.2 Statement of the Problem**

The execution of the project encountered challenges in Western Kenya. The project stalled hence hampering the teaching and learning process. Lack of internet connectivity, and inadequate teacher training impacted on the implementation which was not followed by monitoring and evaluation to ensure that the quality of teaching and learning was enhanced. In Western Kenya, Chavakali and Maranda high schools were among the six e-schools. The selected schools were installed with the pre-requisite ICT equipment and teachers and students trained on how to use them. Even though the principals were charged with ensuring that the project is sustained, no more funding was provided. The internet subscription was only available for the grace period of 12 months, monitoring and evaluation was not catalyst since there was no further improvement on the existing infrastructure. This study was meant to examine determinants of implementing the project in selected national secondary schools in Western Kenya. .

### **1.3 Purpose of the Study**

The research sought to examine determinants of implementing the project in selected national secondary schools in Western Kenya.

### **1.4 . Objectives of the study**

The objectives of the study included;

1. To establish how funding determine execution of the project in Western Kenya.
2. To establish how teacher training determine execution of the project in Western Kenya.
3. To establish how leadership determine execution of the project in Western Kenya.
4. To establish how ICT equipment determine execution of the project in Western Kenya.

### **1.5 Research Questions**

The research questions were:

1. How did funding impact on the project in Western Kenya?
2. How did teacher training impact on the project in Western Kenya?
3. How did leadership determine impact on the project in Western Kenya?
4. How did ICT equipment impact on the project in Western Kenya?

### **1.6 Significance of the Study**

It is believed this project report would be invaluable in revamping the existing e- schools into better ICT champion institutions as well as to the NEPAD in enhancing their leadership roles and make them better equipped in implementing projects of this nature and magnitude in future. The study would also be useful for educators and stakeholders involved in integrating ICT into education in Kenya.

### **1.7 Delimitation of the Study**

The study was conducted in two institutions – Chavakali and Maranda high schools. The sampling was done in consideration of distance as a constraining factor between the e-

schools, but the findings of this study would be useful to all other regions which might find it useful since they operate under the same challenges.

### **1.8 Limitations of the Study**

The following barriers and challenges were bound to occur: Study respondents for one reason or another withheld important information from the researcher and therefore the researcher assured the respondents of their confidentiality so that they freely open up to give the information. The interview schedules that were used in the data collection although had many advantages, they were time consuming and costly, the researcher overcame this by setting time frames within which the interviews were conducted to save on time and reduce costs.

### **1.9 Assumptions of the Study**

The assumptions included: there were determinants of implementation of the project; data collection instruments had validity and would measure the desired constructs; the respondents would answer questions correctly and truthfully. That the findings of the study as well as the recommendations would be vital to the stakeholders of the project in , future researchers academicians and policy makers.

### **1.10 Definition of Significant Terms**

**Determinants:** Something that controls or affects what happens in a particular situation

**E-schools:** A learning institution with basic digital equipment that is internet enabled to facilitate learning

**Implementation:** Execution of an activity or programme of known dimensions

**National Schools:** Refers to secondary schools that select students from all parts of the country

**Secondary Schools:** Schools which provide secondary education after primary school and before higher education

**Western Kenya:** Kenya`s former administrative provinces west of the great Rift valley.

### **1.11 Organization of the study**

This project report comprises of five chapters. Chapter one was based on the background to the study, the problem statement, purpose of the study, the objectives of the study, the research questions, the significance of the study, the limitations, delimitations and assumptions of the study, and definition of the significant terms employed in the study.

Chapter Two was on literature review of determinants of implementation of the e-schools project in selected national secondary schools in Western Kenya, which included funding, teacher training, leadership and ICT equipment. It also included the theoretical framework and the conceptual framework of the study.

Chapter Three dwelt on the methodology of research. It included the research design, the study population, sampling procedure and sample size, instruments of data collection, piloting of the study, validity and reliability of the data collection instruments, procedure of data collection, data analysis and data presentation techniques and ethical issues.

Chapter four looked at data analysis, presentation, interpretation and discussion of the findings while chapter five dealt with the summary of findings, conclusions of the findings, recommendations and recommendations for further research.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter presented literature review based on themes drawn from the objectives. The themes included funding, teacher training, leadership and ICT equipment, theoretical framework AND conceptual framework of the study and summary of the literature related to the study.

#### **2.1 The Concept of New Economic Partnership for Africa Development e- schools**

The e-schools project (NEPAD 2003), was started to inculcate ICT skills in students on the African continent to enable them to compete on an equal footing with their counterparts from the developed world and to enhance the teachers' competencies to empower them to incorporate digital technology in their teaching, improve the level of management in schools as well as make education accessible. This follows the realization that ICT has a bearing on all spheres of human life. The main objective of the project was inculcate ICT skills to students in primary as well as secondary schools across the continent (Evoh 2007; NEPAD 2005).

#### **2.2 Variables of the e-schools project**

This section reviewed literature on determinants of the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya. They included funding, teacher training, leadership and ICT equipment.

#### **2.3 Funding**

Effective integration of technology into education entails substantial funding. It requires a sound financial policy framework for sourcing appropriate hardware and software, sourcing teaching and learning resources, carrying out teacher training, being able to connect and subscribe for internet connectivity, upgrading, maintenance and replacement of worn out equipment. Mumtaz (2000), many scholars argue that the lack of adequate funds to procure the necessary infrastructure can obstacle to teachers being committed to using ICT tools in facilitating teaching and learning.

Most countries have realized the role that information technology plays not only in the life of an individual but the country at large and this is the main reason why investments to improve education systems through the use of digital technology continues to be a priority globally. The

British government for instance spent over 2.5 billion pounds between 2008 and 2009 on developing its ICT system of education (Nut, 2010). Its counterpart the United States of America on the other hand spent over \$11 billion in the year 2009 on K-12 schools and institutions of higher learning alone (Nut, 2010). China which is an emerging economy has undergone major transformation with the central one being transformation in e-learning.

Afshari, Bakar & Lu Luan et al (2009) emphasise that being able to access adequate infrastructure is mandatory if there is to be effective utilization of the new technological dispensation. Bangkok (2004) on the other hand affirms that investing in digital technology must however, consider the other pre disposing conditions under which to use it.

Saudi Arabia has made considerable strides in enhancing its use of technology, especially in the public education sector where its government has invested considerably. In 2007, the government invested close to “ billion pounds in revamping and improving education using modern technologies as well as the introduction of development packages for teachers in order to maximize the use of ICTs (Tatweer, 2015).

Rwanda has ventured into partnerships with several organizations globally, regionally as well as and locally to enable the use of ICT in its system of education. The Rwandese government is determined to design and implement education programmes using ICTs, in line with this, ICT infrastructure has been provided to both primary and secondary education. The effort to coordinate all these programmes and initiatives are being done by an ICT unit in the Ministry of education. (Rubagiza, Were & Sutherland, 2011)

In spite of the key role of ICTs in enhancing education, they are financially under prioritized in most of the Kenyan schools. Before the NEPAD program came to Kenya, there were a number of secondary schools already teaching computer studies. They did this by contracting commercial college tutors to teach their students computer literacy, which was paid for by the parents. The curriculum that these colleges followed was not streamlined, but from the way the program was received, the ministry saw the need to incorporate computer studies in its secondary school curriculum (Odera, 2002). This was done to streamline training and offer standard evaluation. Various studies show that effectiveness and sustainability of ICTs in education is expensive (Hawkins; 2002).

In Bangladesh lack of integrity has proliferated, despite the measures put in place to curb it. It can be viewed as a barrier to the successful implementation of ICTs in education. The misappropriation of funds provided by the government that would have been allocated to developing other areas such as integrating ICT in education are diverted, with a few individuals misappropriating the funds (Kessy et al, 2006). Mamun and Tapan (2009) funds meant for the buying modern ICT equipment was misappropriated and squandered and only minor repairs end up being done in the tertiary level of education.

Maintaining outdated computers is even more expensive. Apart from purchase costs, there is also Total Cost Ownership (TCO) which includes hardware and software acquisition, installation and configuration, internet connectivity, maintenance, support, refitting, establishment of computer laboratories and replacement costs (Kukali, 2010). Makoa (2004) cited in Kukali (2010) argues that the success of ICT policy implementation heavily relies on availability of resources, lack of which becomes a serious setback. A research in Kenya on ICT in secondary schools indicated inadequacy of computers most of which were out-dated, and to add onto that and they lacked ICT technicians to service their computers. All these were due to financial constraints, rated at 71.4% of all the schools. Even with supply of computers and other ICT equipment, adequate use of these facilities requires well budgeted funds which are inadequate in many institutions of learning (Kasalu, 2010). Schools are not exceptional.

Sustainability is the ability of a project to maintain its activities, services and outcomes in the course of its expected life time. Sustenance of projects is a serious setback in many African countries. Many projects implemented at high usually costs face challenges with sustainability (Adil ,2000). This implies that whereas huge expenditures are undertaken by the implementing such projects, they are deprived of the benefits expected from such investments.

In South African Gauteng province, there is an initiative to introduce computer laboratories in schools, the introduction of Gauteng on Line (GoL) was to give learners and communities information Technology literacy and equip them with necessary skills that will enable them have access to resources for learning equipping them with ICT skills for getting employment. Mphehle's (2011) study revealed that while the project has had significant progress since its introduction, there has also been challenges and the project in most of GoL schools is offline, and has not achieved success as was planned, among challenges found in the study were

infrastructure was not up to standard, there was lack of ownership and community involvement, installation was not followed by monitoring and evaluation to ensure success of computer use in schools and training provided to computer managers was found to be inadequate (Mphehle, 2011). Rusten further pointed out that mechanisms of revenue generating activities should be developed by schools in order to raise funds for ICT in education projects, he said these revenue generating activities which include computer training to the public providing computers to the community members and government agencies to access their computers for use can be done after normal school hours, these activities can generate income to maintain their computer systems and can create a good relationship with the community. These relationships between school, community and private sector partners can lead to longer term financial political support and access to needed support.

#### **2.4 Teacher Training**

Training of teachers is paramount for effective use of modern technology in a teaching –learning situation. Several countries around the world appreciate the training of teachers Several countries around the world appreciate the training of teachers and have put mechanisms in place to provide them with training inspite of the complaints that it always tends to be inadequate (Jung, 2005). Lack of confidence for instance, is the main source of fearing to fail as exhibited by many teachers (Beggs,2000).

In a study in five countries in Europe to establish teachers' knowledge, skill and level of confidence in using technologies, Peralta and Costa (2007) assert that technical competence had an effect on the way teachers in Italy used ICT in their teaching. The teachers however, cited pedagogy and didactic competences as important factors if successful educational practices are to be put in place.

