



**UNIVERSITY OF NAIROBI**

**SCHOOL OF COMPUTING & INFORMATICS**

**LAPTOPS FOR SCHOOL CHILDREN ICT PROJECT; A COMPARATIVE  
STUDY ON RWANDA AND KENYA**

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**A Research Project Report Submitted in Partial Fulfillment of Requirements  
for the Award of Degree of Masters of Science (Information Systems)**

**AUGUST, 2014**

**DECLARATION**

I declare that this research project is my original work and has never been submitted for a degree in any other university or college for examination/academic purposes.

Signature: ..... Date: .....

**KIPLAGAT K. VICTOR**

**SUPERVISOR’S DECLARATION**

This research project has been submitted for examination with my approval as the University Supervisor.

Signature: ..... Date: .....

**DR. CHEPKEN**

## **DEDICATION**

I dedicate this project to my mum Betty Kiplagat, for all the support given to me throughout my lifetime. You always prayed for me, believed in me and always told me that I could rise above all challenges. The lessons learnt from you are invaluable and priceless in every sense and will last through a lifetime. May God keep you and give you a long healthy life.

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## ABSTRACT

By using a framework based in the field of technology transfer, a comprehensive study of the laptops for school project is presented in this research report. It covers the whole process from early decision making and acquisition to the assimilation and deployment of the technology. The objectives of this study were to compare teachers e-readiness for the implementation of the Laptops project in both countries, compare the Laptops project implementation process and to understand the Laptops project implementation using the ICT transfer model in Rwanda and in Kenya, then recommend a possible framework for future implementations. This study adopted a descriptive design approach. Target population included teachers, officials from the ministry of education and other relevant implementation teams in both countries. Data from schools were collected in Rwanda from Muhanga sector just out of Kigali city and in Kenya from Langata constituency located within Nairobi city. Data was collected using questionnaires, literature study, interviews and observation. Questionnaires in both countries were distributed on a drop and pick method. A pilot study was done before actual data collection in order to establish the reliability and the validity of the questionnaires. The reliability test showed ( $\alpha=0.798$ ), which exceeded the prescribed threshold of 0.7. Both descriptive statistics and inferential statistics were used in the data analysis. IBM SPSS Statistic software v22.0 was used for analyzing quantitative data while qualitative data was analyzed using content analysis. Data was presented by use of tables, figures and narrations. The study findings established that Laptops project implementation in both countries was being executed in phases. The implementation process was more successful in Rwanda than in Kenya with the most important strength in the OLPC project Rwanda being a strong will and commitment of the government to see it through. The study revealed that the existing ICT infrastructure in schools was insufficient however Rwanda is better positioned than Kenya. The study further found out that common challenges are facing both projects which included lack of supporting infrastructure such as electricity and internet, insufficient training of teachers, insufficient laptops/computers for learners, and lack of proper ICT policy. The study further noted that the majority of teachers lacked basic ICT skills and that the general skills and knowledge on usage of computers is higher in Kenya than in Rwanda. The study recommends that the Ministries of Education in both countries should consider increasing the training sessions for teachers and make them more frequent as possible. Both governments should take measures to improve the infrastructures in schools such as power supply and internet access. The study further recommends that the project should be incorporated as soon as possible to cover the upper primary levels. A lot of focus needs to go to training teachers on IT skills as a long term measure to a successful project. The issuing of laptops are in phases, hence the researcher recommends that the governments should fast track the issuance from one phase to another to avoid resentment among the children who miss out in the first phases.

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## **ABBREVIATIONS AND ACRONYMS**

EDPRS - Economic Development and Poverty Reduction Strategy

GDP - Gross Domestic Product

HRD – Human Resource Development

ICT – Information Communication Technology

ITL - Information technology life-cycle

KICD – Kenya Institute of Curriculum Development

MDG – Millennium Development Goals

MinEduc – Ministry Of Education

MIT - Massachusetts Institute of Technology

NICI - National Information and Communication Infrastructure

OLPC – One Laptop per Child

RDB - Rwanda Development Board

RDB-IT - Rwanda Development Board; section IT

REB – Rwanda Education Board

RITA - Rwanda Information and Technology Authority

SPSS - Statistical Package for Social Science

TAM - Technology acceptance model

XO - Low cost laptops designed by OLPC project

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# CHAPTER ONE

## INTRODUCTION

### 1.1: Background of the Study

Information and Communication Technology (ICT) is an effective educational technology tool which promotes dramatic changes in teaching and learning processes. The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self-directed and constructive way. At present ICT is considered as an important means to promote new methods of instruction (teaching and learning). It should be used to develop students' skills for cooperation, communication, problem solving and lifelong learning (Plomp et al., 1996; Voogt, 2003).

Although computers and technology are prevalent throughout our society developing countries are far from enjoying the benefits due to a number of challenges. Many developing countries have opted to transferring ICT technology from a developed country, with the hope to improve technological capabilities and advance the capacity to generate their own technology. One of the countries that have embraced this way of thinking is Rwanda; a small country in East Africa, and Kenya followed suit in 2013 by announcing the intention to have all class one going kids be given laptops at school entry in January 2014. Rwanda and Kenya both have long-term plans that guide the countries. Kenya's vision 2030 and Rwanda's Vision 2020 have a lot in common.

Rwanda's Vision 2020 which was published in 2000, outlining an agenda to transform the country into a medium-level, knowledge-based economy by the year of 2020. Due to the lack of sea-access and few natural resources, it was acknowledged that ICT would have to play a central role in this transformation. The Vision 2020 plan declare ICT as crucial in two out of six main areas; among them education, where an increased use of computers in schools hope to improve ICT skills among the young. Based on such expectations, the Rwandan government has collaborated with the One Laptop per Child (OLPC) association, a non-profit US-based organization focused on the creation of educational tools for use in the developing world.

Together they have initiated a project to deploy “low-cost, low-power, connected laptops with content and software designed for collaborative, joyful, self-empowered learning” in primary schools around Rwanda. As of 2013, the project had distributed over 115,000 computers in primary schools across the country and with the aim of having half a million of the laptops distributed, and at least one million by 2017.

The model they used in this project was purely an ICT transfer model, and although it has turned out to be beneficial for the country, research also indicates that any transfer of ICT is complex, risky and time-consuming, especially in developing countries. This is mostly due to the inherent characteristics of the technology itself and the complex processes that are involved in a successful adaptation to local circumstances. The majority of these processes require a high availability of financial, human, physical, and technological resources, as well as a strong absorptive capacity in the host country.

## **1.2: Statement of the Problem**

ICT is a critical tool in education that increases access to learning opportunities and enhances the quality of education with advanced teaching methods. It was on this light that the current government of Kenya made its promise to equip every child starting their primary school education in January 2014 with a laptop. Kenya's Laptops for Children project has very high numbers hence requiring much thought and preparations before roll-out. These preparations should include benchmarking with other countries that have launched the project.

In 2008, Government of Rwanda embarked on a One-Laptop-Per-Child (OLPC) ICT program which was one of the initiatives in their 'Vision 2020' blueprint. They envisioned a Rwanda with every child in school having a laptop and enriching its new generation with ICT skills. The OLPC project in Rwanda, being one of the largest ICT projects to date in the country, inevitably faced many challenges that Kenya is facing in implementing the Laptops for Children initiative. Rolling out of laptops in primary schools require training of teachers and students, skills to supply a technical infrastructure, and maybe most importantly, an ability to support and maintain these on a continued basis.

Both countries are in the same regional block, same goals, faced with implementing similar project; hence the need to carry out a comparative study, to determine the progress of the project in both countries, the teacher readiness in terms of ICT skills and the lessons can be learnt from their strengths and the weaknesses

### **1.3: Objectives of the study**

- i. To compare teachers e-readiness for the implementation of the Laptops project in both Kenya and Rwanda
- ii. To compare the Laptops project implementation process between Rwanda and Kenya
- iii. To understand the Laptops project implementation using the ICT transfer model in both Rwanda and Kenya, then recommend a possible framework for future implementation.

### **1.4: Research Questions**

- i. How is the teachers' e-readiness for Laptops project implementation in Rwanda in comparison to Kenya?
- ii. What are the comparisons in Laptops project implementation process between Rwanda and Kenya?
- iii. How was Laptops project implemented in Rwanda and in Kenya using the ICT transfer model?

### **1.5: Significance of the Study.**

The project contributes to the understanding of how the ICT transfer models in developing countries are working, and the difficulties inherent in such a transfer. In the smaller context, the researcher aimed to highlight some of the issues and opportunities faced when implementing such a huge ICT project. Results and conclusions would mainly be useful for other Laptops for school children projects across the developing countries and any mass implementation of ICT project.

## **1.6: The scope of the Study**

It's an ICT project within the context of ICT4E thematic area. The researcher was keen not to shift to the educational benefits of ICT and other education philosophy related issues but dwell on the implementation frameworks. The project took into consideration certain key events when assessing the performance of this ICT project. However, due to constraints in time and financing, the researcher focused only on the key ICT issues of the project, its processes and implementation.

## **1.7: Assumptions of the Study**

This study assumed that the respondents gave truthful and honest responses, had adequate knowledge on the issues being addressed by the study and were supportive and co-operative during the exercise. The study further assumed that the respondents gave credible and relevant information with no bias and this information would eventually be analyzed and the relevant inferences made. Researcher also assumed that the Rwanda and Kenya share a lot of similarities, with same attitudes and approaches to ICT.

## **1.9: Definition of key Terms**

Technology -is the application of scientific or other organized knowledge - including any tool, technique, product, process, method, organization or system - to practical tasks.

Technology transfer is defined as the knowledge, skills, methods and procedures generated and developed in one location and transferred to another, where is it is used to achieve some practical end.

Agrarian Community – A community highly dependent on agriculture as its major foreign exchange earner

Triangulation - the information on areas of special interest which is collected from one interviewee will then be compared to data from other interviews and observations to ascertain consistency.



An innovation, according to Rogers (1983), is “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”.

The innovation diffusion - that an innovation (technology) is passed on from its source to end users through a medium of agents and its diffusion in potential users for the most part dependent on the personal attributes of the individual user.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1: Theoretical Review: Comparing Kenya's and Rwanda's

##### 2.1.1: General Global Rankings

Below is a table comparing Kenya and Rwanda's rankings in each metric outlined above.

Green indicates the country with the advantage (WR = World Ranking)

**Table 2.1: Kenya Vs Rwanda – General rankings**

|                                     | Kenya   | Rwanda  |
|-------------------------------------|---------|---------|
| Literacy rate                       | 87%     | 71%     |
| High education (best univ. ranking) | WR 1435 | WR 4157 |
| Ease of doing business              | WR 121  | WR 52   |
| Corruption Index                    | WR 139  | WR 50   |
| Total tax rate                      | 41.6%   | 31.3%   |
| Quality of infrastructure           | WR 80   | WR 48   |
| Democracy                           | WR 103  | WR 136  |
| Good governance                     | 28      | 47      |
| GDP/Capita                          | \$808   | \$583   |
| GDP growth rate                     | 4.4     | 8.3     |
| Quality of life                     | 51      | 46      |
| Govt. priority of ICT               | WR 69   | WR 3    |
| Importance of ICT to govt. vision   | WR 31   | WR 3    |

Source: World Economic Forum's report 2012-2013

Kenya is leading in the important education sector. Kenya has a better literacy rate and their top university is ranked significantly higher. Clearly one of the major challenges for the development of ICT in Africa will be the quality of higher education to deliver the talent to work on the development of high-tech ICT innovation.

Rwanda is leading in most of the other indicators. Most important are the ease of doing business and the corruption perception index where Rwanda has a significant advantage over Kenya being ranked respectively 52nd vs. 121st for ease of doing business and 50st vs. 139th for corruption

index. Rwanda has also the advantage in governance. Finally for the priority of ICT and importance of ICT for the government, Rwanda is ranked significantly higher than Kenya, being ranked third in the world for those criteria behind Singapore and Sweden.

### 2.1.2: Global Competitiveness

Based on the World Economic Forum’s report 2012-2013, the following table compares the Global Competitiveness Index (CGI) of Kenya and Rwanda for the last three years.

**Table 2.2: Global Competitive index**

|           | Global Competitiveness Index |       |            |       |
|-----------|------------------------------|-------|------------|-------|
|           | Kenya                        |       | Rwanda     |       |
|           | World rank                   | Score | World rank | Score |
| 2012-2013 | 106                          | 3.7   | 63         | 4.2   |
| 2011-2012 | 102                          | 3.8   | 70         | 4.2   |
| 2010-2011 | 106                          | 3.6   | 80         | 4.0   |

Source: World Economic Forum’s report 2012-2013

Here again it is interesting to observe how Rwanda's global competitiveness as measured by the GCI is better than Kenya's. In fact, Rwanda’s GCI is improving as Kenya's GCI is stagnating over the last three years.

### 2.1.3: ICT Networked Readiness Index

One of the most authoritative exercises to measure and benchmark ICT developments is the Networked Readiness Index (NRI) available in the World Bank and INSEAD’s Global IT report 2012, which has been adopted by several governments as a valuable tool for assessing and leveraging technology for competitiveness and development.

**Table 2.3: Network readiness Index**

| Networked Readiness Index 2012 |       |            |       |
|--------------------------------|-------|------------|-------|
| Kenya                          |       | Rwanda     |       |
| World rank                     | Score | World rank | Score |
| 93                             | 3.5   | 82         | 3.7   |

Source: INSEAD’s Global IT report, 2012

## 2.2: Background Information on Laptop Project

In order to understand the background of the Rwanda OLPC project, one also needs to understand the basic thinking behind the project. The One Laptop per Child (OLPC) association is a US non-profit organization set up to supervise the creation of an affordable educational device for use in the developing world. Its mission is stated as to “create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning. The first initiative behind it all was sprung out of Massachusetts Institute of Technology (MIT) in early 2005. It is based on an education philosophy called *constructionism*; a philosophy where children learn-by-doing in a public, guided and collaborative process. One important element in the process is feedback from fellow students as well as more traditional feedback from teachers. In enabling the constructionist approach, computers are considered a powerful and invaluable tool, especially in developing countries where lack of teachers has proven to be a common problem.