A study in South Africa by Howie and Blignaut (2009) to determine if teachers of Mathematics and Science in secondary schools were ready for ICT integration into the teaching and learning of these subjects showed that the teachers who lacked confidence in using ICT equipment end up not acquiring the knowledge and skills in using ICTs in teaching. Confidence is gained through experience and lack of access to computers for instance constraints acquisition of confidence in teachers. Lack of confidence was also echoed by BECTA (2004), teachers who lack confidence may even shy away from training due to fear of embarrassment in the event of a mishap. Cox et al

(1999) argues that teachers who are confident in the using of ICT appreciate its value in their careers as well as personal lives and always want to use it.

Balanskat et al (2006) on the other hand realized that teachers' lack of ICTs competencies led to loss of confidence in using technology in their lessons due to anxiety thus demotivating them. Students' ICT literacy put demands on teachers expecting them to be competent in the usage of ICT which adversely affects the teachers who are not confident (Guha, 2000).

Webster and Hackley (1997) identify three qualities of teachers that greatly influence their students' performance and they include attitude, teaching style and their ease of using technology. The qualities are therefore indispensable in choosing suitable teachers. (Volery and Lord, 2000).

In Syria, teachers' lack of competence in ICTs is a challenge (Albirini, 2006). Competence in ICT is very demanding hence the need to ensure that teachers undergo adequate training which is practical over a long period of time. (Awouters and Jans, 2009).

In Netherlands, teachers' competence is no longer an obstacle in the use of ICT, (Balanskat et al, 2000). Baylor and Ritchie (2002), argue that no amount of sophisticated technology will be utilized unless teachers become competent and acquire necessary attitudes to incorporate ICT into the curriculum. Karsenti and Larose (2001), cite lack of enough teachers who are qualified in using technology across all grade levels as a barrier to adequate use of technology especially in inducting those who are still technologically shy.

In Saudi Arabia, teachers' lack of ICT competences is a drawback to the use of ICT in teaching science subjects (Al-alwani 2005, Almohaissin, 2006). While most of the teachers have been trained, the training has not equipped them to successfully use ICT in teaching their subjects (PanAf, 2008-2011). Pelgrum (2001), teachers' knowledge and skills affect the successful innovations in education, and it is a hindrance to the integration of ICT in education for both developed and developing countries (mantaz & Tapan 2009; Pelgrum 2001; Ihemeideh 2009; Williams 1995).

## **2.5 Leadership**

Leadership in transformation of methods of teaching is paramount is a key component especially if it involves integration of ICTs. Schools leadership determines the rate at which changes get embraced by the school community (Becta 2005; Heinrich 1995; Selwood 2007). The leadership approach will impact on the teachers willingness to adopt to the new pedagogy.

Tearle (2003), a study in a school in England where new teaching strategies using ICT integration, was successfully implemented and sustained. Tearle noted that this was as a result of involvement and collaboration of all the staff enabled by a sound leadership policy. The case was the same in several schools a study done in Hong Kong.

Researchers in the area of ICTs in schools have argued that a vision in ICT in schools is invaluable for ICT integration to be effective (Anderson and Dexter, 2002). Before substantial investments are made in schools' hardware and software, Means and Olson (1997) advice the need for schools to have a vision. Kennewell et al (2000) contends that collaborative leadership in a school leads to the development of a culture of inclusiveness (Fox 2003; Tagg 1995).

Yaxley (2003), ICT policy is can be viewed as direction that a school takes in as far as its plans in ICT utilization is concerned. It details the activities, the available resources and time frames within which to achieve the ICT plans in a given school setting. Baylor and Ritchie (2002), many factors that need to be taken into consideration when integrating computers into the school system, for instance the school policy, the leadership, curriculum, the attitude of the students as well as teachers to name just but a few as this will impact on how the integration of ICT is received.

The importance of having ICT policies in education is seen by most governments around the world as essential to the successful integration of ICT in education. The Kenyan government decreed for the introduction of computer studies in all secondary schools (Odera, 2002). A national policy on ICT was then formulated. The introduction of e-schools in Kenya is hinged on this policy.

For ICT in education projects to be successful and sustainable, Rusten (n.d) pointed out that monitoring and evaluation is fundamental. Monitoring and evaluation in ICT in education in

Korea is done for all institutions right from primary to upper high schools and for related national projects. It includes the state of resources, learning activities among others

Studies have shown that teacher committees are important in the successful implementation of ICT. There is need for teachers to adjust in order to make a positive contribution. If they don't embrace change they become an impediment to the process of transformation. Teachers, beliefs and attitudes impact on their use of the same technology in their classes.(Bingmlas, 2009). Integration of ICT in education is a detailed process that needs changes at all levels of the system. Institutions in Bangladesh have not embraced implementation committees in information technology in education. Integration of ICT is determined by the decisions taken at the level of the school for instance developing an ICT plan, supporting ICT and training in ICT (Tondeur, Vankeer et al, 2008). Al-Harbi (2014) and Ghamrawi (2013) the head of institution is a pillar in the process of integrating ICTs, if he fails to provide adequate support and encourage the teachers there will be no conducive working environment in which teachers are motivated to incorporate it in their classrooms. Levin and Wadmany (2005) attest to the same sentiments.

## **2.6 ICT equipment**

Like in all underdeveloped countries, ICT projects have been hampered by infrastructural challenges. For instance lack of electricity, lack of necessary devices like computers to facilitate continuous access to e-learning, higher internet costs and its unavailability, lack of space for establishment of e-learning centres among others. Gronlund and Islam (2010), asserts that less developed countries encounter infrastructural challenges.

Evidence demonstrates that schools with enough and good quality ICT resources, demonstrate a good practice in the use of ICTs (Mumtaz, 2000), and absence of good quality software and computers can limit what teachers and students can do with ICTs in the classroom. The study by BECTA highlights the importance for schools to be well equipped with enough and good quality ICT resources. The research investigated the relationship between ICT use in schools and pupils achievement in national examinations and found that schools that were well resourced in ICTs outperformed those schools that were not well resourced with ICTs (BECTA, 2003).

In Korea, the ratio of computer to students is 1:6, over 71% of the schools have internet connectivity. E-learning adoption (88%) was highest in primary schools, the middle schools had

78%, junior-high schools had 69%, the junior colleges had 62% while universities recorded 78% (UNESCO,2010).

In the United States, the ratio of students to instructional computers reached five to one (5:1) and 98% of schools were connected to the internet by 2007. In the United Kingdom, the ratio of students to computers was twelve to one (12:1) in primary and seven to one (7:1) in secondary schools while access to the internet was virtually universal, as it was in the European Union as a whole (Worldwide web, 2008).

Bangladesh lacks resources and infrastructure necessary for integrating ICT in education. ICT requires modern hardware and software, a key element in the diffusion of technology (Gulbahar, 2007). Internet connectivity is pre-requisite for ICT in a teaching-learning situation. However, internet access is very poor.

Lumumba (2007), in a study on obstacles in e-learning at public secondary schools, based on the NEPAD e-schools project in Kenya cited inadequate e-learning facilities as key obstacles to the success of the project. Oracle Corporation (2005), the Ministry of Education, Science and Technology (MOEST), and three companies: Microsoft Corporation, Oracle Corporation and Digital Satellite Television (DSTV) did the program implementation in Kenya. Altogether, the schools were to provide infrastructure to be used while each company was to provide the kit for hardware and the software. In the original plan, each classroom was to have a computer served from the ICT laboratory for the teacher`s use. Basic infrastructure is critical for successful implementation of the NEPAD e-school strategy. Technical and basic infrastructure, coupled with sustaining schemas, will empower or constrain the application of ICT in secondary education in Kenya.

Technical support is a pre-requisite in determining the acceptance of technology for teaching (William, 2002). Especially during the adoption stage of technology.

One of the critical factors for the effective implementation of ICT in schools as Seyaum (2004) argues, is to provide effective technical support to schools. In order to guarantee efficient and effective implementation and integration of ICTs in schools, technical support should be an integral part of schools overall plan, the plan should include installing hardware, operation, hardware maintenance, security and administration of network and supporting the whole school



and teachers no matter who provides the support, be it a trained staff from within the school or external technical provider or both, in-school technical support is essential for sustaining ICT in any given school.

OFSTED (2004) conducted a study in Britain and discovered that professional and technical support was more efficient in schools where schools strategic ICT plan integrated the element of technical support and where the educator and technical support personnel had a good relationship. Information Technology (IT) requires support staff to help in maintenance and troubleshooting of hardware and software, ongoing teacher professional development in the use of ICT for teaching and lesson planning and delivery.

A census on ICT infrastructure (as cited in ICT Strategy group report 2008 – 2013) in the Netherlands indicated that 85% of the schools considered technical support and maintenance a high priority and claiming it should be an integral element of the school ICT environment with proper technical support being made available to maintain hardware and infrastructure. Similarly, Yilmaz (2011), in his assessment of the integration of technology processes in the education system in Turkey reported that in providing schools with hardware and internet connections, it is also crucial to provide them with technical support with regard to repair and maintenance for the continued ICT use in schools.

Teacher's anxiety that something might get wrong during the process of using ICTs is a major barrier that prevents teachers from using ICTs, when a teacher expects technical faults with ICT equipment and does not have available technical support, the teacher will have less confidence in using ICT for teaching and this may cause teachers to avoid using ICTs in future (Bradley and Russel, 1997). Snoeyink and Ertmer (2001) found out that while trying to use computers and cannot do the task intended due to technical mishaps, teachers would avoid using computers, and this therefore undermines the need for availability of qualified and competent technical personnel in schools to carry out technical support on a permanent basis.

Accessibility to ICT equipment and resources in schools is a pre-requisite to the integration of ICT in education (Plomp, Anderson, Law and Quarter, 2009). Effective adoption and integration of ICT into teaching in schools depends mainly on the availability and accessibility of ICT

resources. Thus, access to computers, updated hardware and software are key elements to the successful adoption and integration of technology.

In countries, such as Estonia, Finland and France, internet access is considered as a fundamental human right and access to technology and broadband regarded as a basic infrastructure (ITU, 2010).

A study in conducted in Turkey showed that majority of the respondents had access to computers and internet connectivity. (Usluel, Askar and Bas, 2008). In Turkish schools, Toprackci (2006) found that inadequate computers, old or slow systems of ICT, coupled with scarce educational software in the schools were obstacles to the successful integration of ICT into science education.

Ross Itogaboam-Gray and Hannay (1999) pointed out that in discussing the issue of access to ICT resources, there is a need to link the access teachers need to teach with ICTs and teachers personal access to ICTs to allow teachers plan and prepare their lessons, the amount of personal access to ICTs for example teachers access to laptops at home raises teachers confidence. The relationship between personal access to ICTs and teachers confidence was also found by (Guha (2000) Cox; Preston and Cox (1999), the result of their study showed that teachers who were regular users of ICTs demonstrated more confidence in using ICTs and as a result they develop less fear in using ICTs and see ICTs as a valuable tool for both their own personal use and for teaching purposes.

## **2.7 Theoretical Framework**

The theoretical framework adopted for this study is derived from the constructivism theory. This theory is – based on observing and scientifically studying the ways in which people learn. Earlier on computers were used in behaviourist models in line with the works of Skinners`s (Ravenscroft; 2001) he laid emphasis the teacher being in control over what was learnt and the way it was to be learnt. In the recent past, emphasis has been placed on technologies using the constructivist approach which accords students the opportunity to create their own understanding.

This theory advances the argument that people are able create their own world view, as a result of our experiences. We reconcile our experiences and past ideas whenever we have new

encounters occasionally changing our perceptions. In order to achieve this, we must interrogate, explore and assess our knowledge of the world.

The constructivist theory can adopt different methods of teaching in a classroom setting. It encourages students to adopt realistic ways of solving problems in order to develop knowledge think about and talk about their actions and how their perceptions change. The teacher endeavours to understand the pre-existing conceptions of the students then and directs the activities to deal with their conceptions and develop them. The teachers encourage the learners to continuously assess how the activities help them gain understanding. Students in the constructivist classroom eventually become experts as a result of probing their strategies since it accords them broader tools of learning.

Research indicates that behaviourism, cognitivism and constructivism theories can be used to support e-learning. Any teaching method may borrow principles from schools of thought (Dede, 2008).

Critics argue that constructivism dismisses the teachers' role. However, it only modifies the role so that students are capable of creating knowledge as opposed to reproducing information. Students participate actively in the learning process and not passive recipients of knowledge. With the guidance of the teacher students are capable of creating ideal environments of learning since they can actively create their own knowledge and not ingest it superficially from the teacher or secondary material. This principles can yield varied situations for conducive learning atmospheres they can be used to help create the types of learning environments and the types of support for learning that are known to be ideal.

## 2.8 Conceptual Framework of the Study

This study was guided by the conceptual framework on the determinants of the implementation of the NEPAD e-schools project.

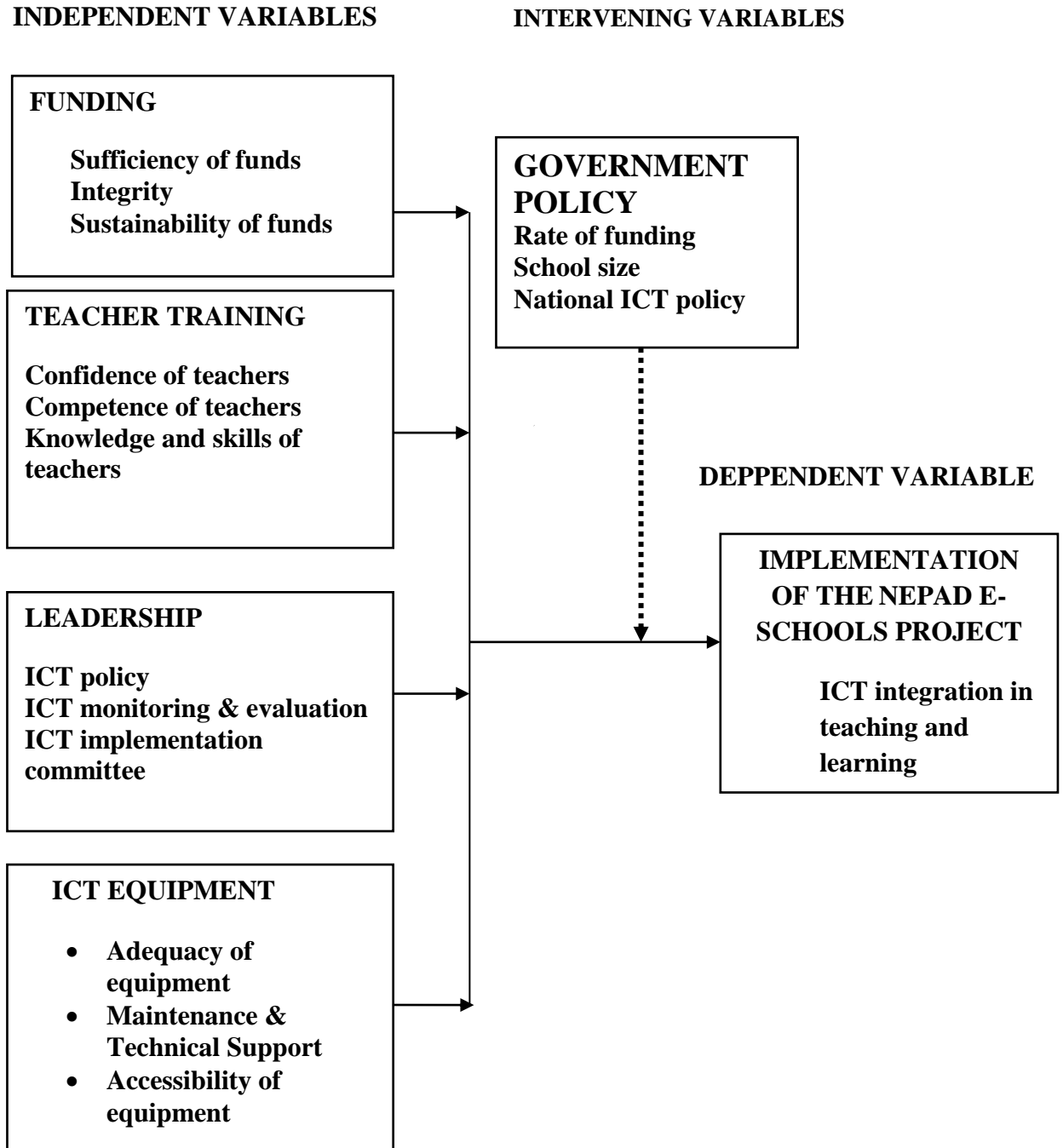


Figure 2.1: Conceptual framework showing interrelationship between key variables of the study

The conceptual framework above shows how the independent variables relate to the dependent variables. It also shows the indicators in each of the independent variables, that is, funding, teacher training, leadership and ICT equipment which determine the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya. This relationship is moderated by organizational factors like government policies, school size, and political factors. The arrows show the interrelationships among the study variables as shown in Figure 2.1

## **2.9 Knowledge Gap**

The challenge of human resource development in Africa is seen through the limited access to secondary school and the poor quality of education. Hence the focus on enhancing the quality and relevance of secondary education in Africa. This is the need to change the teaching and learning in both primary and secondary schools in countries in Africa. The NEPAD e-schools project seeks to achieve this through a paradigm shift in the educational curriculum. Therefore the implementation of this project was determined by funding, teacher training, leadership and ICT equipment. This study intended to determine the effect of these variables on the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya.

## **2.10 Summary of Literature review**

This chapter reviewed literature related to the study on determinants of the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya, based on themes drawn from the objectives. The themes included funding on the implementation of the NEPAD e-schools project with the following sub themes; sufficiency, integrity and sustainability. The second theme was teacher training on the implementation of the NEPAD e-schools project and its sub themes were; competence, confidence and commitment and knowledge and skills. The third theme was leadership with the following sub themes; ICT policy, monitoring and evaluation and implementation committee. The last theme was on ICT equipment and implementation of the NEPAD e-schools project. It had the following sub themes; Adequacy of equipment, maintenance and technical support and accessibility. The study was guided by a theoretical frame work propounded by the Constructivism school of thought. It was also backed by a conceptual framework.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter provided a detailed methodology employed into this research in terms of research design, target population, sample selection and size, instruments of research, validity and reliability of instruments, data collection procedures and data analysis techniques.

#### **3.2 Research Design**

The descriptive survey research design was employed. Its purpose was to establish how funding, teacher training, leadership and ICT equipment impacted on the execution of project in Western Kenya since the study was correlational. The design enabled the researcher to generate information directly from the respondents on the determinants and the influence that they had on the implementation of the project (Orodho, 2005).

#### **3.3 Target Population**

The study population consisted of teachers and students of selected national secondary schools in Western Kenya, giving a total of 3,121 respondents.

#### **3.4 Sample size and Sampling procedure**

Singleton (1993), sampling is the selection of objects of research for observation while sample size is the number of items selected from the entire population to make the sample. Sample size of 10% is reasonable for experimental studies while 30% is required for descriptive studies (Orodho, 2005). The sampling procedure was guided by the general rule in most social science research which suggests that the use of the largest sample will facilitate generalization (Orodho, 2005). The sample consisted of 341 respondents selected from a target population of 3,121. Most researchers suggest sample sizes of between 10% - 30% (Orodho, 2005).

The 341 respondents were distributed as:

**Table 3.1: Sample size**

<b>Category of participants</b>	<b>Total population</b>	<b>Sampling Method</b>	<b>Sample selected</b>
Principals	2	Purposive	2
Teachers	147	Simple Random	44
Students	2,972	Simple Random	295
<b>Total</b>	<b>3,121</b>		<b>341</b>

This no 341 was chosen according to Krejcie and Morgan table (1970), See appendix 6. The study employed purposive sampling to pick the key informants and simple random sampling to pick the teachers and students. Purposive sampling is a method that enables the researcher to pick on respondents who have information related to the objectives of his or her study (Mugenda, 2008). It was preferred for this study because it selects typical and useful cases only. Moreover, it saves time and money.

Simple random sampling on the other hand refers to selecting a sample where every individual in the study population has an equal chance of being picked (Oso and Onen, 2005). Taking the upper limit of 30% against the target population of 147 teachers gives a sample of 44 teachers. The researcher listed down the names of the 147 teachers in the sampling frame and assigned a number to each name. These names were placed in a container and mixed and 44 names were drawn without replacement. The researcher did the same for the 2,972 students and drew 295 names without replacement.

### **3.5 Research Instruments**

In collecting data, the researcher used the following instruments: questionnaire, interview schedule and observation checklist.

#### **3.5.1 Questionnaire**

A questionnaire is a group of item that the respondent responds to in written form (Oso and Onen, 2005). The structured (closed - ended) questionnaires were utilized to give uniform

answers from the respondents. The structured questions are uniform and can be processed with ease (Oso and Onen, 2005). The structured questionnaires had all alternatives that the respondents could choose from (Orodho, 2005). The advantage of using this type of instrument is the ease that it accords the researcher during analysis. There were 2 sets of questionnaires for: teachers and students based on the objectives of the study.

### **3.5.2 Semi structured interview schedule**

The study also used semi structured interview schedules to gather information from the respondents. Semi structured interview schedule has preset questions that the respondent answers in the course of the interview (Rukwaru, 2007). Interview schedules were used to interview key informants. The interview guide enables the researcher to elicit similar information from different people since there is one on one interaction and as such the questions can be customized to meet the needs of each individual. They will also allow the researcher obtain historical information as well as obtain information that cannot be directly observed. This approach makes the process of interviewing different people systematic as well as comprehensive.

### **3.5.3 Observation checklist**

Observation checklists were also used. Observation involves the use of senses to view and comprehend interesting experiences to the researcher which allows him or her to see for himself what people actually do rather than what they say they do (Onen and Oso, 2005). Observation schedules allowed the researcher to gain firsthand experience without informants, record information as it occurred as well as notice unusual aspects.