The OLPC organization was created as a mean to convey the constructionist approach through computer usage. By giving the children an opportunity to use a laptop, a window was believed to be opened where “large amount of information can be harvested”. In the end, this aims to enable well-educated and consequently empowered children.

Five core principles are said to imbue the association:

- *Child Ownership*, the children should own the laptops themselves.
- *Low ages*, the laptop should be designed for children in the age of six to twelve years.
- *Saturation*, the project aims reach digital saturation in a given population. The population can be a whole country, a region, a municipality or a village. The purpose of this is to make the whole community feel responsible for the success of the project.
- *Connection*, through the computer network, children in the neighborhood should be permanently connected to chat-sessions, information sharing on the web, videoconferencing and the joy of collaborative games online.
- *Free and Open Source*, the software, content, resources, and tools should be able to expand as the child grows older. This fifth principle states the need of project growth to

be driven locally, in large part by the children themselves. There should be no inherent external dependency in being able to localize software into their language, fix the software to remove bugs, and customize the software to fit their needs.

Based on the principles of a computer tool, the XO laptop was presented by the OLPC association in 2006. The release was headed by OLPC president and MIT professor Nicholas Negroponte with special guest UN secretary Kofi Annan by his side. After the release, interest in computers for the developing world increased heavily, resulting in more IT companies becoming engrossed in both the market opportunities and the good-will that could be extracted from the initiative. Thus, at least two more companies began producing a laptop that was specifically developed for use in the developing world: The *Mobilia* designed and manufactured by the Indian company Encore Software, and the *Classmate*, designed by the United states-based Intel.

However, of the two competitors, at least the Classmate should be seen as a serious contender with a sale of two million laptops in 2009. The Mobilia project on the other hand has been rather anonymous since the release in late 2006 and the only country that so far has ordered the laptops is Brazil. Total sales of the OLPC laptop are approaching two million units, with full-scale deployments. Countries that have implemented the OLPC XO laptops are: Uruguay, Peru, United States (Alabama), Haiti, Rwanda, Ethiopia, Cambodia, Mongolia, Afghanistan, Mexico, Nicaragua, Paraguay and Nigeria

### **2.3: OLPC Rwanda Stakeholders**

The OLPC project contains four main stakeholders who are involved in the project. These are Core team which is a group constituted by the Ministry of Education, the ministry of education who are the owners of the project, RDB, Teachers, students and the suppliers.

#### *Core Team*

It is a team of 25 persons whose mission is to train teachers in the use of the laptop as well as to act as a support function both during and after the deployment of laptops to a school. The 25 persons are split into two different teams, one with responsibility for maintenance and laptop repairs and one that is responsible for the training of the teachers. The repair section is the

smaller one, consisting of two persons dealing with both hardware and software issues such as replacing broken parts or upgrading the systems. The learning team organizes teacher training sessions before and after the deployments.

#### *Ministry of Education - Rwanda*

Ministry is the governmental body responsible for education in Rwanda. The goal of the agency is to reduce ignorance and illiteracy and to provide human resources useful for the socio-economic development of Rwanda through the education system. Ministry of Education is the current owner of the OLPC project, and has a coordinators working full time on the project.

#### *Rwanda Information and Technology Authority (RITA)*

The Rwanda Information Technology Authority (RITA) was created in 2002, by an act of the parliament, with a mission to “lead the process of creating the Rwanda information society and developing the economy in line with the aspirations of the Vision for Rwanda.” Its main function is to advise the government on matters relating to development and implementation of ICT policies, strategies and plans. RITA was the first owner of the OLPC project. In 2008, RITA was integrated into the Rwanda Development Board; section IT (RDB-IT).

#### *Rwanda Development Board (RDB)*

The Rwanda Development Board (RDB) was modelled after similar agencies in other successful, recently developed countries, such as the “tiger economies” of Asia. It consists of eight governmental agencies, among them the agency formerly known as RITA. RDB’s main responsibility is to fast-track development activities by both the government and the private sector.

### **2.4: Kenya’s Laptop Project Stakeholders**

The following are the major stakeholder sin the Kenya’s laptop project.

### *Ministry of Education - Kenya*

It's the ministry in charge of the project. It carries the overall responsibility of the project from planning phase, to implementation. It also has e-learning specialist and other education related personalities.

### *Ministry of Information and Communication Technology*

In charge of the ICT component like training teachers on ICT skills, roll out of ICT infrastructure and internet and network deployments.

### *Ministry of Finance and Donor Organizations*

They are the funders of the project. They also form part of the tendering and acquisition process. The donor organizations include UNESCO.

### *Suppliers*

They are the providers of the laptops and they are also in charge of deployment at a faced out rate

### *Teachers and students*

These are the users of the laptops. Teachers use the laptops to teach in class, while students practice using the laptops and refer to soft copy notes in the laptops.

## **2.5: Literature Comparison of Rwanda's OLPC project to Kenya's Project**

Rwanda's OLPC project can be concluded to be similar to Kenya's ambitions to offer class one joining children with laptops, since both have long term goals of building the ICT-literate population in the country. Rwanda set the pace for the region with the launch in September 2008, of the One Laptop Per Child (OLPC) program targeting primary school pupils in Standard Four to Six (P4 – P6). The current government of Kenya which was formed in April 2013 led Kenya to following suit with the plan to issue laptops to school children, following a campaign promise

in the presidential elections. Implementation was to begin with Standard One pupils 2014, of which 700,000 children were expected to enroll for the class of 2014.

Rwanda had a total primary school population of just over 2.3 million as of 2011. As of September 2012, exactly four years after the launch, according to the Rwanda Education Board, there were about 115,000 computers in primary schools across the country. The aim is to have half a million of the laptops distributed, and at least one million by 2017. At least one school in each of the 416 sectors in Rwanda has gotten the laptops. A sector is the equivalent of a sub-district or division in Kenya.

Kenya's challenges have no much different from what was the situation in Rwanda. The challenges are the same across East Africa. The major challenges include inadequate infrastructure, especially electricity supply to schools. Efforts however were put into installing solar electricity in as many schools as possible. The second challenge is inadequate capacity, in terms of numbers and computer literacy, of the primary school teachers. As of May 2013, the OLPC Project had trained just over 2,800 teachers and heads of school not only in computer literacy, but in troubleshooting hardware, software and applications. There is good reason for such technical training of the teachers. Computers often tend to break down for one reason or another, especially in the hands of children. Giving the teachers the ability to diagnose what the problem is likely to be, and how to fix it, is crucial.

Kenya has a primary school population of over 8.5 million pupils (National Census Report, 2009). Only 5 per cent of public primary schools have computers. It has already been pointed out that the imminent laptop project may not be viable without first addressing teachers' computer literacy, including the woefully inadequate school infrastructure in much of the country, and ensuring the computers are loaded with relevant curriculum.

There are other major challenges of poverty that tend to hinder access to education. A significant number of school-going children in Kenya lack basic needs, including food and clothes, which has raised questions of feasibility for such an ambitious project. While the promise is for a solar powered laptop for the Kenyan children, there have also been concerns by early childhood



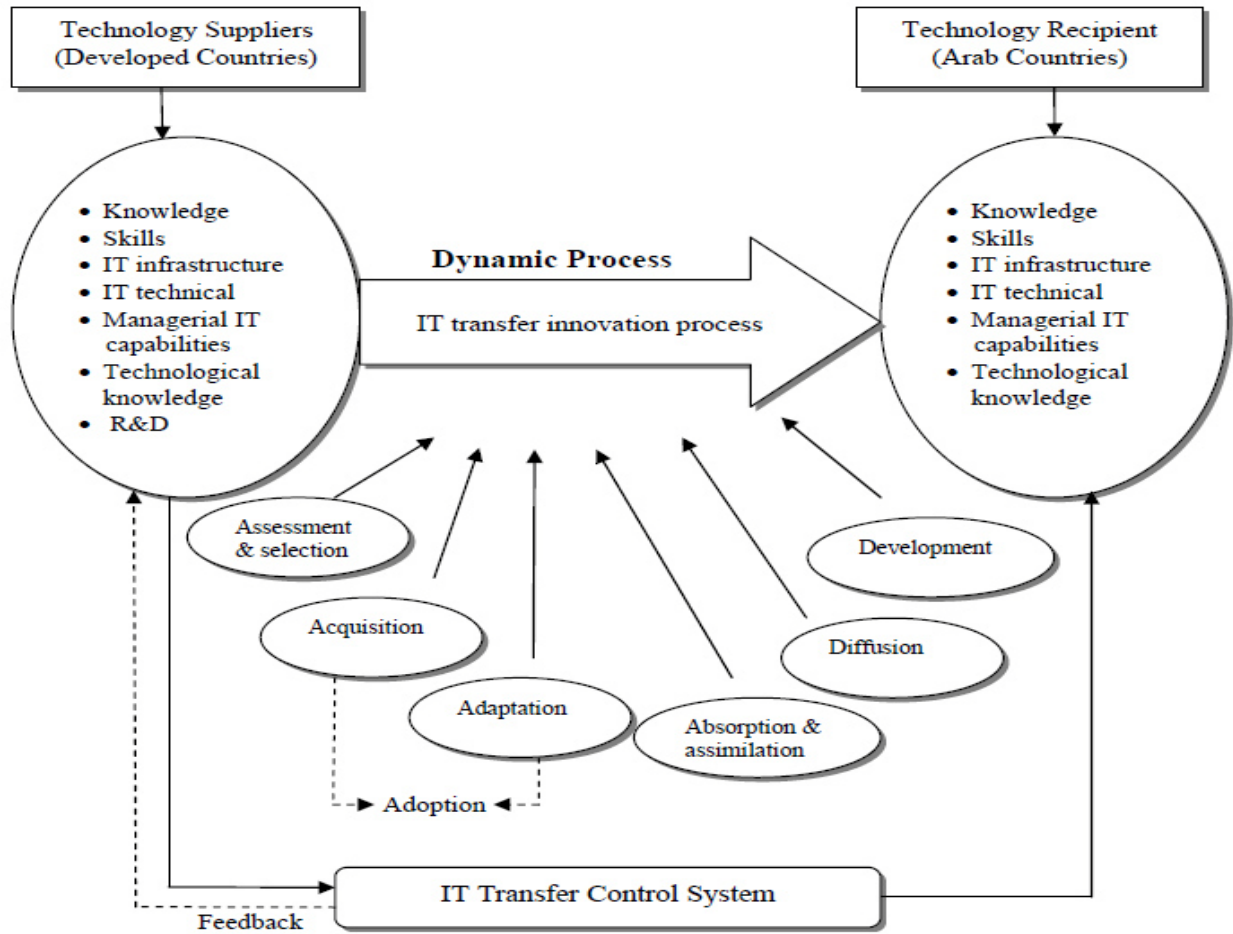
educationists about the merits of giving laptops to Standard One pupils as opposed to, say, Standard Four pupils who are a bit more “mature” to use the computers more efficiently.

## **2.6: Theoretical Frameworks Used In the Study**

There are two specific models that the researcher has used to come up with the conceptual framework for this study. These are frameworks for ICT transfer that was used in several OLPC projects including OLPC Rwanda and Peru. These two models i.e. ITT Model and the ITL model, have been used for evaluating other ICT projects in developing countries. In the below segment, we describe each model and show how each has been used to develop the conceptual framework.

### **2.6.1: The Information Technology Transfer Model (ITT model)**

This model on ICT transfer was presented by a researcher called Al-Mabrouk. He collected his empirical material mainly in the Arab countries of the middle-east. For us, this model presents a useful method by which the skills and technologies that are transferred as well as the process in which the transfer takes place can be understood. Mabrouk et al argue that the IT transfer process should be seen as a dynamic and logical structure split into stages, ranging from assessment and selection to the actual development of the imported IT (see figure 2.1)



**Figure 2.1: Information technology transfer Model (ITT model)**

**Source: Al-Mabrouk, 2009.**

According to Al-Mabrouk et al, participants require the support of IT technological resources specified as knowledge (or know-how), skills, infrastructure, technical, managerial capabilities, technological hardware and R&D. The purpose of the control system is to ensure that the technology comply with the suppliers own organizational goals and interests, and do not impact negatively on their competitive advantage in the region. What we extract from this model is primarily the six stages.

*Assessment & selection* – Assesses the requirements of – and the alternatives to – the new technology.

*Acquisition* - actual purchase and distribution of the hardware and software technology, as well as training and assistance in installations.

*Adaptation*- understanding of the technology by the people who use and maintain it has been reached.

*Absorption & assimilation* - recipient has learned to alter and adjust the technology to improve or adapt its use according to the local conditions and needs.

*Diffusion* - the technology is fully understood by the recipient country. In a techno-economic sense, diffusion on IT knowledge affects all society, industrial and service sectors.

*Development*, - confirms that the technology has been fully transferred. At this point the recipient can, on their own, derive new products or systems from the transferred technology

### 2.6.2: The Information Technology Life-Cycle Model (ITL model)

The second model we will present is the ITL model, presented by Baark, E. and Heeks, R., 1998, consists of five *phases* (see figure 2.2). The authors developed the model based on experiences from several ICT projects in China. The model adds an important dimension to research; namely the cyclic behavior of the transfer process.

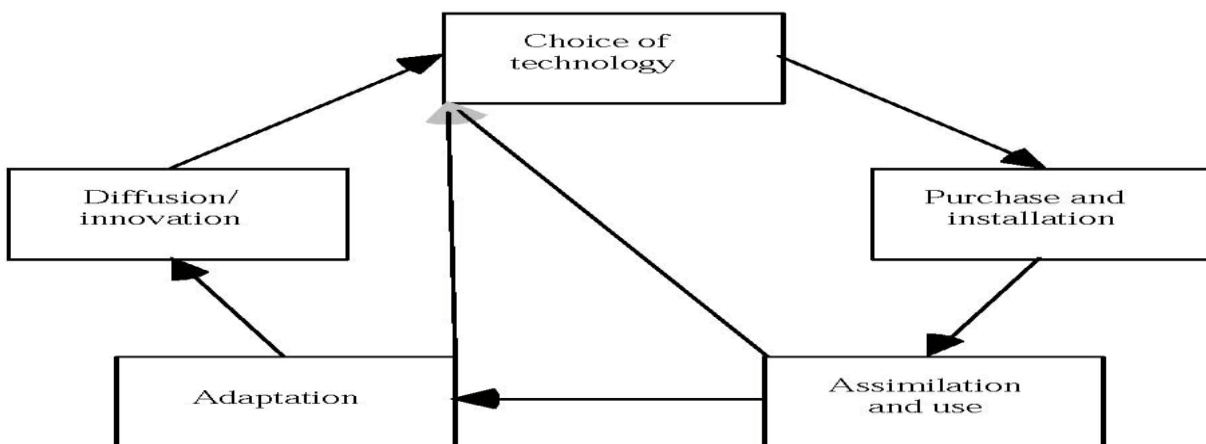


Figure 2.2: Information technology life-cycle model (ITL model)

Source: Baark and Heeks, 1998

Baark and Heeks (1998), argue that the life-cycle approach should be seen as a time-continuous process rather than a process limited to discrete stages. It adds the important characteristic of non-linearity; instead of seeing the transfer of a technology from one location to another as a single process it also adds the aspect of *regular infusion of new technology*. New technology can either be new in terms of an upgrade to the existing technology (a new *technology generation*) or simply be an entirely new technology not used nor seen before. These infusions are sometimes introduced as early as in the first and second phases. Except for the attributes above, the model and its five phases are in content similar to the six phases of the model presented by Al-Mabrouk and Soar. However, where the ITT model was mainly based on earlier literature and theories, the ITL model is rather derived from praxis and empirical studies

### **2.6.3: Conceptual Framework**

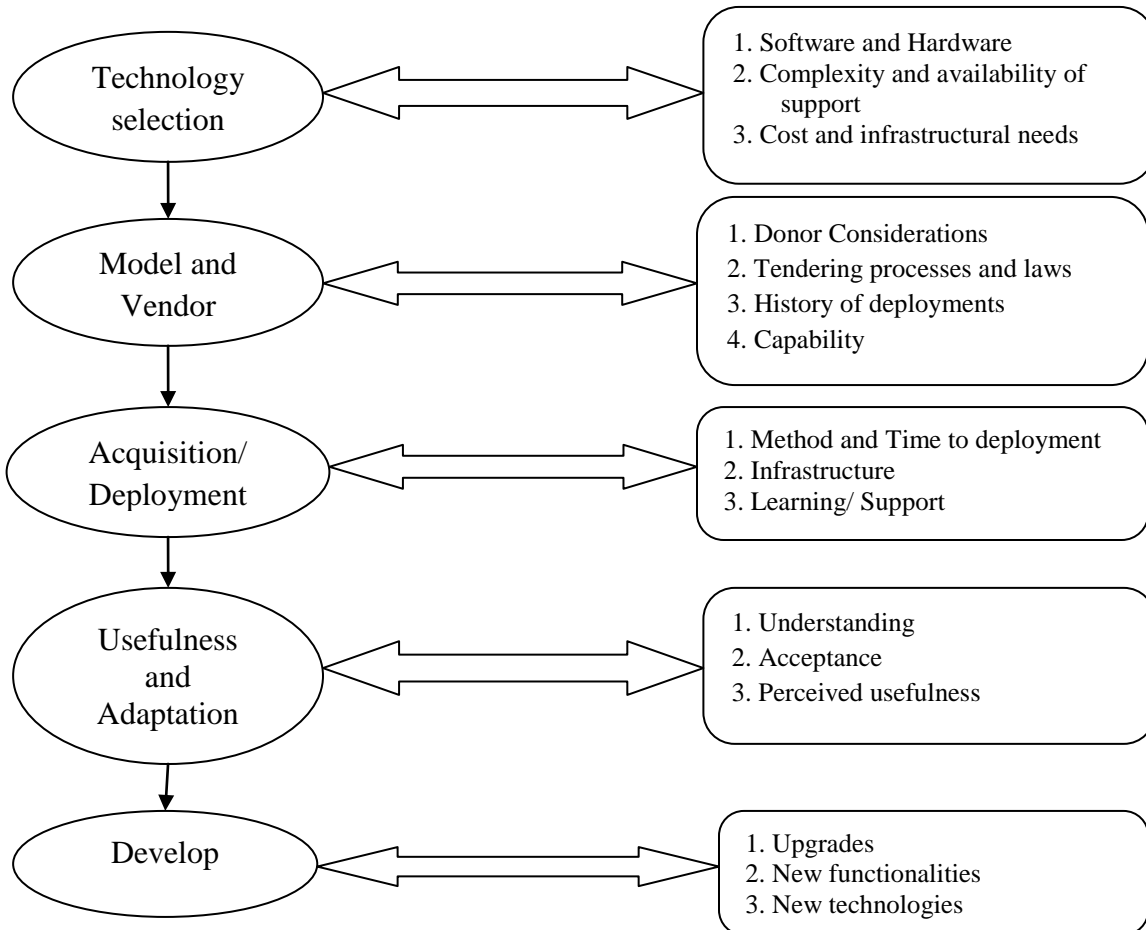
Figure 2.5 presents the research conceptual framework. It is a hypothesis that has heavily relied on the contributions of earlier literature, theories and models put forward by Baark and Heeks (1998), and Al-Mabrouk, (2009). The major contribution of Baark and Heeks (1998) is a 5 – phased implementation model which has been adopted in this conceptual framework. The five phases are distinct to each other with each having sub categories that must be met. Al-Mabrouk, (2009), in his ITT model brings in the transferability aspect of technology and looks at IT as a transfer process, which is dynamic and a logical structure, split into stages. The stages are as developed in our conceptual framework (figure 2.3). These two models, combined with other empirical studies have formed a hypothesis of this research.

#### **Definition of Constructs**

**Technology selection** – It involves formulating a set of clearly defined goals on the type of technology needed that would meet the needs of the recipient. This involves:

- Software and Hardware – Choosing the most suited hardware and software technology that best fit the needs present. There must be ability to support the chosen technology and sustain it over the pre-defined duration of time
- Complexity and availability of support – Technology chosen should be operationalized without much complexity. There should be a readily available support from the vendor.

- Cost and infrastructural needs – The cost should be within the budget limit of the recipient. Its infrastructure should have the ability to sustain this chosen technology or should be within the budgeted limits



Source: Author, 2014

**Figure 2.3: Research Conceptual Framework**

**Model and Vendor Selection** - This stage follows after the exact technology needed has been selected. The model covers the model of the transfer to be used and the vendor is the provider of the selected technology

- Donor Considerations – Is the project funded by a donor and does the donor insist on its preferred model of roll out and the provider of the technology?
- Tendering processes and laws – The laws of the recipient country on how tendering of

technological projects is carried out

- History of deployments – The potential suppliers should proof the ability to handle the project by demonstrating their previous similar deployments
- Capability – Does the supplier have the capacity to supply the needed quantities within budget and time limits?

**Acquisition/ Deployment** – It's the physical implementation of the technology into use

- Method and Time to deployment – How is the technology rolled out? Is it in Phases or a one-time deployment?
- Infrastructure – Developing the supporting infrastructure for the technology to be functional
- Learning/ Support – Training the users of the technology on its use and how to operate

**Usefulness and Adaptation**: Putting the technology into use and productivity

- Understanding – Deep understand on the functionality of the technology that comes with experience of using it.
- Acceptance – Technology becomes part of life and its effects starts to be seen. This can be on Key Performance indicators
- Perceived usefulness – The efficiency witnessed on using the technology in terms of ease of use and turnaround time

**Develop**: Getting feedback and using it to improve the current technology

- Upgrades – Deploying advanced versions of the same technology
- New functionalities – Adding patches and releases to support new functionalities that were not envisaged at the beginning
- New technologies – Completely removing the current technology and deploying new ones

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1: Introduction**

This chapter outlines the methods that were used for the study and adopts the following structure: data collection methods, research design, population description and sample, research procedures and data analysis and methods. This study adopted a descriptive survey design. It's mainly using quantitative research approaches but also incorporating qualitative approach especially in areas that requires explanation of phenomenon. Data was collected both in Rwanda and in Kenya in order to make this comparative study a success.

#### **3.2: Data Collection Methods**

The researcher's approach consisted of four data collection methods: Questionnaires, interviews, follow up explanations and observation. Data collection was carried out both in Rwanda, Kigali city and in Kenya, Nairobi city.

A detailed questionnaire was distributed on a drop and pick method. This was followed up by explanation on areas that need explanation or further follow up questions. Extensive observations were also made during the whole period of study including conducting visits to schools and witnessing children as they use the laptops. Literature review and reading general information on the OLPC initiative continued throughout the study.

#### **3.3: Target Population**

The researcher's target population was mainly the people working on the Laptops for school children project in both countries. The information attained from literature review was helpful in understanding of the different stakeholders involved in the project, who were the target. To have a more precise comparative study, the researcher ensured that the target population in both countries like similarities like the size, levels of financial ability etc.

For Rwanda, the target population of the study was mainly ministry of Education and the school teachers from the identified schools. The ministry has internal stakeholders that include: Rwanda

Development Board section IT – RDB-IT (An equivalent of ICT Board in Kenya) which is the government-body responsible for executing ICT policies, Core team; the local agents supplying the laptop to the schools and is in charge of training teachers and offering the technical support.

For Kenya’s target population, it shared several similarities to that of Rwanda. We had the ministry of education and the primary school teachers from the identified schools. Under the ministry of education we have; Laptop Project caucus committee, representatives from the Ministry of Finance and Ministry of ICT

The researcher did not collect data from students because of two main reasons. The students in Kenya are standard 1 pupil who may not add much value to the research which is different from Rwanda’s children who are in p4, p5 or P6. Secondly the laptops hadn’t reached the students in Kenya which is also different from Rwanda’s case

### **3.4: Research Design**

The study adopted is a descriptive design. According to Cooper and Schindler (2000), a descriptive research design is concerned with finding out the; who, what, where, when and how much. The design was deemed appropriate because of the comparative nature of this research and to describe how the factors support matters under investigation.

After identifying all the stakeholders, the researcher structured an approach where the views of all parties concerned were considered.

The questionnaire had specific questions to capture critical events in the project. Where applicable, the technique of “triangulation” were used i.e. the information on areas of special interest which was collected from one respondent, then compared to data from other respondent. Were inconsistencies were found; the researcher examined the topic closer in search for why.

Questionnaires were also used to get information from teachers. First, it enabled the researcher to get an understanding of the local knowledge of the project and what impact the project had had among the Teachers and as well teacher preparedness to handle the ICT project. Secondly, provided a natural meeting point where discuss could be carried out on the project with the teachers, have a feel of the laptops and interaction with other stakeholders.



### 3.5: Population Sampling

This was divided into two; the sampling for Rwanda data collection and the sampling for Kenya's data collection. In both cases, the study focused on depth rather than breadth hence the sample did not necessarily give representative percentages but rather the quality and the source of knowledge that the researcher intended to discover.

**Rwanda population sampling:** Refer to sampling technique section

**Table 3.1: Sampling Frame**

| Target group                  | Number of institutions | Respondent per Institution | Sample size |
|-------------------------------|------------------------|----------------------------|-------------|
| Ministry of Education         | 3                      | 5                          | 15          |
| RDB-IT                        | 2                      | 5                          | 10          |
| Teachers: 4 different sectors | 12                     | 10                         | 120         |

The sampling of the teachers in both countries was of keen attention for a better comparison. The school teachers were from 12 different schools in Muhanga sector out of Kigali. This was Cyeza, Kabacuzi, Kibangu, Kiyumba, Muhanga, Mushishiro, Nyabinomi, Nyamabuye, Nyarusange, Rongi, Rugendabali and Shiyogwe. Muhanga sector have a similar economic and social setting like the Langata district. With some high income areas and low income areas within the sector. The reasons for selecting these three sectors were mainly to reach different social backgrounds and also those who had the laptops and those who didn't.

### Kenya's population sampling

**Table 3.2: Kenya's Sampling Frame**

| Target group                    | Number of institutions | Respondent per Institution | Sample size |
|---------------------------------|------------------------|----------------------------|-------------|
| Ministry of Education           | 5                      | 5                          | 25          |
| Teachers: 4 different divisions | 12                     | 10                         | 120         |

Ministry of education have 5 different departments handling; project implementation (Laptop caucus committee), representatives from the Ministry of Finance and Ministry of ICT, teacher training, School infrastructure readiness, tendering/acquisitions processes

The researcher also collected data from teachers in Langata constituency. It was chosen because it shares lots of similarities with the Muhanga sector in Rwanda and it could give a better comparison. These schools are: Olympic primary, Ayany primary, Sarangombe, Kianda primary, Gatwakera primary, Mama Okinda primary, St Charles Iwanga, Uhuru Gardens, Lanagata West, Ngei primary school, Kongoni primary and Ngong Forest Primary.

The comparison of the data from these two locations would shed light on schools preparedness and teacher trainings.