## **3.6 Pilot testing of instruments**

Before the researcher went out to collect the actual data, pilot testing was done in Menengai high school one of the schools under the project, which was not used in the final analysis. This helped the researcher to identify the problems that were bound to occur, especially in terms of filling in the questionnaire before issuing them out thus enabling the researcher make the necessary corrections on the instruments before the actual research. The researcher critically considered each item to see if it would examine the intended constructs. Instruments of the research were piloted to Menengai high school to ensure content clarity. After piloting the study, the data was re-evaluated and the ambiguous items changed.



### **3.7 Validity of and Reliability of Research Instruments**

Orodho (2005) validity is the accuracy of deductions made based on the results. It refers to asking a relevant question framed in the best way. Content validity was used to measure the validity of instruments used. It enables the reliability in representing the specific content of a particular concept in the data being collected. An instrument that will yield valid data is designed and then subjected to subjects of similar samples; inferences are then made and compared to existing theories. Orodho (2005), reliability is the degree to which the instrument of research gives similar results of data, after several trials.

In order to minimize errors, test and re-test was done to ascertain reliability of the research instruments during piloting. Research instruments were retested on a sample of 45 respondents (1 principal, 2 Teachers and 42 students) who were not used in the final analysis, (Mulusa, 1990). Menengai high school had 45 Respondents. The next testing was done after a fortnight, and the correlation between the two sets of scores computed. A Pearson's product moment formulae was administered and correlation coefficient calculated. Therefore, from the data analysis, the research instrument was tested to ascertain whether it was reliable and valid to collect the data or not. A score of +0.78 was obtained which was a good measure of reliability (Bowa, 1997).

### **3.8 Data Collection Procedures**

The researcher prepared a research proposal that was approved by a panel of supervisors after oral defense. Using their comments, the researcher incorporated them into the research project report. A permit from the National Council of Science, Technology and Innovation (NACOSTI) was then obtained, before proceeding to the field to collect data. The researcher also obtained an introductory letter from the University of Nairobi. The researcher then went to the field to carry out the pilot study. From the findings gathered necessary alterations were made on the research instruments. The researcher then visited the selected schools to consult with the management on the data gathering exercise. The next step was going back on the agreed dates to supply the questionnaire and collect them after they were duly filled, conduct the interview and observe other phenomena.

### **3.9 Data Analysis Techniques**

Data analysis entails ordering, giving form and meaning to the collected data. The raw data collected from the field was sorted, edited, coded and tabulated for analysis to answer the

research objectives and questions. Both qualitative and quantitative analyses were used. The researcher used Qualitative Descriptive data analysis for qualitative data. After isolating the qualitative data, the researcher then determined association between the different data contexts so as to develop themes which were the desired outcome of data analysis process. RECAP.

The researcher used quantitative analysis to interpret data on how funding, training of teachers, leadership and ICT equipment impacted on the project. The quantitative data was analysed by descriptive statistics through percentages and frequencies to explain the relationship. This entailed describing the items that made up the sample. The frequency with which items appeared was considered. The specific classification system was used to record the information on the content analysis which determined the frequency and trends with which concepts of the objectives were interpreted as a measure or bias. Tabulating data and presenting it in tables was used to give a visual display of findings, the trends and for easy reference. The second level of the data analysis involved inferential statistics to establish the associations of the determinants of the project. The researcher also used computer and computer software in the process of analyzing data. The Statistical Package for Social Sciences (SPSS) version 22 was employed, this is an integrated package for the input, analysis and graphical presentation of results.

**Table 3.2: Summary of Operational Definition of Variables**

**DEPENDENT VARIABLES**

<b>Objective</b>	<b>Variable</b>	<b>Indicators</b>	<b>Tools</b>	<b>Scales</b>
Determinants of implementation of the NEPAD e-schools project	ICT integration in teaching and learning.	Records from NEPAD reports	Questionnaires Interview schedules Observation checklists	Nominal

**Table 3.2: Summary of Operational Definition of Variables**

**INDEPENDENT VARIABLES**

<b>Objective</b>	<b>Variable</b>	<b>Indicators</b>	<b>Tools</b>	<b>Scales</b>
i. To examine how funding impacted on the project in Western Kenya.	Funding	Sufficiency Integrity Sustainability	Questionnaires, interview schedules and observation checklists	Nominal, ordinal and interval
ii. To establish training of teachers impacted on the project in Western Kenya.	Teacher training	Confidence Competence Knowledge and skills	Questionnaires, interview schedules and observation checklists	Nominal, ordinal and interval
iii. To determine how leadership impacted on the project in Western Kenya.	Leadership	ICT policy Monitoring and evaluation Implementation committee	Questionnaires, interview schedules and observation checklists	Nominal, ordinal and interval
iv. To examine how ICT equipment impacted on the project in Western Kenya.	ICT equipment	Adequacy Maintenance and technical support Accessibility	Questionnaires, interview schedules and observation checklists	Nominal, ordinal and interval

### **3.10 Ethical Considerations**

Orodho (2003) ethical considerations are paramount in any research. In this research, research ethics were reviewed to ascertain ethical guidelines in carrying out research in order to preserve ethical values. Such issues entailed the researcher conducting himself or herself well in the course of the research, avoiding plagiarism as well as fraud. The researcher ensured that respondents were treated with utmost respect. Any data collected remained confidential. The researcher ensured there was no discrimination, physical and psychological harm to the respondents and obtaining voluntary information from respondents. The researcher was allowed by the National Council for Science, Technology and Innovation (NACOSTI) to conduct the study. The information collected would at no time be pegged to a particular individuals or institutions but treated with anonymity and privacy.

### **3.11 Summary**

In this chapter the researcher discussed the target population, how the researcher obtained the sample size and how sampling was done before the researcher proceeded to the field to collect data. Instruments that were used in the data collection have also been discussed and how their validity and reliability was tested as well as operational definition of variables. The researcher also detailed how data analysis was done; qualitative data was analysed through descriptive analysis whereas quantitative data was analysed using descriptive statistics respectively.

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

#### 4.1. Introduction

This chapter entails data analysis, presentation, interpretation and discussion. The study sought to analyse how the determinants affected the execution of the project in Western Kenya. The findings are based on the variables such as funding, teacher training, leadership and ICT equipment with the government policy as a moderating variable.

#### 4.2 Questionnaire return rate

A total of 300 out of 339 questionnaires administered were returned. The return rate was 88.49%. (Mugenda and Mugenda, 1999), a return rate of at least 70% of all questionnaires administered for study was acceptable for analysis. The respondents answered every item in the questionnaire.

#### 4.3 Demographic characteristics of the Respondents

##### 4.3.1 The gender of respondents

The study intended to establish the gender of the respondents. The findings are indicated in table 4.1.

**Table 4.1 The gender of Respondents**

<b>Respondents</b>	<b>Frequency</b>	<b>Percentage</b>
Male	321	94.11
Female	20	5.89
<b>Total</b>	<b>341</b>	<b>100</b>

Most 94.11% were males and least 5.89% were females. Males are more because the study was carried out in predominantly boys' schools leading to the high percentage of males while the few females are teachers in the schools under study.

### 4.3.2 Respondents working experience

The work experience of respondents was also established. The findings are indicated in table 4.2.

**Table 4.2 Respondents working experience**

<b>Respondents working Experience</b>	<b>Frequency</b>	<b>Percentage</b>
Less than one year	4	9.09
One year	5	11.36
Two years	9	20.45
Three or more years	26	59.09
<b>Total</b>	<b>44</b>	<b>100</b>

Findings present that most 26 (60%) had worked for three or more years. 9 (20%) had worked for 2 years. 5 (11%) worked for one year and 4 (9%) for less than a year. Most teachers have been in the schools for more than three years because well established schools like Chavakali and Maranda have minimal transfers. The four teachers with an experience of less than one year had just joined the school.

### 4.3.3 Respondents level of education

The study sought to establish the respondents' highest level of education. The findings are indicated in table 4.3

**Table 4.3 Education Level of the Respondents**

<b>Highest level of Education</b>	<b>Frequency</b>	<b>Percentages</b>
Doctorate degree	2	4.5
Masters degree	12	27.3
Bachelor's degree	25	56.8
Diploma	5	11.3
<b>Total</b>	<b>44</b>	<b>100</b>

The majority of the sampled teachers had a bachelor's degree 25 (59.5%) while the minority were doctorate degree holders 2 (4.8%) since once they obtain their doctorate degree they quit teaching secondary school and join the universities. However, Diplomas were 5 (11.3%) and those with masters degree were 12 (27.3%).

Descriptive analysis included an assessment of funding, teacher training, leadership and ICT equipment and how they affected the project. Descriptive measures included frequencies and percentages.

#### 4.4 Funding

The study set out to establish funding indicators determined the project. Funding was operationalized along three dimensions namely sufficiency, integrity and sustainability of funds in the implementation of the project. Various statements were formulated to measure the funding sub-constructs.

##### 4.4.1 Sufficiency of funds

The study sought to establish if the funds provided were sufficient to sustain the project. The findings are as indicated in table 4.4.

**Table 4.4: Sufficiency of funds and implementation of the NEPAD e-schools project**

Sufficiency of Funds	SD	D	U	A	SA
The school has collaborated with private companies to help in the execution of the project	15.91% 7	29.55% 13	25 % 11	6.81% 3	11.36% 5
The funds are adequate for the successful execution of the project	18.18% 8	36.36% 16	27.27% 12	11.3% 5	6.81% 3
The school has adequate financial sources for the execution of the project	25% 11	38.64% 17	11.36% 5	15.9% 7	9.09% 4



16% of respondents strongly agreed that schools collaborated with private companies, 30% disagreed, 25% were not sure, 7% agreed while 11% strongly agreed. The majority disagreed there is no collaboration between schools and private companies however at the beginning Microsoft corporation partnered with the schools under study under the Public Private Partnerships (PPPs).

18% of the respondents agreed that the funds were not adequate to sustain the project, 54% strongly disagreed while 27% were undecided. 25% of the respondents agreed that the schools had adequate financial resources to sustain the project, 64% strongly disagreed while 11% were undecided. The majority disagreed that the funds available were inadequate for the successful execution of the project. During the launch of the project the schools e-laboratories were fitted with the pre-requisite equipment and internet connectivity subscribed for a period of 12 months but there was no further financial support, the schools were expected to ensure that the project was sustained.

#### 4.4.2 Integrity of funds

The study sought to establish if the funds allocated were well utilized, the findings are as indicated in Table 4.5.

**Table 4.5: Integrity of funds**

<b>Integrity</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
There is transparency in the management of funds	18.18%	31.81%	38.64%	6.81%	4.55%
	8	14	17	3	2
There is accountability for all funds	11.36%	40.91%	25.0%	18.18%	4.55%
	5	18	11	8	2

50% of the respondents strongly disagreed that there was no transparency in the management of the funds, 12% agreed that there was transparency while 39% were undecided. The majority

disagreed there was no transparency in the management of funds since no funds were sent to the schools.