### **3.6.: Sampling Techniques**

Sample size selection on the Ministry of Education was based on the Key informant technique (KIT), a technique that majorly considers rigor, richness, trustworthiness of data and saturation based on researcher's judgment but guided by the following three factors: First is Convenience sampling; this is the least rigorous technique, involving the selection of the most accessible subjects. Secondly is the judgment sampling; Also known as purposeful sample, the researcher actively selects the most productive sample to answer the research question. Lastly is the theoretical sample; this is where the samples are usually theory driven.

In Teachers sampling, the researcher relied on Mugenda and Mugenda (2003) that notes that for a better comparative study, the sample size should be a minimum of 10% of the total population (teachers) of the area under study. The choosing of schools within the 2 regions was purely under researcher's discretion balancing high income area, middle income area and the low income area. This is same approach in both countries

### **3.7: Data Analysis**

Bryman and Bell (2003) describe data analysis as a technique used to make inferences by systematically and objectively identifying specific characteristics. Both descriptive statistics and inferential statistics were used in the data analysis.

The quantitative data collected through the questionnaires was analyzed through IBM Statistical Package for Social Science (SPSS) Statistic v22.0. The statistical tools used are Cronbachs alpha for reliability analysis, means, frequencies, standard deviations, as well as interpretational analysis used to identify constructs, themes and patterns that were used to describe and explain issues being studied. The qualitative data collected was collected through interviews and analyzed using Content analysis. The responses were captured through short hand notes by the researchers on the predetermined questions.

## CHAPTER FOUR

### RESULTS AND FINDINGS

#### 4.1 Introduction

This chapter presents results and findings of the study as set out in the research methodology. This section is divided into three sections. The first section presents the data as collected from the teachers in both countries as per the sampling frame, then followed by the findings from the ministry of education officials in both countries, and finally a chronological presentation of the implementation process as detailed out in both countries.

##### 4.1.1 Response Rate

The following is the response rate from the sampled groups. 120 teachers were sampled in both countries and 25 officials from the ministry of education in Kenya and Rwanda in collecting data with regard to the research project being undertaken.

**Table 4.1: Response Rate**

| Response                          | Country | Frequency | Percentage |
|-----------------------------------|---------|-----------|------------|
| Teachers                          | Kenya   | 85        | 70.8       |
|                                   | Rwanda  | 89        | 74.2       |
| Ministry of Education respondents | Kenya   | 22        | 88.0       |
|                                   | Rwanda  | 19        | 76.0       |

Source: Research data, (2014)

From the study, 85 and 89 out of 120 target teachers in Kenya and Rwanda respectively filled in and returned the questionnaire contributing to response rates of 70.8% and 74.2% respectively. Further, 18 and 19 out of 25 target respondents in the ministry of education filled in and returned the questionnaire contributing to response rates of 88.0% and 76.0% in Kenya and Rwanda respectively as shown in Table 4.1. This response rate was excellent and representative and conforms to Mugenda and Mugenda (2003) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent.



**Figure 4. 1: P4 student in Cyeza Primary school in Rwanda using the OX laptop**

#### **4.2 Reliability Analysis**

Reliability of the questionnaire was evaluated through Cronbach's Alpha which measures the internal consistency. Cronbach's alpha was calculated by application of SPSS for reliability analysis. The aim was to ascertain the correctness of the data gathered.

According to Zinbarg (2005), Cronbach's alpha is a coefficient of reliability that gives an unbiased estimate of data generalizability. The value of the alpha coefficient ranges from 0-1 and may be used to describe the reliability of factors extracted from dichotomous and or multi-point formatted questionnaires or scales. A higher value shows a more reliable generated scale. Cooper & Schindler (2008) has indicated 0.7 to be an acceptable reliability coefficient. Table below shows that understanding of the Laptops project implementation process had the highest reliability ( $\alpha=0.798$ ) followed by teacher e-readiness ( $\alpha=0.718$ ). This illustrates that the two scales were reliable as their reliability values exceeded the prescribed threshold of 0.7.

**Table 4.2: Reliability Coefficients**

| <b>Scale</b>  | <b>Cronbach's Alpha</b> | <b>No. of Items</b> |
|---|-------------------------|---------------------|
| Understanding of the Laptops project implementation process | 0.798                   | 7                   |
| Teacher e-readiness   | 0.718                   | 7                   |

**Source: Research Data, 2014**

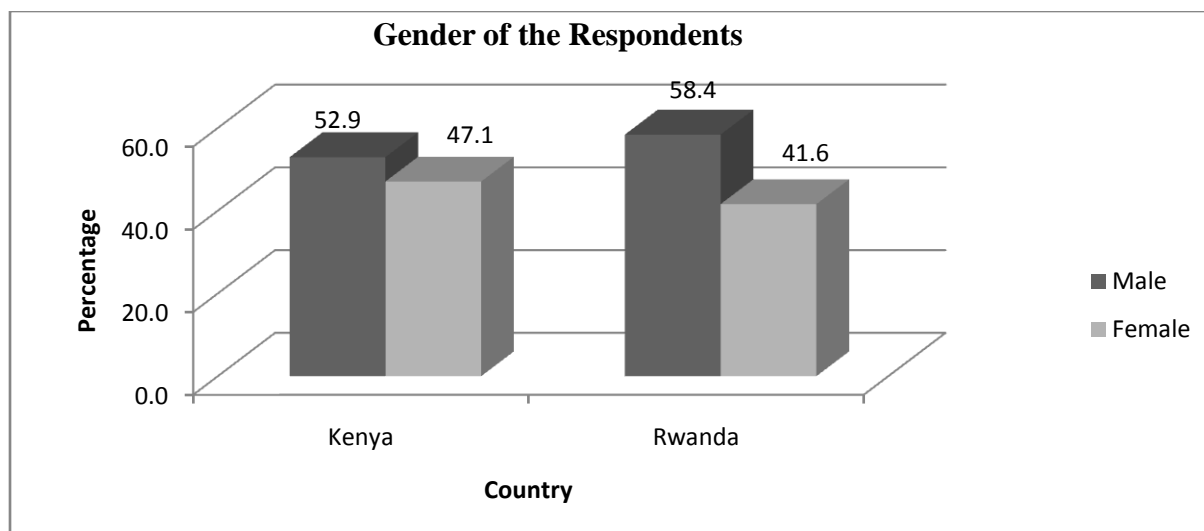
### **4.3 Information from Teachers: Objective 3**

In a bid to establish the conversance of the respondents to the subject matter, the study sought to establish the respondents' demographics including gender, age, level of education, work experience and the classes/grades taught.

#### **4.3.1 Gender of the Respondents**

The study sought to establish the respondents' gender. The results were as shown in Figure 4.2 below.

.



**Figure 4.2: Gender of the Respondents**

**Source: Research data, (2014)**

From the findings, a significant number of the respondents from Kenya were male as shown by 52.9%, while 47.6% were female in Kenya. In Rwanda, 58.4% of the respondents were male while 41.6% were female. It was an implication that the views regarding the study were collected from both genders hence gender sensitivity. This shows that public primary schools were in Kenya and Rwanda had both male and female members and that the male were more than the female teachers.

#### **4.3.2 Age of the Respondents**

The study inquired on the age of the respondents. The findings are presented in Table 4.3 below.

**Table 4.3: Age of the Respondents**

|                    | Kenya     |         | Rwanda    |         |
|--------------------|-----------|---------|-----------|---------|
|                    | Frequency | Percent | Frequency | Percent |
| Below 25 years     | 15        | 17.6    | 32        | 36.0    |
| 25 - 34 years      | 19        | 22.4    | 25        | 28.1    |
| 35 - 44 years      | 20        | 23.5    | 12        | 13.5    |
| 45 - 54 years      | 24        | 28.2    | 18        | 20.2    |
| 55 years and above | 7         | 8.2     | 2         | 2.2     |
| Total              | 85        | 100.0   | 89        | 100     |

Source: Research data, (2014)

From the study in Kenya, 28.2% of the respondents were aged between 45 and 54 years, 23.5% of the respondents had between 35 and 44 years of age, 22.4% had 25 and 34 years, 17.6% had below 25 years while 8.2% of them were aged 55 years and above. In Rwanda, the study findings established that 36.0% of the respondents were aged below 25 years, 29.4% were aged between 25 and 34 years, 20.2% had between 45 and 54 years, 13.5% were aged between 35 and 44 years while 2.2% of them had 55 years and above. This question was significant in establishing the distribution of the respondents in terms of age within the institutions to enable generalization of the results as well as ensuring responses obtained cut across all the ages brackets.

### 4.3.3 Highest Qualifications

The study sought to establish the highest qualifications achieved by the respondents. The results were as shown in table 4.3 below

**Table 4.3: Highest Qualifications**

|        | <b>Certificate</b> | <b>Diploma</b> | <b>Degree</b> |
|--------|--------------------|----------------|---------------|
| Rwanda | 76.40%             | 23.60%         | 0%            |
| Kenya  | 8.20%              | 56.50%         | 35.30%        |

Source: Research data, (2014)

According to the findings, least of the respondents in Kenya, comprising 8.2% had certificates, 56.5% had Diploma while 35.3% had degrees. In Rwanda, majority (76.4%) of the respondents had Certificate as their highest qualifications while 23.6% has Diploma. This implies that the respondents both in Kenya and in Rwanda had enough level of education to respond to the issues sought by this study. There were no cases of teachers having degree in Rwanda same to teachers with Certificates as their highest qualifications in Kenya.

### 4.3.4 Length of Time in Teaching Profession

The study inquired on the number of years the respondents had been in the teaching profession. The findings are presented in table 4.4 below.



**Table 4.4: Length of Time in Teaching Profession**

|                    | Kenya     |         | Rwanda    |         |
|--------------------|-----------|---------|-----------|---------|
|                    | Frequency | Percent | Frequency | Percent |
| 1- 5 years         | 15        | 17.6    | 36        | 40.4    |
| 6 - 10 years       | 17        | 20.0    | 25        | 28.1    |
| 11 - 15 years      | 21        | 24.7    | 12        | 13.5    |
| 15 - 20 years      | 24        | 28.2    | 6         | 6.7     |
| 21 years and above | 8         | 9.4     | 10        | 11.2    |
| Total              | 85        | 100.0   | 89        | 100     |

Source: Research data, (2014)

From the study findings, majority (28.2%) of the respondents had been in the teaching profession for 15 to 20, 24.7% for 11 to 15 years 20.0% for 6 to 10 years 17.6% for 1 to 5 years while 9.4% had been in the teaching profession for 21 years and above. In Rwanda, majority of the respondents had been in the teaching profession for a period of 1 to 5 years as indicated in Table 4.4 by 40.4%, another 28.1% of them had been in the teaching profession for 6 to 10 years, 13.5% of the respondents indicated that they had had been in the teaching profession for 11 to 15 years, 11.2% for 21 years and above while 6.7% of them had worked in the been in the teaching profession for 15 to 20. This question was significant in establishing the length of time the respondents had been in the teaching profession which was necessary for comparison with the knowledge on laptop usage.

#### 4.3.5 Classes/ Grades Taught

The study sought to establish the grades/ classes to which the respondents taught. The findings are presented in the table 4.5 below.

**Table 4.5: Classes/ Grades Taught**

|            | Kenya     |         | Rwanda    |         |
|------------|-----------|---------|-----------|---------|
|            | Frequency | Percent | Frequency | Percent |
| Class 1/P1 | 5         | 5.9     | 20        | 22.5    |
| Class 2/P2 | 30        | 35.3    | 32        | 36.0    |
| Class 3/P3 | 25        | 29.4    | 23        | 25.8    |
| Class 4/P4 | 20        | 23.5    | 38        | 42.7    |
| Class 5/P5 | 20        | 23.5    | 46        | 51.7    |
| Class 6/P6 | 25        | 29.4    | 32        | 36.0    |
| Class 7    | 30        | 35.3    |           |         |
| Class 8    | 25        | 29.4    |           |         |

Source: Research data, (2014)

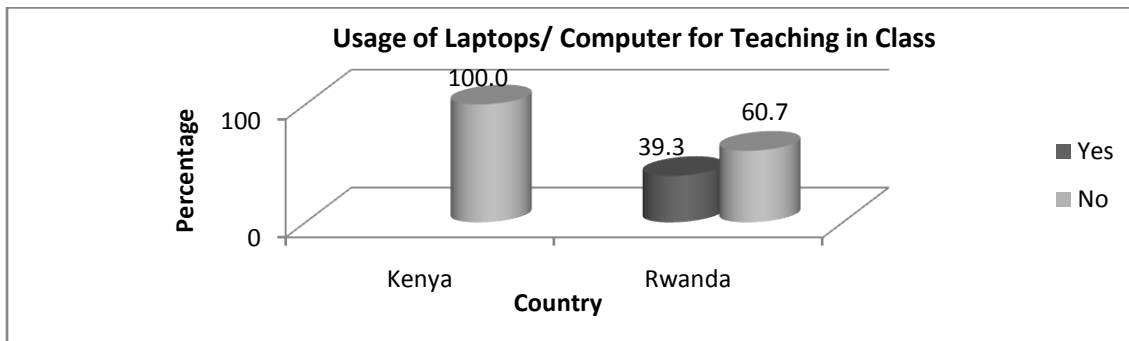
From the study findings, 5.9% of the respondents in Kenya taught class one, 35.3% taught class two, 29.4% taught class three, 23.5% taught class four, 23.5% taught class five, 29.4% taught class six, 35.3% taught class seven while 29.4% taught class eight. In Rwanda, 22.5% of the respondents taught P1, 36.0% taught P2, 25.8% taught P3, 42.7% taught P4, 51.7% taught P5 while 36.0% taught P6. This question was relevant to the study as it aimed at ensuring that teachers from all classes echoed their views on laptop implementation projects necessary for their incorporation in this study.