In relation to accountability of funds, 23% of the respondents agreed that there was accountability on all funds set aside for the project, 52% strongly disagreed while 25% were undecided. Majority disagreed that there was no accountability for the funds since the schools did not handle any money.

#### 4.4.3 Sustainability of funds

The study sought to establish if there was a long term plan to ensure the sustainability of the project, the findings are as indicated in Table 4.6.

**Table 4.6: Sustainability of funds**

<b>Sustainability of funds</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
The school has developed a long term plan to help fund the project	15.91%	38.64%	20.45%	20.45	4.55%
	7	17	9	% 9	2
There is a long term plan that allows for the replacement of equipment after its life expectancy	20.45%	25%	31.81%	22.75	0%
	9	11	14	% 10	0
There are sufficient funds to cater for maintenance of equipment and renewal plan	15.91%	29.55%	36.36%	15.91	2.27%
	7	13	16	% 7	1

55% of the respondents disagreed that there was a long term project to help fund the e-schools project in their schools, 25% agreed while 21% were undecided. Majority disagreed that the schools lacked a long term plan.

45% disagreed that there was a strategic plan in place for replacement of equipment, 23% agreed while 32% were undecided. Majority disagreed indicating that the schools lacked a strategic plan.

46% of the respondents disagreed that there were sufficient funds to cater for maintenance of equipment and renewal plan, 18% agreed while 36% were undecided. The majority disagreed that there were sufficient funds to cater for maintenance of equipment and renewal plan, after the installation of the equipment there was no technical support to ensure that the equipment was serviced and repaired incase of breakdown the schools had to ensure this was done.

#### 4.5 Teacher Training

The study set out to establish how teacher training the project. Training was parameterized based on the confidence, competence and knowledge and skills.

##### 4.5.1 Competence of teachers and students

The study sought to establish the level of competence for both the teachers and students, the findings are indicated in Table 4.7.

**Table 4.7: Competence of teachers and students**

<b>Competence</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Teacher training has resulted to increase in teacher competency in ICT	6.82% 3	47.73% 21	22.73% 10	15.91% 7	6.82% 3
Teacher training has resulted to increase in teacher competence hence students are able to use ICT to improve their academic performance	17.62% 52	44.75% 132	16.61% 49	14.24% 42	6.78% 20

55% of the respondents disagreed that the training they had received had made them competent enough to use ICTs to improve their professional and administrative proficiency, 23% agreed while 23% were undecided. Majority disagreed that the training they had received was not adequate to make them competent since the time allocated for the same was too short.

63% of the respondents disagreed that the training of the teachers had made them competent to teach students on how to handle the hardware, 21% agreed while 17% were undecided. The majority disagreed indicating that the training given to the teachers was not adequate to make them competent to teach the students.

#### 4.5.2 Confidence of teachers

The study also sought to establish the level of confidence of the teachers, the findings are indicated in table 4.8.

**Table 4.8: Confidence of teachers**

Confidence	SD	D	U	A	SA
Teacher training enables them to have confidence that enable them to teach students effectively	11.36%	40.91%	25.0%	18.1%	4.55%
	5	18	11	8	2
Teacher training enables them to have confidence that enable them to teach students how to utilise the hardware	22.71%	24.07%	20.31%	24.41%	8.47%
	67	71	60	72	25
The school provides both formal and in-formal ICT training that has increased the commitment of teachers	18.18%	50.0%	15.91%	11.36%	4.55%
	8	22	7	5	2

52% of the respondents disagreed that the training they received gave them the confidence to teach students effectively, 24% agreed while 25% were undecided. Majority disagreed that the training they received gave them the confidence to teach students effectively. This can be attributed to the short period of time allocated for training.

47% disagreed that teacher training gave them the confidence to teach students how to use available hardware devices safely, 32% agreed while 20% were undecided. The majority disagreed that the training they received did not give them the confidence to teach students how to use available hardware devices safely since the duration allocated for training was not adequate.

68% of the respondents disagreed that the schools provided both formal and informal ICT training that had increased the confidence of the teachers,16% agreed while 16% were undecided. The majority disagreed that the school provided both formal and informal training that increased the level of commitment of the teachers. This can be attributed to the inadequate training during the launch of the project.

#### 4.5.3 Knowledge and Skills

The study also sought to establish if the knowledge and skills acquired were adequate, the findings are indicated in Table 4.9.

**Table 4.9: Knowledge and Skills**

<b>Knowledge and Skills</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Teacher training is customized and tailored to subject content that is critical in integrating ICT into learning	9.52%	40.91%	25.0%	13.63%	6.82%
	6	18	11	6	3
Duration of training is adequate to impart required knowledge and skills	18.18%	34.09%	34.09%	9.09%	4.55%
	8	15	15	4	2
There are computer courses in place to upgrade teachers' competencies	11.36%	47.73%	20.45%	13.63%	6.81%
	5	21	9	6	3

51% of the respondents disagreed that teacher training was not customized and tailored to subject content that is critical in integrating ICT into learning, 21% agreed while 25% were undecided. Majority disagreed that teacher training is customized and tailored to subject content that is critical in integrating ICT into learning this can be attributed to the inadequate training given to the teachers at the onset of the project.

52% of the respondents disagreed that the duration of training was inadequate to impart the required knowledge and skills, 15% agreed that the duration was adequate while 34% were

undecided. The majority disagreed that the training duration was inadequate to impart required skills and knowledge since the training at the onset of the project was hurried.

59% of the respondents disagreed that there were computer courses in place to upgrade teachers' knowledge and skills in the use of ICT facilities enabling them to develop digital content teaching materials on their own, 21% agreed while 20% were undecided. The majority disagreed that there were computer courses in place to upgrade teachers' knowledge and skills, this can be attributed to inadequate training at the onset of the project.

#### 4.6 Leadership

Leadership was operationalized in form of ICT policy, monitoring and evaluation mechanism, and implementation committee.

##### 4.6.1 ICT Policy and implementation of the NEPAD e-schools project

The study sought to establish how leadership affected the project, the findings are indicated in Table 4.10.

**Table 4.10: ICT Policy**

ICT Policy	SD	D	U	A	SA
There is ICT policy in place	18.18%	34.09%	34.09%	9.09%	4.55%
	8	15	15	4	2
There is a national structure responsible for coordinating the project	6.81%	47.73%	22.73%	15.91%	6.81%
	3	21	10	7	3
There is ICT policy in place	36.27%	18.98%	15.93%	11.86%	6.78%
	107	86	47	35	20

52% of the teacher respondents disagreed that there is an ICT policy in place, 14% agreed while 34% were undecided. The majority disagreed that there is an ICT policy in place. 55% of the student respondents also disagreed that there is an ICT policy in place, 19% agreed while 16% were undecided. The majority disagreed that there was an ICT policy. The school principals were

charged with the responsibility of implementing the project and did not form committees at the school level to oversee this.

55% disagreed that there is a national structure responsible for ICT in schools, 19% agreed while 16% were undecided. The majority disagreed that there is a national structure in place. There was an implementation committee at the NEPAD Secretariat but its impact may not have been felt since leadership was ceded to the principals after the launch of the project.

#### 4.6.2 Monitoring and Evaluation Mechanism

The study sought to establish how monitoring and evaluation affected the project, the findings are indicated in Table 4.11.

**Table 4.11: Monitoring and Evaluation mechanism**

<b>Monitoring and Evaluation</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
There is a monitoring and evaluation mechanism to oversee the project	11.36%	40.91%	25.0%	18.18%	4.55%
	5	18	11	8	2
There a monitoring and evaluation mechanism to oversee the project	17.63%	36.61%	26.10%	16.95%	2.71%
	52	108	77	50	8

51% of the teacher respondents disagreed that there was a monitoring and evaluation mechanism to oversee the project, 24% agreed while 25% were undecided. 55% of the students equally disagreed, 20% agreed while 26% were undecided. The majority of the teachers and students disagreed that there was a monitoring and evaluation mechanism to oversee the project. Monitoring and evaluation was done however, it was not catalyst since no further improvements were made on the existing facilities after the launch of the project.

#### 4.6.3 Implementation committee

The study also sought to establish how ICT committees influenced the project, the findings are as indicated in Table 4.12.

**Table 4.12: Implementation committee**

<b>Implementation committee</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
There a committee in place responsible for ICT coordination in the school	13.64% 6	40.91% 18	25.0% 11	13.64% 6	6.81% 3
There a committee in place responsible for ICT coordination in the school	6.44% 12	50.51% 149	14.92% 44	16.95% 50	11.19% 33
Computer time is integrated into the school timetable	6.81% 3	47.73% 21	22.73% 10	15.91% 7	6.81% 3
Computer access has been fully integrated into the school timetable	32.29% 100	23.39% 69	7.46% 22	27.79% 82	7.46% 22

55% of the teacher respondents disagreed that there was an implementation committee in place responsible for ICT coordination in the school, 21% agreed while 25% were undecided. 57% of the student respondents also disagreed, 28% agreed while 15% were undecided. The majority disagreed that there is an implementation committee in place responsible for ICT coordination in the school.

55% of the teacher respondents disagreed that computer time is integrated into the school timetable, 23% agreed while 23% were undecided. 55% of the students respondents, disagreed that computer access has been fully integrated into the school timetable, 35% agreed while 7% were undecided. The failure to do this could be attributed to lack of a committee mandated to implement this as this was one of the goals of the project.

#### **4.7 ICT Equipment**

The indicators of ICT equipment were adequacy, maintenance and technical support and accessibility.



#### 4.7.1 Adequacy of ICT equipment

The study sought to establish how ICT equipment influenced the project, the findings are indicated in table 4.13.

**Table 4.13: Adequacy of ICT equipment**

<b>Adequacy of ICT equipment</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
NEPAD e-schools computer laboratories contain all the ICT equipment that you need and all the equipment is functional	20.45% 9	22.73% 10	38.64% 17	11.36% 5	6.81% 3
NEPAD e-schools computer laboratories contain all the ICT equipment which is functional	19.32% 57	44.41% 131	22.03% 65	8.47% 25	5.08% 15
The ICT equipment provided by the consortia was adequate	31.81% 14	56.81% 25	6.81% 3	4.55% 2	0% 0

44% of the teacher respondents disagreed that the NEPAD e-schools computer laboratories contain all the ICT equipment that you need and all the equipment is functional, 18% agreed while 38% were undecided. 63% of the student respondents disagreed, 13% agreed while 23% were undecided. Majority of the respondents disagreed that the ICT equipment was adequate and functional.

89% of the teacher respondents disagreed that the ICT equipment provided by the consortia was adequate, 4% agreed while 6% were undecided. The majority disagreed that the ICT equipment provided by the consortia was not adequate since during the initiation of the project only 20 computers were installed in each school to be shared amongst a population of 2,972 students, this gave a ratio of one to sixty five (1:65) students per computer which is low.