#### 4.4 Laptop Usage

##### 4.4.1 Usage of Computer for Teaching in Class

The study sought to establish whether the respondents had ever used computer for teaching in class. The findings are presented in the Figure 4.4 below.

**Figure 4.4: Usage of laptops / Computer for Teaching in Class**



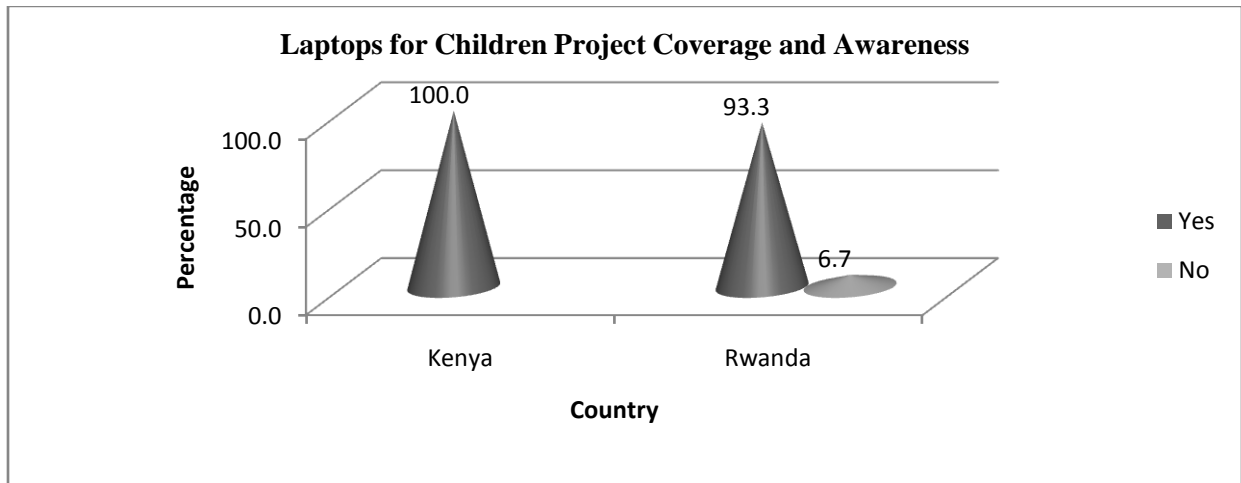
Source: Research data, (2014)

According to the study findings, all (100%) the respondents from Kenya had not used computer laptops for teaching in class. In Rwanda, 35% of the respondents had used computers for teaching in class while 60.7% had not. Comparing the data findings, it can be deduced that there was more usage of computers in class by teachers in Rwanda than in Kenya. This could be attributed to the differences in the implementation phases of the projects in the countries as in Kenya the laptop procurement process is ongoing while in Rwanda the laptop usage in class already commenced.

#### 4.4.2 Laptop Project Coverage and Awareness

The study inquired from the respondents on whether they had heard about the Laptops for Children project and whether their schools were covered in this project. Figure 4.5 presents the data findings.

**Figure 4.5: Laptops for Children Project Coverage and Awareness**



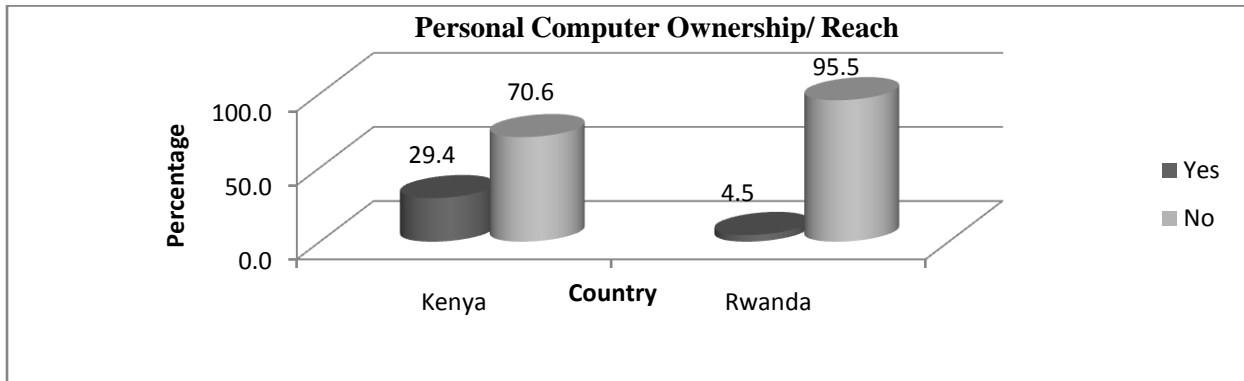
Source: Research data, (2014)

From the study findings, all (100%) Of the respondents in Kenya indicated that they were aware of the Laptops for Children project with a few of them citing that their schools were covered in the project. Majority (93.3%) of the respondents in Rwanda indicated that they were aware of the Laptops for Children project with most of them citing that their schools were covered in the project. 6.7% indicated that they were not aware. From the comparison, it can be deduced that the awareness of the laptops projects and the coverage of the schools was more in Rwanda than in Kenya. Even though Kenya is still very young in the project phase, there has been a lot of media attention to the project such that 100% of the respondents were aware of it. This is different from Rwanda where even though the project has been in existence from 2008, some 6.7% of the respondents said they were not aware. There is low media coverage in Rwanda.

#### 4.4.3 Personal Computer Ownership /Reach to a Computer at Home

The study sought to establish whether the respondents had their own personal computers. The findings are presented in the figure below.

**Figure 4.7: Personal Computer Ownership/ Reach**

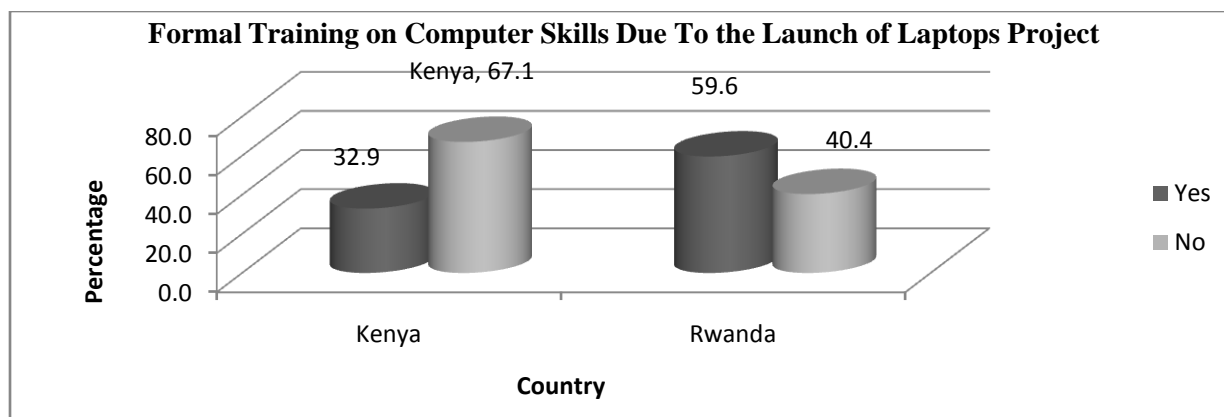


Source: Research data, (2014)

In Kenya, the study findings established that 29.4% of the respondents owned or had neither reach to personal laptops/computers while 70.6% had no ownership nor reach. Only 4% of the respondents in Rwanda had personal laptop or reach at home with 95.5% having no reach at all. Comparatively, more respondents owned/had reach to laptops/computes in Kenya than in Rwanda which suggests that more teachers in Kenya own laptops compared to their counterparts in Rwanda. These findings concur with Doe (2004) findings that majority of the teachers in developing countries lacked personal laptops.

#### **4.4.5 Formal Training on Computer Skills Due To the Launch of Laptops Project**

The study sought to establish whether the respondents underwent through a formal training on computer skills due to the launch of Laptops project. The findings were presented in the figure below.



**Figure 4.9: Formal Training on Computer Skills Due To the Launch of Laptops Project**

**Source: Research data, (2014)**

From the study findings, 32.9% the respondents had undergone through a formal training on computer skills due to the launch of Laptops project while 67.1% had not. In Rwanda, 59.6% of the respondents indicated that they had formal training on computer skills due to the launch of laptops project while 40.4% indicated that they had not received any formal Training. These study findings show that there were more training among the teachers in Rwanda than in Kenya on computer Skills majorly due to time duration of the existence of the project

#### 4.4.6 Length of Training

For those respondents who had formal training on computer skills due to the launch of Laptops Project, the study sought to establish how long the training was. The findings are presented in the table below.

**Table 4.6: Length of Training**

|                              | Kenya     |         | Rwanda    |         |
|------------------------------|-----------|---------|-----------|---------|
|                              | Frequency | Percent | Frequency | Percent |
| Less than a week             |           |         | 14        | 26.4    |
| Between a week and a month   | 28        | 100.0%  | 35        | 66.0    |
| Between 1 month and 3 months |           |         | 4         | 7.5     |
| Total                        | 28        | 100.0%  | 53        | 100.0   |

Source: Research data, (2014)

From the study findings, all (100.0%) those respondents trained in Kenya had been trained for a period of between a week and a month. However, in Rwanda, majority (66.0%) of the respondents had been trained for duration of between a week and a month, 26.4% indicated less than a week while 7.5% indicated less than between 1 month and 3 months.

#### 4.4.7 General perceptions of teachers

The study sought to find out the level of agreement or disagreement of the respondents with the following statements on the Pilot project. A scale of 1-5 where: 1= strongly disagree, 2=Disagree 3=Neutral, 4=Agree, 5=strongly agree was provided and results were as shown in Table 4.7.

**Table 4.7: Pilot Project**

| Statements   | Country | Mean | Std. Deviation | Independent Samples Test for equality of means |       |
|--|---------|------|----------------|--|-------|
|  |         |      |                | Mean Difference                                | Sig.  |
| Use of ICT in learning enhances better understanding by students   | Kenya   | 4.59 | 0.6034         | 0.25   | 0.065 |
|  | Rwanda  | 4.34 | 1.0969         |  |       |
| Student's perceptions on use of Laptops are great. They are excited about it   | Kenya   | 4.94 | 0.2367         | 1.44   | 0.000 |
|  | Rwanda  | 3.51 | 1.4781         |  |       |
| I would recommend that all students from p1 to p8 to be given laptops  | Kenya   | 4.82 | 0.3835         | 0.94   | 0.000 |
|  | Rwanda  | 3.89 | 1.4881         |  |       |
| Teachers who had never used computers before the Laptops project have a very low perceived ease of use for computers | Kenya   | 3.88 | 1.3751         | 0.01   | 0.977 |
|  | Rwanda  | 3.88 | 1.3040         |  |       |
| The process of planning new technology lessons can be overwhelming for a new learner                                 | Kenya   | 4.29 | 0.8284         | 2.75   | 0.000 |
|  | Rwanda  | 1.54 | 1.0981         |  |       |
| Technology increases the self-directed learning opportunities for both students and staff                            | Kenya   | 4.59 | 0.6034         | 2.07   | 0.000 |
|  | Rwanda  | 2.52 | 1.0348         |  |       |
| The existing ICT infrastructure in this school is sufficient for student learning activities using computers         | Kenya   | 1.35 | 0.5917         | -0.89  | 0.000 |
|  | Rwanda  | 2.25 | 1.0256         |  |       |

Source: Research data, (2014)

From the study findings, the respondents in both countries strongly agreed that the use of ICT in learning enhanced better understanding by students as shown by mean score of 4.59 and 4.34 in Kenya and Rwanda respectively. The respondents from Kenya strongly agreed that the Student's

perception on use of Laptops was great and that they were excited about it while those from Rwanda agreed as shown by means of 4.94 and 3.51 respectively. These findings are in agreement with Hennessy, Harrison and Wamakote (2010) who established that use of ICT creates excitement among students hence rekindling their interest and learning in the subject. Further the respondents in both countries strongly recommended that all students from p1 to p8 to be given laptops as shown by mean score of 4.82 in Kenya and 3.89 in Rwanda. Asked on whether the teachers who had never used computers before the Laptops project had a very low perceived ease of use for computers, the respondents from both countries agreed as shown by mean of 3.88 in each case.

Asked further on whether the process of planning new technology lessons could be overwhelming for a new learner, the Kenyan respondents strongly agreed as shown by mean of 4.29 while their Rwandan counterparts disagreed as shown by 1.54. The respondents from Kenya strongly agreed that technology increased the self-directed learning opportunities for both students and staff as shown by mean of 4.59 while their counterparts in Rwanda were neutral as shown by mean of 2.52. These findings agree with Tella, Tella, Toyobo, Adika & Adeyinka (2007) who found out that teachers perceived ICT as very useful and as making teaching and learning easier. The study findings established that the respondents from both countries were in strong disagreement that the existing ICT infrastructure in this school is sufficient for student learning activities using computers as shown by mean of 1.35 and 2.25 in Kenya and Rwanda respectively. The findings of this study conform with Hennessy, Harrison and Wamakote, (2010) who found out that major barriers to ICT classroom use is a result of the lack of computer hardware, software and reliable internet implying that existing infrastructures was insufficient..

At 5% significance level, there was significant difference in the levels of agreement among respondents from the countries on whether student's perceptions on use of Laptops was great., recommendation that all students from p1 to p8 to be given laptops, whether the process of planning new technology lessons could be overwhelming for a new learner, Technology increased the self-directed learning opportunities for both students and staff and whether the existing ICT infrastructure in this school is sufficient for student learning activities using

computers as shown by probability values of 0.000 in each case which was less than 0.05. The study established that all the level of agreement in these cases was higher in Kenya than in Rwanda except for the case of whether the existing ICT infrastructure in this school were sufficient for student learning activities using computers.

#### 4.4.8 Challenges Faced By Teachers in Using ICT

The study sought to establish the challenges that were perceived by the respondents to be faced by teachers in using ICT in their schools. A scale of 1-5 where; 1= No effect; 2= Less Extent; 3= Moderate extent; 4= Great extent; 5= Very great extent (Halted the project) was provided and results were as shown in Table 4.8.

**Table 4.8: Challenges Faced By Teachers in Using ICT**

|   | Country | Mean | Std. Deviation | Independent Samples Test for equality of means |       |
|---|---------|------|----------------|--|-------|
|   |         |      |                | Mean Difference                                | Sig.  |
| Computer breakdowns and system crashes. i.e. hardware problems    | Kenya   | 4.29 | 0.7531         | 0.36   | 0.050 |
|   | Rwanda  | 3.93 | 1.5211         |  |       |
| Software problems. Lack of proper learning software's             | Kenya   | 4.41 | 0.6034         | 2.56   | 0.000 |
|   | Rwanda  | 1.85 | 1.0062         |  |       |
| Insufficient training of teachers                                 | Kenya   | 4.53 | 0.6092         | 3.18   | 0.000 |
|   | Rwanda  | 1.35 | 0.7246         |  |       |
| Lack of e-content   | Kenya   | 4.18 | 0.7101         | 2.94   | 0.000 |
|   | Rwanda  | 1.24 | 0.6400         |  |       |
| Security of laptops and computers                                 | Kenya   | 4.35 | 0.6850         | 3.06   | 0.000 |
|   | Rwanda  | 1.29 | 0.8147         |  |       |
| Societal perceptions. Resistance to change                        | Kenya   | 2.88 | 1.6505         | 1.43   | 0.000 |
|   | Rwanda  | 1.45 | 1.0661         |  |       |
| Learners limited abilities  | Kenya   | 3.29 | 1.6462         | -0.82  | 0.000 |
|   | Rwanda  | 4.11 | 1.1720         |  |       |
| Lack of proper ICT policy   | Kenya   | 4.59 | 0.6034         | 0.37   | 0.017 |
|   | Rwanda  | 4.21 | 1.3097         |  |       |
| Insufficient laptops/ Computers for learners                      | Kenya   | 4.53 | 0.6092         | 1.04   | 0.000 |
|   | Rwanda  | 3.49 | 1.9017         |  |       |
| Lack of supporting infrastructure e.g. Electricity, Internet etc. | Kenya   | 4.53 | 0.9831         | 1.21   | 0.000 |
|   | Rwanda  | 3.31 | 1.8744         |  |       |

**Source: Research data, (2014)**



From the study findings, the Kenyan respondents perceived that computer breakdowns and system crashes such as hardware problems could be a challenge to a very great extent while the Rwanda counterparts perceived the challenge to be of great extent as shown by mean scores of 4.29 and 3.93 respectively. Software problems such as lack of proper learning software's was a perceived challenge to a great very great extent by the Kenyan counterparts as shown by mean of 4.41 while in Rwanda it was of less extent as a mean score of 1.85. Insufficient training of teachers was a challenge to a very great extent in Kenya as shown by mean of 4.53 while the Rwandan counterparts rated it to be of less extent as shown by mean of 1.35. These findings imply that teachers' training is still a challenge and hence concurs with Pelgrum (2002) who found out that lack of ICT-related knowledge of teachers was a major obstacle to the realization of their ICT-related goals in Africa. Lack of e-content was a perceived to be a challenge to great extent in Kenya and less extent as Rwanda as shown by mean scores of 4.18 and 1.24 respectively.

Security of laptops and computers was perceived to be a challenge in Kenya to a very great extent as shown by mean of 4.35 while in Rwanda; it was to a less extent as shown by mean score of 1.39. Societal perceptions such as resistance to change was a perceived to be a challenged to less extent in Kenya as indicate by mean of 2.88 while in Rwanda, it was to a less extent as indicated by mean of 1.45. Learners limited abilities was perceived to be a challenge in Kenya to a moderate extent as indicated by mean score of 3.29 while in Rwanda it was to a very great extent as indicated by mean of 4.11. The challenge of lack of proper ICT policy was to a very great extent in Kenya and in Rwanda as shown by means of 4.59 and 4.21 respectively. Insufficient laptops/Computers for learners were a challenge to a very great extent in Kenya and to a great extent in Rwanda as shown by mean of 4.53 and 3.49 respectively. Lack of supporting infrastructure e.g. Electricity, Internet etc. was a challenge to a very great extent in Kenya and of moderate extent in Rwanda as shown by means of 4.53 and 3.31 respectively. These finding of agree with Anderson (1997) lack of reliable access to electricity and limited technology infrastructure (especially internet access, bandwidth, hardware and software provision) are key challenges which face implementation ICT projects in developing countries.

Further, the study established that at 5% level of significance, there was significance difference in both countries on their ratings on challenges that were perceived by the respondents to be faced by teachers in using ICT in their schools as the obtained probability values were less than 0.05. The study further established that the challenges were higher in Kenya than in Rwanda as indicated by higher means in Kenya than in Rwanda except for the case of learner's limited abilities. This perception can mean a lot when it comes to analyzing the attitudes of the teachers from both regions in towards the success of the project. The researcher also noticed that other big challenges like the insecurity of the laptops in Kenya were never existent challenges in Rwanda.

#### **4.4.9 Computer Skills Rating**

The study required the respondents to rate their basic computer skills using the Likert scale of 1-5 with 1=No idea, 2= I know but very little 3=Average 4=Good and 5= Very good. Table 4.9 below tabulates the findings.

**Table 4.9: Computer Skills Rating**

|  | Country | Mean | Std. Deviation | Independent Samples T-Test for equality of means |       |
|--|---------|------|----------------|--|-------|
|  |         |      |                | Mean Difference                                  | Sig.  |
| Starting a computer  | Kenya   | 3.12 | 1.2384         | 0.31   | 0.179 |
|  | Rwanda  | 2.81 | 1.7247         |  |       |
| Using Microsoft word   | Kenya   | 3.12 | 1.2384         | 0.02   | 0.943 |
|  | Rwanda  | 3.10 | 1.7713         |  |       |
| Printing a document  | Kenya   | 3.06 | 1.4003         | 0.38   | 0.102 |
|  | Rwanda  | 2.67 | 1.6636         |  |       |
| Creating a new folder  | Kenya   | 3.12 | 1.4177         | 0.38   | 0.107 |
|  | Rwanda  | 2.74 | 1.6274         |  |       |
| Saving a document in a folder or directory   | Kenya   | 3.00 | 1.3801         | 0.27   | 0.255 |
|  | Rwanda  | 2.73 | 1.7107         |  |       |
| Browsing or Navigating through the search engine   | Kenya   | 2.00 | 1.3801         | 0.35   | 0.152 |
|  | Rwanda  | 1.65 | 1.7780         |  |       |
| Sending and receiving emails   | Kenya   | 2.88 | 1.4591         | 1.55   | 0.000 |
|  | Rwanda  | 1.34 | 0.9163         |  |       |
| Using various social medias i.e. Facebook, twitter, Skype etc.                             | Kenya   | 2.82 | 1.4324         | 1.46   | 0.000 |
|  | Rwanda  | 1.36 | 1.0362         |  |       |
| Use of formulas and perform calculations in Microsoft Excel                                | Kenya   | 1.82 | 1.4324         | 1.55   | 0.000 |
|  | Rwanda  | 1.27 | 0.9625         |  |       |
| Basic troubleshooting skills like restart, checking connection to power etc.               | Kenya   | 1.94 | 1.4003         | 1.74   | 0.000 |
|  | Rwanda  | 1.20 | 0.7860         |  |       |
| Advanced troubleshooting skills e.g. checking proxy settings for internet connections etc. | Kenya   | 1.22 | 1.4852         | 1.50   | 0.000 |
|  | Rwanda  | 1.17 | 0.9625         |  |       |
| Using keyboard shortcuts   | Kenya   | 1.08 | 1.2856         | 1.68   | 0.000 |
|  | Rwanda  | 1.02 | 0.7860         |  |       |

Source: Research data, (2014)

From the study findings, the respondents, both in Kenya and Rwanda rated their knowledge on starting a computer as average as shown by mean score of 3.12 and 2.81 respectively. The knowledge on the use of Microsoft word in both Kenyan and Rwandan respondents was moderate as shown by mean of 3.12 and 3.10 respectively.

Asked on their knowledge on printing a document, the Kenyan respondents indicated that their knowledge and skills were average as shown by mean of 3.06 while their Rwandan counterparts indicated that their knowledge was very little as shown by mean of 2.67. Knowledge on creating a new folder to the respondents in Kenya and Rwanda was average as shown by means of 3.12 and 2.74 respectively. Knowledge on saving a document in a folder or directory was average among the respondents in Kenya and Rwanda as shown by mean of 3.00 and 2.73 respectively. Knowledge on Browsing or Navigating through the search engine was average among the respondents in Kenya and Rwanda as shown by mean of 2.00 and 1.65 respectively. Knowledge on sending and receiving emails was average among the respondents in Kenya and very little in Rwanda as shown by mean of 2.88 and 1.34 respectively. Knowledge on using various social Medias i.e. Facebook, twitter, Skype etc. was average among the respondents in Kenya and Rwanda as shown by mean of 2.82 and 1.36 respectively. The respondents in Kenya had average knowledge on use of formulas and performing calculations in Microsoft Excel while the Rwanda counter parts had little ideas as shown by mean of 1.82 and 1.27 respectively. The respondents in both countries had little idea on Basic troubleshooting skills like restart, checking connection to power etc. as shown by mean of 1.94 and 1.20 in Kenya and Rwanda respectively. The respondents in both countries had little idea on Advanced troubleshooting skills e.g. checking proxy settings for internet connections etc. as shown by mean of 1.22 and 1.17 in Kenya and Rwanda respectively. The respondents in both countries had very little idea on using keyboard shortcuts as shown by mean of 1.08 and 1.02 Kenya and Rwanda respectively. This is as good as having no idea at all.

At 95% confidence level, there was significance difference in means on respondents skills and knowledge in both countries on Sending and receiving emails, Using various social medias i.e. Facebook, twitter, Skype etc., Use of formulas and perform calculations in Microsoft Excel, Basic troubleshooting skills like restart, checking connection to power etc., Advanced troubleshooting skills e.g. checking proxy settings for internet connections etc. and using keyboard shortcuts as indicated by Probability values of 0.000 in each case which was less than 0.05. The study findings established that there general skills and knowledge on usage of

computers was higher in Kenya than in Rwanda as shown by higher mean in Kenya. This is despite the project having been launched in 2008 in Rwanda.

This could be a reflection of the overall academic qualification of teachers in Kenya compared to their counterparts in Rwanda. The research also found out that the advanced computer skills like use of Access, excel and troubleshooting skills were almost zero in both countries. This conforms to Pelgrum (2002) that ICT-related knowledge of teachers is still low in developing countries.

#### 4.5 Ministry Official’s Information – Objective 2

##### 4.5.1 Years Served at the Ministry

The study sought to establish the period of time the respondents had worked at the Ministry. The findings are tabulated in table 4.10 below.

**Table 4.10: Years Served at the Ministry**

|                  | Kenya     |         | Rwanda    |         |
|------------------|-----------|---------|-----------|---------|
|                  | Frequency | Percent | Frequency | Percent |
| Less than 1 Year | 7         | 31.8    | 4         | 21      |
| 1- 5 years       | 6         | 27.3    | 11        | 57      |
| 6 - 10 years     | 4         | 18.2    | 4         | 21      |
| 11 - 15 years    | 2         | 9.1     | 0         | 0       |
| Over 15 years    | 3         | 13.6    | 0         | 0       |
| Total            | 22        | 100.0   | 19        | 100.0   |

Source: Research data, (2014)

From the study findings, Kenya’s majority (31.8%) of the respondents had been in service at the ministry of education for less than 1 year. Between 1 to 5 years 27.3%, 18.3% for 6 to 10 years, and 9.1% for 11 to 15 years while 13.6% for over 15 years. In Rwanda, majority of the respondents had been in the ministry for a period of 1 to 5 years as indicated in Table 4.10 by 57%, while those respondents who had been in the ministry for less than one year are 21%. 6 to 10 years were only 4 respondents which represent 21%. None of the respondents in Rwanda had been in the ministry for over 10 years. This means Rwanda’s team is much younger than their counterparts in Kenya had almost even distribution with majority being less than a year which can be explained by change of governments in 2013 which had some ministries merging.

## 4.6 Initial phase / planning phase

### 4.6.1 Laptop Project Initiation, Launch and Targeted Classes

Regarding laptop project initiation, Launch and targeted classes, the study findings established that in Kenya it was yet to be launched however the procurement process was underway and that the project targeted standard one pupil's in all public primary schools. *“First phase of the project in Kenya is aimed at providing 6,000 primary schools with over 425000 laptops”*, says one of the respondents in the MinEduc, Kenya. Another one says, *“The government of Kenya is the main funder of the project as the project has its origin from the Jubilee Coalition pre-election manifesto.”*

In Rwanda, the project was initiated in October 2007 whereby a trial was carried out in October and ended in November 2007 then launched in 2008 on September 5<sup>th</sup>. One of the respondents indicated that, *“the main funder of the project in Rwanda was the government and a few other donors like World Bank and UNESCO. The project has its origin to NICI-2010 plan in Rwanda”* The study established that after pilot in Rwanda, two products were competing namely the inter classmate and the Mobilia laptop but Rwanda government settled for OLPC OX from IBM

### 4.6.2 Pilot Project

The study sought to find out whether pilot project was conducted. The findings were presented in the table below.