#### 4.7.2: Maintenance & Technical Support of ICT equipment

The study sought to establish how maintenance and technical support of ICT equipment influenced the project, the findings are indicated in table 4.14.

**Table 4.14: Maintenance & Technical Support of ICT equipment**

<b>Maintenance &amp; Technical Support</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
There is ICT equipment maintenance and renewal plan	11.36%	38.64%	13.64%	20.45%	15.91%
	5	17	6	9	7
There is systematic maintenance and replacement of ICT equipment	6.94%	40.0%	10.17%	29.83%	10.85%
	27	118	30	88	32

50% of the respondents disagreed that there was ICT equipment maintenance and renewal plan, 36% agreed while 14% were undecided. The majority disagreed that there is ICT equipment maintenance and renewal plan since after installation there was no maintenance of the equipment by the consortia, it was left for the schools to get means and ways to ensure that the equipment was up and running. Similarly, no funds were allocated to the schools for the same.

47% of the student respondents disagreed that there is systematic maintenance and replacement of ICT equipment, 41% agreed while 12% were undecided. The majority disagreed that there is systematic and well planned maintenance and replacement of ICT equipment, during the launch of the project most of the computers that were installed were obsolete and thus irreparable, the intel content on the smart board got lost after servicing and no new ICT equipment was delivered after nor funds allocated for the purchase of new equipment.

#### 4.7.3: Accessibility of ICT equipment

The study also sought to establish how accessibility of ICT equipment affected the project, the findings are indicated in Table 4.15.

**Table 4.15: Accessibility of ICT equipment**

<b>Accessibility</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Computers with internet connectivity are accessible to students and teachers during class time as well as outside class time	11.36%	29.55%	29.55%	13.64%	15.91%
	15	13	13	6	7
Computers with internet connectivity are accessible to students and teachers during class time as well as outside class time	28.81%	40.68%	15.25%	8.47%	6.78%
	85	120	45	25	20

41% of the teacher respondents disagreed that computers with internet connectivity are accessible to students and teachers during class time as well as outside class time, 30% agreed while 29% were undecided. 70 % of the student respondents disagreed, 13% agreed while 15% were undecided. The majority disagreed that computers with internet connectivity are accessible to students and teachers during class time as well as outside class time however, at the onset there was internet connectivity which lasted for a grace period of 12 months after which there was no further connection and no funds were allocated for the same.

#### **4.8 Extent of execution of the project**

Lastly, the study sought to find out the extent of execution of the project in western Kenya. This was because implementation depends on funding, teacher training, leadership and ICT equipment, the findings are indicated in Table 4.16.

**Table 4.16: Response on the Extent of Use**

<b>Implementation Areas</b>	<b>SD</b>	<b>D</b>	<b>U</b>	<b>A</b>	<b>SA</b>
Lesson presentation	20.45%	38.68%	13.64%	20.45%	6.81%
	9	17	6	9	3
Lesson presentation	25.76%	39.32%	21.02%	8.47%	5.42%
	76	116	62	25	16
Lesson preparation	15.91%	29.55%	36.36%	15.91%	2.27%
	7	13	16	7	1
Communicating with other students and teachers	11.36%	36.36%	29.55%	0.0%	0.0%
	15	16	13		
Communicating with other students and teachers	31.19%	41.69%	27.12%	0.0%	0.0%
	92	123	80		
Accessing and using online assessment tools	34.09%	40.91%	13.64%	11.36%	0.0%
	15	18	6	5	
Accessing and using online assessment tools	36.61%	37.97%	23.73%	1.69%	0.0%
	108	112	70	5	

59% of the teacher respondents disagreed that there is utilization of the ICT equipment in lesson presentation, 27% agreed while 14% were undecided. 65% of the students' respondents disagreed, 13% agreed while 22% were undecided. The majority disagreed the equipment was utilized in lesson preparation. This was as a result of limited access, only a few students could access the computers at a time since they were few in relation to the number of students in the schools.

46% of the teacher respondents disagreed that the ICT equipment was used in lesson preparation, 18% agreed while 36% were undecided. The majority disagreed that the equipment was used in lesson preparation, this was however, done at the beginning since there was internet connectivity.

47% of the teacher respondents disagreed that the ICT equipment was used in communicating with other students and teachers, none agreed while 53% were undecided. 72% of the student

respondents disagreed, none agreed while 28% were undecided. The majority disagreed that the ICT equipment was used in communicating with other students and teachers.

75% of the teacher respondents disagreed that they could access and use online assessment tools, 11% agreed while 14% were undecided. 75% of the student respondents disagreed, 2% agreed while 24% were undecided. The majority disagreed that they could access and use online assessment tools. However at the beginning this was possible since there was internet connectivity.

#### **4.9 Report on the interview schedule responses from the principals in Chavakali and Maranda high schools in Western Kenya.**

The sample used was 2 principals. The interview schedule had a number of open-ended questions which were to elicit information on determinants of the implementation of the project in Western Kenya. The principals were asked if the funding was adequate. They both agreed that the funding was not adequate since it was short-term. It was only available in the initial stages through provision of ICT equipment and capacity building. The necessary ICT equipment was installed but there was no maintenance and repair due to lack of technical support and internet connectivity to ensure that the project was sustained.

When asked if the training given to the teachers was sufficient, they both agreed that the training of the teachers was sufficient to sustain the project. It should be noted this was a major setback in this project for the teachers were only trained at the beginning of the project but the time allocated was not adequate. They were then expected to cascade the knowledge to the extent to which it was geared to the students and fellow teachers. There was however, no capacity building of all the old and new stakeholders.

In as far as leadership of the NEPAD e-schools project is concerned, both principals agreed that internally the leadership was good, the ICT champions spearheaded the execution of the project, the school heads oversaw the overall rolling out of the project. They were in charge of all logistics. However, limitations set in financially. Externally, the NEPAD secretariat at the Ministry of Education was charged with monitoring and evaluation. There was continuous follow up to see what was happening on the ground however it was not catalyst for they failed to

keep up the tempo as there was no improvement on the existing ICT equipment and this rendered the project unsustainable.

With regard to adequacy of ICT equipment, the principals interviewed agreed that the ICT equipment that was provided by the NEPAD e-schools partners was not adequate to sustain the project. The ratio of students to computers was high. Some of the machines were irreparable by the third year, most of the computers were obsolete and incompatible with current technology for instance the computer systems were not upgradeable to higher versions of applications and could not recognize memory chips of higher capacities. The multi printers accessories (Lexmark) were not available on the market and they therefore became redundant, The smart board software could not be re installed after servicing and the Intel content got lost. Finally, the internet connectivity went down after the expiry of the grace period.

The respondents were asked in their opinion what they thought could be done to ensure that the project is sustainable. They gave the following suggestions; there is need to have a budget for, repair, maintenance and technical support and on the issue of obsolete ICT equipment, to replace new ICT equipment and subscription of internet connectivity. There was also need for intensive training for teachers to make them more skilled in ICT so that they can be competent and confident to teach the students. In terms of leadership there was need for a team of experts to implement the ICT policies as well as be responsible for the monitoring and evaluation of this initiative. Lastly, there was also need to have more access to ICT equipment therefore there is need for more ICT equipment.

#### **4.10 Report on the Observation Checklist on ICT equipment in the NEPAD e-school laboratories in Chavakali and Maranda high schools**

The study sought to establish the ICT equipment that was installed in the NEPAD e-schools laboratories both at Chavakali and Maranda high schools. Both schools were under the same consortium – Microsoft. The results are presented in table 4.17.

**Table 4.17: ICT Equipment in the NEPAD e-laboratories**

<b>Equipment</b>	<b>Quantity</b>	<b>Available and working at the time of visit</b>
Floor (tiled)	1	1
Power sources with back – up generators	1	1
Computers (Mercer Model)	20	20 (none working)
Smart board	1	1
Smart television set	1	1
LCD projectors	1	1
Computer servers	1	1
Laptops	2	1
Printers (Lexmark model)4	4	4 (None working)
Scanner	1	None

From the above statistics, the quality of the floor was suitable for a computer laboratory since the computers need to be free of dust. There was 1 smart board, 1 smart television set, 1 DSTV decoder, 1 LCD projector, computer servers, 20 computers (Mercer model), 1 scanner and 2 laptops.

The smart boards, television sets, and LCD projectors in both schools were functional. The computer servers, LANs and VSAT were intact but not functional because there was no internet connectivity in both schools.

There were power sources with a backup generator.

In one of the schools under study the laptops could not be traced while in the other only 1 laptop existed. However, the 20 computers and which were not functional were inadequate.

#### 4.11 The extent of Determinants of the project execution

Inferential statistics was used to establish the strength and significant of association between the study factor and the execution of the project at significance level of .05. As such the study used Pearson’s chi-square of association since the data was ordinal in nature hence this kind of analysis was ideal. The pertinent results are presented in Table 4.18.

**Table 4.18: The association between determinants and execution of the project**

<b>Factors</b>	<b>Chi Square</b>	<b>Cramer’s V</b>
Funding	$X^2(252, N=339)=1252.67, P=0.000$	0.522
Teacher training	$X^2(210, N=339) =787.57, P=0.000$	0.414
Leadership	$X^2(266, N=339) =1195.51, P=0.000$	0.509
ICT equipment	$X^2(210, N=339) =1054.66, P=0.000$	0.479

##### 4.11.1 Funding

Funding involves availability and sufficiency of funds needed in implementing a project. With  $X^2(252, N=339)=1252.67, P=0.000$  and Cramer’s V = 0.522 the results revealed there was a strong significant association between funding which included sufficiency, integrity and sustainability of funds in implementing the project in Western Kenya. The Cramer’s V of 0.522 indicated a significant moderate association between the funding and the execution of the project. After installation of the ICT equipment and subscription for internet connectivity for a period of 12 months, there was no further financial support. This resulted to insufficient funds available to cater for ICT equipment acquisition, equipment maintenance and successful implementation of the project



Hawkins (2012) asserted that effective and sustainable ICT integration in education requires intensive funds. Since the sampled schools in this study lacked sufficient funds as well as little collaboration with private companies to assist in the implementing the project, funding was a strong determinant executing the project in Western Kenya.

#### **4.11.2 Teacher Training**

Training of teachers is paramount for the successful execution of e-learning hence teacher training is a determinant of the project implementation. With  $X^2(210, N=339) = 787.57$ ,  $P=0.000$  and Cramer's  $V=0.414$ , the findings indicated there existed a moderate significant association between teacher training and the execution of the project in Western Kenya. The main purpose of training is to increase knowledge and skills. Hence the teachers gain the skills and the confidence necessary in the integration of e-learning in preparing teaching materials which enrich the curriculum. However, the descriptive analysis revealed that most teachers were not inducted maintenance of equipment since the training duration was insufficient to impart the knowledge and skills necessary for successfully implementing the NEPAD project.