**Table 4.11: Pilot Project**

|       | Kenya     |         | Rwanda    |         |
|-------|-----------|---------|-----------|---------|
|       | Frequency | Percent | Frequency | Percent |
| Yes   | 22        | 100.0   | 19        | 100.0   |
| Total | 22        | 100.0   | 19        | 100.0   |

Source: Research data, (2014)

According to the study findings, all (100.0%) the respondents from Kenya indicated that a pilot project was conducted same to their counterparts (100%) in Rwanda an implication that pilot project was carried in both countries prior to the initiation of the projects.

In Kenya, a pilot project was done at Our Lady of Mercy Primary School South B in Kenya's capital where they received 16 of these computers from the One Laptop per Child Initiative.

In Rwanda, the trial was conducted with 106 laptops. The trial involved 96 students at Rwamangama primary school. The projects targeted P4 to P6 students.

#### 4.6.3 Pilot Project Evaluation

The study further sought to establish if the pilot project evaluated. The findings are presented in the table below.

**Table 4.12: Pilot Project Evaluation**

|       | Kenya     |         | Rwanda    |         |
|-------|-----------|---------|-----------|---------|
|       | Frequency | Percent | Frequency | Percent |
| Yes   | 22        | 100.0   | 19        | 100.0   |
| Total | 22        | 100.0   | 19        | 100.0   |

Source: Research data, (2014)

From the study findings, the study established that the pilot project in both Kenya and Rwanda was evaluated as indicated by all (100.0%) the respondents in both countries respectively. in Rwanda, core team was formed in order to carry out the evaluation.

#### 4.6.4 Benchmarking

The study sought to establish whether the Ministry did a prior benchmark on difficulties/possibilities in other countries that were already running the laptops for school children project. The secretary to the Laptop project sub-committee in the Ministry of Education in Kenya mentioned that, *“indeed a bench mark was done with the government officials visiting Rwanda to look at how the implementation had been done.”*

On the other hand, the coordinator of the REB Rwanda, mentioned that, *“the country then could not do a bench mark with any other country as there was none to bench mark with as we were the first to launch the project in the region”*

#### 4.6.5 Training of Teachers on the ICT Skills

The study inquired from the respondents on whether the Ministry of Education trained the teachers on the ICT skills and how to use the laptops.

For Kenya, the secretary to the Laptop’s caucus committee, indicated that, *“the Ministry of Education trained the teachers on the ICT skills and how to use the laptops since October 2013. This is done by a team under the ministry of education and there is a training plan that will see more teacher get trained in the near future”*

In Rwanda, the researcher established that indeed training of teachers was done by a core team under Rwanda education ministry and it started in 2008.

#### 4.6.6 Framework for Implementing Laptop Project

The study further inquired on whether there was any developed framework that the ministry was following in implementing the project. The findings are presented in the table below.

**Table 4.13: Framework for Implementing Laptop Project**

|       | Kenya     |         | Rwanda    |         |
|-------|-----------|---------|-----------|---------|
|       | Frequency | Percent | Frequency | Percent |
| Yes   | 22        | 100.0   | 19        | 100.0   |
| Total | 22        | 100.0   | 19        | 100.0   |

Source: Research data, (2014)

The study findings revealed that there was framework for implementing laptop project in Kenya as indicated by all (100.0%) the respondents same as in Rwanda. The framework that was followed by Rwanda was the Technological Transfers framework which was based on research in developing countries as developed by IBM Based OLPC organization. As described by the REB Coordinator, *“the framework was adopted because of low cost, low power connected laptops with contents and software designed for collaborative, self-empowerment learning”*.

In Kenya’s approach, *“it was based on Specially Permitted Procedure where the legislature formulates an act of parliament, which permits the ministry of education to carry out a tender in order to arrive at the selected bidder. The bidder would then deliver and support in deployment”*, as described by the secretary to the Laptop caucus committee under the ministry of education.

#### 4.6.7 Statements on the Pilot Project

The study sought to establish the respondents’ level of agreement or disagreement with the following statements on the Pilot project. A scale of 1-5 whereby: 1= strongly disagree,



2=Disagree 3=Neutral, 4=Agree, 5=strongly agree was provided. The findings were presented in the table below.

**Table 4.14: Statements on the Pilot Project**

|   | Country | Mean | Std. Deviation | Independent Samples Test for equality of means |       |
|---|---------|------|----------------|--|-------|
|   |         |      |                | Mean Difference                                | Sig.  |
| Pilot project was very helpful in understanding the project needs   | Kenya   | 4.23 | 0.7516         | -0.14  | 0.675 |
|   | Rwanda  | 4.37 | 1.3421         |  |       |
| Prior evaluation was done on ICT technical preparedness within schools?   | Kenya   | 4.41 | 0.6661         | -0.38  | 0.069 |
|   | Rwanda  | 4.79 | 0.6306         |  |       |
| During the technical preparedness evaluation, common problems in ICT project implementation practice was considered e.g. Lack of sufficient supporting infrastructure | Kenya   | 4.27 | 0.6311         | -0.15  | 0.638 |
|   | Rwanda  | 4.42 | 1.3045         |  |       |
| Pilot project and initial assessment were key considerations in making the decision on the viability of the project   | Kenya   | 4.27 | 0.9847         | 1.17   | 0.013 |
|   | Rwanda  | 3.11 | 1.8225         |  |       |
| There were many problems with the laptops during the pilot phase including system crashes, breakdowns   | Kenya   | 1.18 | 0.3948         | -2.08  | 0.000 |
|   | Rwanda  | 3.26 | 0.6534         |  |       |
| Teachers ICT skills capacity was considered at initial phase, and the process of teacher training started immediately   | Kenya   | 3.82 | 1.1807         | -0.66  | 0.051 |
|   | Rwanda  | 4.47 | 0.8412         |  |       |
| There was a legislative law passed in parliament before the project was started   | Kenya   | 1.27 | 0.4558         | -0.15  | 0.610 |
|   | Rwanda  | 1.42 | 1.2612         |  |       |
| Government got funding from international donors in order to run the project  | Kenya   | 4.32 | 0.4767         | 1.53   | 0.000 |
|   | Rwanda  | 2.79 | 1.1343         |  |       |

Source: Research data, (2014)

From the study the respondents strongly agreed that Pilot project was very helpful in understanding the project needs as shown by mean of 4.23 and 4.37 in Kenya and Rwanda respectively. With regard to whether Prior evaluation was done on ICT technical preparedness within schools, the respondents strongly agreed as shown by mean score of 4.41 and 4.79 in Kenya and Rwanda respectively.

On whether during the technical preparedness evaluation, common problems in ICT project implementation practice was considered e.g. Lack of sufficient supporting infrastructure, the respondents strongly agreed as shown by mean score of 4.27 and 4.42 in Kenya and Rwanda respectively. Regarding whether, pilot project and initial assessment were key considerations in making the decision on the viability of the project, the Kenyan respondents strongly agreed as shown by a mean score of 4.27 while their counterparts in Rwanda were neutral as shown by mean score of 3.11. On whether there were many problems with the laptops during the pilot phase including system crashes, breakdowns, the respondents from Kenya disagreed shown by a mean score of 1.18 while their counterparts in Rwanda were neutral as shown by mean score of 3.28. The respondents in Kenya agreed that Teachers ICT skills capacity was considered at initial phase, and the process of teacher training started immediately as shown by a mean score of 3.82 while the respondent in Rwanda strongly agreed as shown by mean score of 4.47. Regarding whether there was a legislative law passed in parliament before the project was started; the respondents disagreed as shown by a mean score of 1.27 and 1.42 in Kenya and Rwanda Respectively. The respondents in Kenya strongly agreed that Government got funding from international donors in order to run the project as shown by a mean score of 4.32 while their counterparts from Rwanda were neutral as shown by a mean score of 2.79. The study established that the problems identified during pilot phase such as training of teachers, content and needs were evaluated by the core team formed.

At 5% level of significance, there was significant difference on the levels of agreement from respondents on both countries on whether there were many problems with the laptops during the pilot phase including system crashes, breakdowns and whether Government got funding from international donors in order to run the project as indicated by probability values of 0.000 in each case which was less than 0.05.

#### **4.7 Vendor selection/ Acquisition/ Deployment**

##### **4.7.1 Tendering Process**

The study sought to establish whether there was a tendering process to select the successful vendor.

The study findings established that the successful bidder considered in Kenya was India's Olive Telecom PVT for the reasons that it was the cheapest bidder; however this tender was cancelled again on 11<sup>th</sup> March by the Public Procurement Administrative Review Board. The board said its decision was informed by the fact that Olive Technologies lacked financial ability to carry out the project.

In Rwanda, the successful bidder considered was the IBM based OLPC International for the reasons that it was cheaper as it used OX technology but some of the officials were not sure whether a tender was done or it was only awarded based on its donor-subsidized abilities

#### 4.7.2 Statements on the Project Implementation Process

The study sought to establish the respondents' level of level of agreement or disagreement with the following statements on the Project implementation process. A scale of 1-5 scale rating whereby: 1= strongly disagree, 2=Disagree 3=Neutral, 4=Agree, 5=strongly agree was provided. The findings are presented in the table below.

**Table 4.15: Statements on the Project implementation process**

| Statements   | Country | Mean | Std. Deviation | Independent Samples Test for equality of means |       |
|--|---------|------|----------------|--|-------|
|  |         |      |                | Mean Difference                                | Sig.  |
| The Bidders provided the sample before being awarded the tender  | Kenya   | 4.05 | 0.8439         | -0.74  | 0.010 |
|  | Rwanda  | 4.79 | 0.9177         |  |       |
| The shortlisted vendors had their business units visited by officials of the Ministry to inspect their capability to provide the laptops | Kenya   | 4.05 | 0.7223         | 3.05   | 0.000 |
|  | Rwanda  | 1.00 | 0.0000         |  |       |
| Cost amounts were considered in vendor selection   | Kenya   | 4.82 | 0.3948         | -0.18  | 0.052 |
|  | Rwanda  | 5.00 | 0.0000         |  |       |
| The successful bidder would deliver the laptop and also provide the support team for deployment  | Kenya   | 3.77 | 0.6119         | -1.02  | 0.000 |
|  | Rwanda  | 4.79 | 0.6306         |  |       |
| Ministry got involved in the LAPTOP project from the start   | Kenya   | 4.50 | 1.1852         | -0.39  | 0.180 |
|  | Rwanda  | 4.89 | 0.4588         |  |       |
| Government legislature was involved in decision making on the supplier choice  | Kenya   | 4.77 | 0.4289         | 3.67   | 0.000 |
|  | Rwanda  | 1.11 | 0.3153         |  |       |

| Statements  | Country | Mean | Std. Deviation | Independent Samples Test for equality of means |       |
|---|---------|------|----------------|--|-------|
|   |         |      |                | Mean Difference                                | Sig.  |
| The delivery of laptops where done in phases in relation to the expansion plan                                | Kenya   | 1.32 | 0.4767         | -3.16  | 0.000 |
|   | Rwanda  | 4.47 | 1.2635         |  |       |
| A special department was established under the ministry to look into the laptops project only                 | Kenya   | 3.00 | 0.6172         | -2.00  | 0.000 |
|   | Rwanda  | 5.00 | 0.0000         |  |       |
| The software upgrades, reinstalls, updates, software issues etc., would be organized by the Successful bidder | Kenya   | 3.23 | 1.1519         | -1.35  | 0.001 |
|   | Rwanda  | 4.58 | 1.2612         |  |       |
| Schools in Rural Kenya have Internet access   | Kenya   | 1.00 | 0.0000         | -0.21  | 0.125 |
|   | Rwanda  | 1.21 | 0.6306         |  |       |
| Schools in Rural Kenya have access to electricity   | Kenya   | 1.18 | 0.3948         | -0.87  | 0.013 |
|   | Rwanda  | 2.05 | 1.5083         |  |       |
| The launch of the project greatly led to the increase in coverage of electricity in the country               | Kenya   | 1.82 | 1.1396         | -2.97  | 0.000 |
|   | Rwanda  | 4.79 | 0.4189         |  |       |
| Ministry of ICT and Finance were involved from the initial phase  | Kenya   | 4.27 | 1.3864         | 0.33   | 0.501 |
|   | Rwanda  | 3.95 | 1.6824         |  |       |
| There are annual reviews on the project progress  | Kenya   | 1.36 | 0.6580         | -3.58  | 0.000 |
|   | Rwanda  | 4.95 | 0.2294         |  |       |
| A number of alternative technologies were considered  | Kenya   | 3.00 | 0.0000         | -0.74  | 0.060 |
|   | Rwanda  | 3.74 | 1.7902         |  |       |
| Power and electricity expansion follows on the laptop deployment plan   | Kenya   | 3.64 | 0.4924         | -0.63  | 0.052 |
|   | Rwanda  | 4.26 | 1.3680         |  |       |
| Power connection is already distributed to over 50% public primary schools of Kenya                           | Kenya   | 1.09 | 0.2942         | -0.33  | 0.240 |
|   | Rwanda  | 1.42 | 1.2612         |  |       |
| In areas that do not have electricity, the solar panels will/ has been used                                   | Kenya   | 3.82 | 0.5885         | -1.18  | 0.000 |
|   | Rwanda  | 5.00 | 0.0000         |  |       |
| There is a learning team branch within the ministry whose work is to train teachers                           | Kenya   | 3.41 | 0.5032         | -1.59  | 0.000 |
|   | Rwanda  | 5.00 | 0.0000         |  |       |
| In your opinion, the project objectives has been achieved so far  | Kenya   | 2.00 | 0.4364         | -3.00  | 0.000 |
|   | Rwanda  | 5.00 | 0.0000         |  |       |

Source: Research data, (2014)

On whether the Bidders provided the sample before being awarded the tender, the respondents strongly agreed as shown by mean score of 4.05 and 4.79 in Kenya and Rwanda respectively. The respondents in Kenya strongly agreed that the shortlisted vendors had their business units visited by officials of the Ministry to inspect their capability to provide the laptops as shown by mean score of 4.05 while their counterparts from Rwanda disagrees as shown by mean score of 1.00. The respondents further strongly agreed that cost amounts were considered in vendor selection as shown by mean score of 4.82 and 5.00 in Kenya and Rwanda respectively. Asked on whether the successful bidder would deliver the laptop and also provide the support team for deployment, the respondents in Kenya agreed as shown by mean of 3.77 while their counterparts in Rwanda strongly agreed as shown by mean of 4.79.