Several authors have identified the role of teacher training in information technology. Afshari et al (2009) support the importance of teacher professional development and suggest they can only utilize technology in their classrooms when professional ICT training gives them time to use ICT to teach, instruct, experience as well as work with their peers.

#### **4.11.3 Leadership**

The successful introduction of e-learning projects squarely depends of the leadership. Leadership is required in training, allocation of funds as well as acquisition of facilities. With  $X^2(266, N=339) = 1195.51$ ,  $P=0.000$  and Cramer's  $V=0.509$ , the findings indicated that there was a strong significant association between leadership and the implementation of the project. Similarly, there was no committee for implementation, no clear ICT policy and monitoring and evaluation for coordinating the execution of ICT in schools was not catalyst.

The Cramer's  $V$  value of 0.509 indicated that leadership was a strong determinant in implementing the project. The school leadership determines the school's vision in ICT integration in teaching and learning (Becta, 2005).

#### **4.11.4 ICT equipment**

ICT equipment is pre-requisite in the e-schools project, availability of adequate ICT equipment was a determinant in the project. With  $X(210, N=339) = 1054.66$ ,  $P=0.000$  and Cramer's  $V=0.479$ , the findings showed that there was strong significant association between adequacy of ICT equipment and execution of the project. The descriptive results indicated the sampled schools lacked the necessary ICT equipment for educational use, internet connectivity lasted only for the grace period and students could therefore not access their medium of learning. ICT equipment is major obstacle to the successful implementation of projects.

The Cramer's  $V$  value of 0.479 indicated that adequacy of ICT equipment strongly impacted on the project in Western Kenya. This was revealed when the respondents indicated that the ratio of student to computer was more than 1 computer to over 10 students. The ICT strategies were not being used in teaching all subjects due to inadequacy of equipment since the ICT equipment was not accessible to students outside the classrooms. Moreover, not all classroom presentations were done using ICT equipment. Teachers were also unable to prepare lessons using ICT equipment as the equipment available was inadequate to be used by both students and teachers. Similarly, lack of internet connectivity hindered teachers in using online assessments tools as well as accessing teaching and reference materials from the internet.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter looked at the summary of the findings, the conclusions and recommendations. The summary of findings detailed according to the findings as per the objectives and answers the research questions whereas recommendations for further study detail what the researcher suggests should be studied further in as far as the NEPAD e-schools are concerned.

#### 5.2 Summary of the findings

The findings of the study indicated that: that 94.11% of the respondents were male. This is because the study was done in predominantly male schools. The longest working experience of the respondents was three or more years at 59.09%. The work experience had an impact on the study in that most of the teachers had stayed in the schools under study for more than three years and would increase the reliability of the information provided. The highest level of education attained by the respondents was doctorate degree (5%). Majority of the respondents (60%) had a bachelor's degree.

The study established that funding was a determinant of the project in Western Kenya. 54% of the respondents disagreed that the funds were adequate successfully implement the project. Financial resources is one of the constraining factors in the adoption of e-learning (Africa report, 2012). 50% of the respondents disagreed that there was transparency in the management of funds set aside for the implementation of the project. 52% of the respondents disagreed that there was accountability of funds. Integrity in the use of funds is an obstacle to the successful execution of projects. 55% of the respondents disagreed that there was a long term project to sustain the e-schools project in their schools. 45% of the respondents disagreed term project to help fund the e-schools while 45% of the respondents indicated that there was no long term plan for the replacement of equipment. 46% of the respondents indicated that there were no sufficient funds to cater for maintenance of ICT equipment and renewal plan of the project. Adequate use of ICT equipment requires well budgeted funds which were inadequate. It was found out that after installation of ICT equipment, training of teachers and subscription for internet connectivity for twelve months, there was no other financial support provided to the schools to sustain the project in terms of repair and maintenance of ICT equipment, upgrading of the system and internet connectivity subscription, this led to the failure of the project.

On teacher training as a determinant of the execution of the project, the study indicated that most (55%) of the respondents disagreed that training they had received had made them competent. 63% of the teacher respondents disagreed that the training had made them competent to teach students on how to use the hardware. There cannot be effective integration of ICT in education if the teachers lack proper training. 52% of the respondents indicated that the training they had received had given them the confidence to teach students effectively. 47% indicated that they lacked the confidence to teach. 68% of the respondents disagreed that the schools provided both formal and informal training that had increased the commitment of teachers to use the internet to access teaching materials. Constraints in teachers' ICT knowledge makes them fear to utilise it in their teaching. Majority of the respondents (52%) suggested that the duration of training was inadequate to impart the required knowledge and skills. The training that was done during the rolling out of the project was done hurriedly and within a very short time. There was no continued capacity building and the teachers who were trained were only equipped with basic skills to operate the machines. The knowledge cascaded down to their colleagues and students was therefore not adequate to sustain the project.

On leadership as a determinant of the project, the study indicated that majority (52%) of the respondents disagreed that there is an ICT policy in place. 55% of the respondents disagreed that there was a national structure responsible for coordinating the implementation of the project. Most governments have developed ICT in education policies and have invested a lot in providing access to ICTs in schools (Kozma and Anderson, 2002). 55% of the respondents indicated that there was no monitoring and evaluation mechanism to oversee the successful execution of the project. The monitoring and evaluation that was done was not catalyst and the project thus became unsustainable. 57% of the respondents disagreed that there was an implementation committee in place in the schools under study. 55% disagreed that computer time had been integrated into the school timetable. This limited the accessibility to computers. Teacher committees play an important role in making ICT implementation more successful.

On ICT equipment as a determinant of the project, the study found that on adequacy of ICT equipment (89%) of the respondents disagreed that the ICT equipment was inadequate and not all of it was functional and could not therefore sustain the successful execution of the project. Absence of good quality software and computers can limit what teachers and students can do in

the classroom. (50%) of the respondents indicated that there was no ICT equipment maintenance and renewal plan for the project. (70%) of the respondents indicated that there was no access to computers with internet connectivity during as well as outside class time. The computers equipped in the e-laboratories were obsolete and irreparable and could not be upgraded using modern technology thus incompatible with modern technology. The computer systems were not upgradable to higher versions of applications and could not recognize memory chips of higher capacities. The multi printers accessories (Lexmark) were not available on the market and thus they became redundant. The ratio of students to computers was high, a ratio of one to fifty two ( 1:52) compares unfavourably with the international standards of one to one ( 1:1) or one to two (1: 2 ) and the internet connectivity lasted only for the grace period of twelve months.

### **5.3 Conclusions**

Basing on the findings, the conclusions were; It was found out that funding was key determinant in implementing the project in selected national secondary schools in Western Kenya. From the data, it was evident that the funds that were availed were not sufficient to sustain the project thus resulting to its failure.

It was also established that teacher training in the schools where the NEPAD e-schools project was implemented was not adequate to sustain the e-schools initiative since it was done within a very short time and the teachers were expected to train fellow teachers and also induct students. This study established that majority of respondents lack adequate skills to handle the equipment and experience difficulty in using the installed software. Lack of knowledge of the programs installed poses a challenge to teachers in using the e-learning approach in their lessons.

Findings also indicated that leadership impacted on the of project.

Internally, schools principals were in charge of all logistics but externally the NEPAD secretariat at the Ministry of Education was charged with monitoring and evaluation which was done but did not yield the expected results as there was no improvement on the existing infrastructure and the project thus became unsustainable.

ICT equipment was another determinant in the execution of the project. It was found out that the ICT equipment that was provided was inadequate in terms of students to computer ratio. Most of the computers were obsolete and irreparable and could not be upgraded using modern

technology, the internet connectivity lasted only for the grace period of twelve months after which all the activities came to a halt.

The following suggestions from respondents could be used to improve projects of the same or larger magnitude in future. It was suggested that the government needed to be sensitized in the way they get involved in such projects in terms of financing and not relying on external funding only as this is not adequate to sustain such projects after they have been initiated. Teachers needed to be well trained and experienced on how to integrate ICT otherwise it would be impossible for the project to succeed. There was also need to strengthen the monitoring and evaluation mechanisms and provide ICT equipment.

#### **5.4 Recommendations**

1. There is need for the government to prioritize funding for ICT in education in Kenyan secondary schools.
2. There is need to re-train the teachers to equip them with the necessary skills to handle both the hardware and software facilities.
3. There was need to streamline leadership responsibilities.
4. The e-laboratories needed to be equipped with adequate and modern ICT equipment as well as relevant e-materials and access to internet.

#### **5.5 Recommendations for further studies**

1. A study exploring the successes and failures of other ICT programs in Kenya be done in secondary schools.
2. A similar study covering other regions to be done.
3. A similar study be done in girls schools.

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## APPENDICES

### Appendix I: Letter of Transmittal

UNIVERSITY OF NAIROBI,  
P O BOX 30197,  
NAIROBI.

Dear Respondent,

I am a student at the University of Nairobi, in the department of Extra Mural Studies. I am currently undertaking a Master`s Degree in Project Planning and management. The research I wish to undertake will help me complete my research project. I am carrying out a study on **Determinants of implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya.**

I am using the attached questionnaire to collect information for the study. It is my kind request that you fill the questionnaire, providing the relevant information to facilitate the study. Please use the space provided to fill in the information required as objectively and honestly as possible. The information provided will be treated with strict confidentiality and for the purpose of this study only.

Thank you

Yours faithfully,

Hellen Lorraine C Ateya

L50/65386/2013

## **APPENDIX II: QUESTIONNAIRE FOR STUDENTS**

My name is Hellen Lorraine Chuma Ateya a Masters student at the University of Nairobi.

I am conducting a study on Determinants of the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya. Your participation in this study will help in informing the NEPAD Secretariat and the Ministry of Education on how best to implement such projects in future.

I assure you that the information you give in this questionnaire will be for academic purposes only and there will be no disclosure of your identity.

### **Instructions**

The following questions are open-ended to give you room to express your opinion, for such questions please give a brief narrative answer.

A few more questions require a fixed answer, this is the extent to which you either agree or disagree with the statement. The level of agreement is labeled from 1- strongly agree, 2 - agree, 3 - not sure, 4 - disagree and 5 - strongly disagree, and very poor, poor, fair, good and very good respectively

In this section please tick (e√) the most appropriate response for each of the questions in the table below.

### **Model Student Questionnaire**

#### **Section A: Background Information**

1. Please state your gender

Male [  ]

Female [  ]

### Section B: Funding

1. State whether you strongly agree, Agree, Undecided, disagree or strongly disagree with the following statement on the influence of funding on the implementation of NEPAD e-schools project

---

Statements	SA	A	U	D	SD
There is transparency in the management of funds earmarked for e-school projects by NEPAD					
The school has collaborated with private companies to help in the financing of e-school projects					
The school has developed a long term project to help fund of e-schools projects					
There is a long-term plan allowing for replacement of ICT equipment					

---

### Section C: Training

1. Were you trained in the use of ICT?                      Yes    [   ]    No    [   ]
2. If yes, was the training adequate?                      Yes    [   ]    No    [   ]
3. Are all students in your school trained in the use of ICT  
Yes    [   ]    No    [   ]
4. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statements on the influence of teacher training on the implementation of NEPAD e-schools project

---

**Teacher training**

---

**SA      A      U      D      SD**

Teacher training enables them to have confidence that enable them to teach students how to use available hardware devices safely

Teacher training has resulted to increase in teacher competence hence they able to use ICT to improve their professional and administrative proficiency

The school provides both formal and in-formal ICT training that has increased the commitment of teachers to use the Internet to locate additional learning resources to enrich the curriculum

---

**Section D: Leadership**

1. Does your school have a code of conduct for use of computers and Internet?

Yes    [   ]                          No    [   ]

If yes what are the codes?

2. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statements on the influence of leadership on the implementation of NEPAD e-schools project

---

**1. Leadership**

---

**SA      A      U      D      SD**

There is a monitoring and evaluation mechanism with respect to implementation of the e-schools project

There is a national structure responsible for coordinating the implementation of ICT in schools

Schools have been adequately prepared to take on the responsibilities of effectively using ICTs in teaching and learning

There are awareness programmes in school with respect to utilising ICT in school

There is ICT policy in place which makes it easier for implementation of the NEPAD e-schools project

---

---

The physical layout of the building restricts development of ICT

The school has access to ICT technical support

Computer access is integrated into the school timetable

There a committee in place responsible for ICT implementation in the school

---

### **Section E: Facilities**

1. Is there sufficient technical support from NEPAD in the maintenance of the ICT equipment  
If yes what is the support?
2. Does your school have a code of conduct for use of computers and internet so that they are only used for educational purpose?  
If yes what is the code of conduct?
3. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statements on the influence of facilities on the implementation of the NEPAD e-schools project

---

#### **Facilities**

**SA      A      U      D      SD**

---

NEPAD e-schools computer laboratory contains all the equipment that you need and all the equipment is functioning well

Computers with internet connectivity are accessible to students and teachers during as well as outside class time

Students have the option to choose their medium of learning. i.e. online mediums, use of CDs, Video Conference, etc.

---

## Section F: Implementation Indicators

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### Implementation of NEPAD E-learning

---

**SA    A    U    D    SD**

---

Computer to pupil ratio is less than 1 to 10

Teachers use ICT strategies in teaching all subjects

ICT equipment has enabled you to access more learning materials

The use of ICT in your school has resulted to improvement in performance

Computer access is integrated into the school timetable and is adhered to by the teachers

There are clear roles and responsibilities given to teachers with respect to the NEPAD e-schools programme

I use ICT equipment independently when doing my private studies

Teachers give additional exercises through ICT facilities

---

1. Has ICT been implemented in the following pick one. (**4**=Great extent, **3**=moderate extent, **2**= low extent, **1** Not at all)
  - a. For lectures/presentations
  - b. For communicating with other students and teachers
  - c. For accessing and using online assessment tools

**Thank you.**



## QUESTIONNAIRE FOR TEACHERS

My name is Hellen Lorraine Chuma Ateya a Masters student at the University of Nairobi. I am conducting a study on Determinants of the implementation of the NEPAD e-schools project in selected national secondary schools in Western Kenya. Your participation in this study will help in informing the NEPAD Secretariat and the Ministry of Education on how best to implement such projects in future.

I assure you that the information you give in this questionnaire will be for academic purposes only and there will be no disclosure of your identity

### Instructions

The following questions are open-ended to give you room to express your opinion, for such questions please give a brief narrative answer.

A few more questions require a fixed answer, this is the extent to which you either agree or disagree with the statement. The level of agreement is labeled from 1- strongly agree, 2 - agree, 3 - not sure, 4 - disagree and 5 - strongly disagree, and very poor, poor, fair, good and very good respectively

In this section please tick (e√) the most appropriate response for each of the questions in the table below.

### Section A: Background Information

1. Job designation.....

2. Please state your gender

Male[  ]

Female [  ]

3. State the number of years you have worked in the school

i. Less than one year [  ]

ii. One year [  ]

iii. Two years [  ]

- iv. Three or more years [ ]
- 4. Please indicate the level of your education
  - i. PhD [ ]
  - ii. Masters [ ]
  - iii. Bachelor's Degree [ ]
  - iv. Diplomas [ ]
  - v. Others [ ]

**Section B: Funding**

1. What percentage of your overall school budget for capital and revenue issues is allocated to e-learning equipment, software and servicing?
 

0-20% [ ]      21-50% [ ]      51-80% [ ]      81-100% [ ]

2. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statement on the influence of teacher training on the implementation of NEPAD e-schools projects

<b>Statements</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
There is transparency in the management of funds earmarked for e-school projects by NEPAD					
The school has collaborated with private companies to help in the implementation of the NEPAD e-schools project					
The school has developed a long term project to help in funding of the e-schools project					
There is a long-term plan that allowing for the replacement of ICT equipment					
There are sufficient funds to cater for equipment maintenance and renewal plan of the NEPAD e-schools project					
NEPAD e-schools project funds are adequate to cater for successful implementation of the project					
The school has adequate financial sources for the implementation					

**Section C: Training**

1. Were you trained in the use of ICT?  
Yes [ ]                      No [ ]
2. Are all teachers in your school trained in the use of ICT?  
Yes [ ]                      No [ ]
3. Were you trained in the maintenance of ICT infrastructure?  
Yes [ ]                      No [ ]

---

<b>Teacher training</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
Teacher training enables you to have confidence that enables you to teach students how to use available hardware devices safely					
Training has resulted to increase in your competence hence you are able to use ICT to improve your professional and administrative proficiency					
Teacher training is customised and tailored to subject content that is critical in integrating ICT into learning					
The school provides both formal and in-formal ICT training that has increased the commitment of teachers to use the internet to locate additional learning resources to enrich the curriculum					
Duration of training is adequate to impart the required knowledge and skills needed in the successful implementation of the e-school as required by NEPAD goals					
There are computer courses in place to upgrade teachers 'skills in the use of ICT facilities thereby enabling them develop digital content teaching					

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materials on their own.

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### Section D: Leadership

1. Are there roles that schools are expected to play in the introduction of ICT for more effective teaching and learning? Yes [ ] No [ ]  
If yes what are the roles?
  
2. Does your school have a code of conduct for use of computers and the internet?  
Yes [ ] No [ ]  
If yes what are the codes?
  
3. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statement on the influence of leadership on the implementation of the NEPAD e-schools project

---

**SA     A     U     D     SD**

---

There is a monitoring and evaluation mechanism with respect to implementation of the NEPAD e-schools project

There is a national structure responsible for coordinating the implementation of ICT in schools

Schools have been adequately prepared to take on the responsibilities of effectively using ICTs for teaching and learning

There is an awareness programme for schools with respect to utilising ICT in schools

There is an ICT policy in place which makes it easier for implementation of the NEPAD e-schools project

The physical layout of the building restricts development of ICT

The school has access to ICT technical support

Computer access integrated into the school timetable

---

---

There is a committee in place responsible for ICT implementation in the school

---

**Section E: Facilities**

1. Is there sufficient technical support from NEPAD in the maintenance of the ICT equipment  
If yes what is the support?
2. Does your school have a code of conduct for use of computers and internet so that they are only used for educational purposes?  
If yes what is the code of conduct?
3. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statements on the influence of facilities on the implementation of the NEPAD e-schools project

---

<b>Facilities</b>	<b>SA</b>	<b>A</b>	<b>U</b>	<b>D</b>	<b>SD</b>
NEPAD e-schools computer laboratory contains all the equipment that you need and all the equipment is functioning well					
Computer with internet connectivity are accessible to students and teachers during as well as outside class time					
Students have the option to choose their medium of learning. i.e. online mediums, use of CDs, Video Conference, etc.					
The ICT equipment provided by the consortia was adequate to sustain the e-school initiative					
There is ICT equipment maintenance and renewal plan for the NEPAD e-schools project					

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## Section F: Implementation Indicators

1. Has ICT been implemented in the following pick one. (4=Great extent, 3=moderate extent, 2= low extent, 1 Not at all)
  - a. For lectures/presentations
  - b. For lesson preparation
  - c. For communicating with other students and teachers
  - d. For accessing and using online assessment tools
  - e. For preparing and collecting teaching and reference materials
2. State whether you strongly agree, Agree, undecided, disagree or strongly disagree with the following statement on the implementation of NEPAD e-schools projects

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**Implementation of NEPAD E-learning****SA    A    U    D    SD**

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Computer to pupil ratio is less than 1 to 10

There is a written strategy in place regarding the role of ICT in teaching and learning

ICT is critical to the development of the whole curriculum

The use of ICT in your school contributes to improved pupil attainment

computer access is integrated into the school timetable as a way of implementation of the NEPAD e-learning

There are clear roles and responsibilities given to teachers with respect to the NEPAD e-schools project

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**Thank you.**

### **APPENDIX III: INTERVIEW SCHEDULE FOR PRINCIPALS**

#### **Introduction:**

Good morning Sir. Thank you for granting me this opportunity to interview you. I wish to assure you that I will stick to all ethical codes of conduct with regard to conducting my research as stated in the my introductory letter.

#### **The Interview Questions:**

1. Who are the partners in the NEPAD e-schools initiative in Kenya?
2. In your opinion was the funding of the NEPAD e-schools project adequate in Kenya?
3. Was the training of the teachers and students for the implementation of the NEPAD e- schools project sufficient in Western Kenya?
4. How did the leadership of the NEPAD e-schools project affect the implementation of the project in Western Kenya?
5. Was the ICT equipment that was provided by the NEPAD e-schools partners adequate to sustain the project in Western Kenya?
6. What challenges did you encounter in the implementation of the NEPAD e-schools project as a principal?

#### **Conclusion:**

Thank you for your time sir, I hope your responses to my questions will go a long way in contributing to my research

**APPENDIX IV: OBSERVATION CHECKLIST OF THE NEPAD E-SCHOOL LABORATORY**

**Check for the existence of the following in the NEPAD e-schools laboratory. Mark with a (√) for compliance and (X) for non-compliance**

1. Floor

2. Power sources with back-up generators

3. Computers

(a). Number of computers [   ]

4. Number of computers working [   ]

5. Model of computers installed

6. Smart television set

7. DSTV decoder

8. LCD projectors

(a). Number of projectors [   ]

9. Computer servers

10. Smart board

11. Scanners

12. Laptops

13. Printers

14. Computer server

15. Any other relevant observation



**APPENDIX V: SAMPLE SIZE DETERMINATION USING KREJCIE AND MORGAN TABLE**

Table 1: Table for Determining Sample Size for a Given Population

Table for Determining Sample Size for a Given Population									
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size  
"S" is sample size.

Source: Krejcie & Morgan, 1970

## **APPENDIX VI: RESEARCH PERMIT**