Asked further on whether the Ministry got involved in the laptop project from the start, the respondents strongly agreed as shown by mean scores of 4.50 and 4.89 in Kenya and Rwanda respectively. The respondents in Kenya strongly agreed that the budgeting process was collaboration between ministry of Finance and ministry of Education as shown by mean of 4.68 while their Rwanda counterparts were neutral as shown by mean of 2.89. Asked on whether Government legislature was involved in decision making on the supplier choice, the Kenyan respondents strongly agreed as shown by mean of 4.77 while those from Rwanda disagreed as shown by mean of 1.11. Further, asked on whether the delivery of laptops were done in phases in relation to the expansion plan the respondents in Kenya disagreed as shown by mean of 1.32 while the Rwanda respondents strongly agreed as shown by mean of 4.47.

The respondents in Kenya were neutral that a special department was established under the ministry to look into the laptops project only shown by mean of 3.00 while those from Rwanda strongly agreed as shown by mean of 5.00. Asked on whether the software upgrades, reinstalls, updates, software issues etc., would be organized by the Successful bidder, the respondents in Kenya strongly were neutral while their counterparts in Rwanda strongly agreed as shown by mean of 3.23 and 4.58 respectively. Asked further whether the Schools in Rural Kenya had Internet access, the respondents strongly disagreed as shown by means of 1.00 and 1.21 in Kenya and Rwanda respectively. The respondents further disagreed that schools in rural areas had

access to electricity as shown by mean of 1.18 and 2.05 in Kenya and Rwanda respectively. On whether the launch of the project greatly led to the increase in coverage of electricity in the country, the Kenyan respondents were neutral as shown by mean of 2.81 while their counterpart in Rwanda strongly agreed as shown by mean of 4.79.

Asked if the support team operated in all schools, the respondents in Kenya disagreed while those in Rwanda strongly agreed as shown by means of 1.91 and 5.00 in Kenya and Rwanda respectively. The Kenyan ministry respondents' strongly agreed that the Ministry of ICT and Finance were involved from the initial phase while the Rwanda counterparts agreed as shown by means of 4.27 and 3.94 respectively. The respondents from Kenya disagreed that there are annual reviews on the project progress which was contrary to their counterparts in Rwanda who strongly agrees as shown by means of 1.36 and 4.94 respectively. Asked whether a number of alternative technologies were considered, the Kenyan respondents were neutral while their counterpart from Rwanda agreed as shown by means of 3.00 and 3.73 respectively. Asked further on whether power and electricity expansion followed on the laptop deployment plan the respondents agreed as shown by means of 3.64 and 4.26 in Kenya and Rwanda respectively. The respondents strongly disagreed with the statement that power connection was already distributed to over 50% public primary schools of their counties as shown by means of 1.09 and 1.42 in Kenya and Rwanda respectively.

Asked if in areas that do not have electricity, the solar panels would/ has been used the respondents in Kenya agreed while those in Rwanda strongly agreed as shown by mean of 3.82 and 5.00 respectively. The respondents in Kenya further agreed that there was a learning team branch within the ministry whose work is to train teachers while their counterparts in Rwanda strongly agreed as shown by means of 3.41 and 5.00 respectively. The respondents in Kenya disagreed that the project objectives has been achieved so far while those in Rwanda strongly agreed as shown by means of 2.00 and 5.00 respectively. In Rwanda, team called core teams was formed to handle the challenges arising during pilot project.

The difference in means was tested at 5% level of significance whereby the study established that the responses from the respondents from both countries with regard to the statements on

project implementation process were significantly different as indicated by probability values of less than 0.05 with the exception of responses on whether; a number of alternative technologies were considered, Power and electricity expansion follows on the laptop deployment plan and whether Power connection was already distributed to over 50% public primary schools whereby the probability values computed were greater than 0.05.

#### 4.7.3 ICT Project Challenges Influence

The study sought to establish the respondents rating on the influence of the following ICT project challenges in laptop. The scale of 1 to 5 whereby: 1= No effect; 2=Less Extent; 3=Moderate extent; 4= Great extent; 5= Very great extent (Halted the project) was provided.

**Table 4.16: ICT Project Challenges Influence**

|  | Country | Mean | Std. Deviation | Independent Samples T-Test for equality of means |       |
|--|---------|------|----------------|--|-------|
|  |         |      |                | Mean Difference                                  | Sig.  |
| Financial challenges                                   | Kenya   | 4.55 | 0.6710         | -0.24  | 0.178 |
|  | Rwanda  | 4.79 | 0.4189         |  |       |
| Human resources i.e. Capability challenges             | Kenya   | 4.55 | 0.6710         | -0.24  | 0.178 |
|  | Rwanda  | 4.79 | 0.4189         |  |       |
| Environmental challenges i.e. Accessibility to schools | Kenya   | 3.55 | 1.0568         | 2.12   | 0.000 |
|  | Rwanda  | 1.42 | 0.9612         |  |       |
| Time constraints                                       | Kenya   | 2.00 | 0.8165         | 0.79   | 0.001 |
|  | Rwanda  | 1.21 | 0.6306         |  |       |
| Infrastructure challenges e.g. Electricity             | Kenya   | 5.00 | 0.0000         | 0.58   | .001. |
|  | Rwanda  | 4.42 | 0.7685         |  |       |
| Conservative Societal perceptions                      | Kenya   | 1.55 | 0.5097         | 0.55   | 0.000 |
|  | Rwanda  | 1.00 | 0.0000         |  |       |
| Lack of vision and strategy                            | Kenya   | 1.82 | 0.3948         | 0.82   | 0.000 |
|  | Rwanda  | 1.00 | 0.0000         |  |       |
| Government support                                     | Kenya   | 3.45 | 1.0108         | 2.45   | 0.000 |
|  | Rwanda  | 1.00 | 0.0000         |  |       |
| Insecurity of the laptops                              | Kenya   | 4.27 | 0.8270         | 3.17   | 0.000 |
|  | Rwanda  | 1.11 | 0.3153         |  |       |

Source: Research data, (2014)

From the study findings the respondents indicated that the influence of financial challenges was to very great extent as shown by mean scores of 4.55 and 4.78 in Kenya and Rwanda respectively. Human resources i.e. Capability challenges was rated by respondents to have influence on project implementation to a very great extent as shown by mean score of 4.55 and 4.78 in Kenya and Rwanda respectively. The respondents further rated Environmental challenges i.e. Accessibility to schools to have no effect on the project as shown by mean score of 1.55 and 1.42 in Kenya and Rwanda respectively. Time constraints were of no effect on the project as shown by mean score of 2.00 and 1.21 in Kenya and Rwanda respectively. The respondents rated Infrastructure challenges e.g. Electricity to have influence on the project to a very great extent as shown by mean of 5.00 and 4.42 in Kenya and Rwanda respectively.

Conservative Societal perceptions were of no effect on the project as shown by mean score of 1.55 and 1.00 in Kenya and Rwanda respectively. The study further established that Lack of vision and strategy was of no effect on the project as shown by mean score of 1.82 and 1.00 in Kenya and Rwanda respectively. Government support had an influence on the project to moderate extent in Kenya as shown by mean score of 3.45 while in Rwanda; it had no effect as shown by mean score of 1.00. The findings established that Insecurity of the laptops in Kenya had influence on the project to a very great extent as shown by mean of 4.27 while in Rwanda; it was of no effect as shown by mean score of 1.10. The finding of this study on the existence of the above problems in both Kenya and Rwanda conform with Anderson (1997) and Hennessy & Onguko (forthcoming) who identified a range of physical and cultural factors that affect ICT use by teachers in developing countries, including lack of reliable access to electricity, limited technology infrastructure (especially internet access, bandwidth, hardware and software provision), language of instruction and available software; geographical factors such as country size, terrain and communications; demographic factors such as population size, density and dispersion.

At 5% level of significance, there was significance difference in responses regarding the ICT Project challenges as indicated by computed probability values which were less than 0.05 with



the exception of responses on financial challenges and Human resources i.e. Capability challenges.

#### **4.7.4 ICT Project Stakeholders**

According to one of the officers in the ministry of education Kenya, *“the project stakeholders in Kenya are the Ministry of education, Laptop caucus committee, representatives from the Ministry of Finance and Ministry of ICT, teachers and the pupils”*. In Rwanda, as indicated in the Ministry of Education charter on ICT, 2010, the stakeholders are the ministry of education who are the Rwanda Education Board (REB) which is housed under the ministry of Education, Core team which is responsible for training and support, Rwanda development board – IT (RDB-IT) that are in charge of ICT policies, OLPC international who are the suppliers, the teachers and the Pupils.

#### **4.7.5 Country Overall Statistics Relating to the Project**

In the data collected from both ministry of Education Kenya and Ministry of Education Rwanda, Kenya has 21,222 public primary schools while in Rwanda there are 2413 public primary schools with an enrolment of 2,394,674 children. The study found out that in Kenya, no school had so far been reached so far in laptop project as it was is still in the procurement phases. In Rwanda, 407 schools had been reached by the laptop project. The study findings established that in Kenya, no laptops have been distributed to schools so far. In Rwanda, the study established that 207,026 laptops had so far been distributed. The study established that the target deployments per year in Rwanda were 120,000 with projections of 1,000,000 laptops by year 2017.

In Kenya only 10,157 schools countrywide are connected to electricity. The Rural Electrification Authority (REA), tasked with ensuring power connectivity all over the country, has reported that it has only managed 48 per cent connections for schools. In Rwanda, 25% (603) schools are connected to power while 3% (72) schools had access to internet. The study established that there were 37967 primary school teachers in Rwanda of which 27% (10,251) had been trained so far. While in Kenya, 150,000 teachers had been trained by March 2014.

## **4.8 Project Implementation Process in Rwanda**

This section will chronologically describe a sequence of key events that the OLPC project has gone through in Rwanda as captured in the research findings. The chronological approach is divided into phases also conceptualized in the conceptual framework

### **4.8.1: Phase 1: Initiation and Technology selection**

#### **4.8.1.1 Initiation**

*“The long-term ICT development plan NICI-2010 was very important in making the OLPC Rwanda project a reality”*, the secretary to the REB mentioned when we asked him about how the project was initiated.

In the NICI\_2010 plan the Rwandan government set up a goal to increase the number of computers in both primary and secondary school. Amongst other, a project named School Net was presented with an objective to increase the computer labs in secondary schools. For primary schools, however, it should be noted that no projects were in plan for introducing computers to the students.

#### **4.8.1.2 Hardware and Software Considerations**

The first model to be used and tested by Rwanda was an experimental model of the XO-B2 laptop. Kagame accepted this and delegated the responsibility of testing to RITA (today called RBD-IT). *“At this stage, the project can be considered officially initiated, with RITA acting as the initial owner. RITA decided that the 106 laptops of the XO-B2 model were to be evaluated in a trial at one primary school.”* Says one of the officials in REB

### **4.8.2 Phase 2: Model and Vendor selection**

#### **4.8.2.1 Donor Considerations:**

Donor considerations were a key decision point in the selection of the supplier in Rwanda. In early 2007, shortly after the NICI-report was published, the Rwandan president Paul Kagame met with the OLPC founder and president Nicolas Negroponte in Kigali. Negroponte summoned the meeting to discuss the possibility for Rwanda to join the OLPC project and thus agree to the

distribution of laptops to all primary school students in the country. At the event, the OLPC association pledged to fundraise for a shipment of 10,000 laptops through an OLPC initiated program called give-one-get-one (G1G1). Kagame demonstrated interest, and a contract for an additional shipment of 110,000 laptops was signed shortly after. The Rwandan government was, while waiting for the shipment, offered to conduct trial on 106 laptops.

#### **4.8.2.2 History of Deployments and Capability**

OLPC got an advantage over other competitors in Rwanda mainly because of their successful history in conducting the trial phase. The findings further show that when the contract was signed there were at least two other competing products in the market, the Intel Classmate and the Mobilis laptop. An officer in RDB says, *“Classmate and Mobilis did not, however, approach RITA with an offer to conduct trials and therefore were not evaluated. Due to this lack of interest and evaluation, the government never considered them an alternative to OLPC.”*

At approximately the same time, the government of Brazil used a different strategy. They started an ICT project called *Um Computador Por Alun* (One Computer per Child) and selected five schools for laptop trials. Two received OLPC laptops, two received Intel Classmates and one received Mobilis laptops. After two years of testing and evaluation, the government announced the purchase of 150,000 Mobilis laptops in January 2009. A similar strategy was used by the government of Uruguay. They chose to be the first country to make a bulk order of OLPC laptops, after a public bidding process also involving the Intel Classmate.

#### **4.8.2.3 Tendering Process**

*“Rwanda government did not carry out an official tendering process to choose its supplier.”* Secretary to REB clarifies. Researcher found out that the things began to move faster once the initial testing phase was over, and since OLPC origination were handling the trial phase, and the government was satisfied on its ability to deliver, on the fifth of September 2008, the Minister of Education officially launched the OLPC program, with OLPC as its supplier. In connection with this, the government of Rwanda decided that laptops would be distributed to all primary schools in the country. Once suitable schools had been selected, the deployments began.

### **4.8.3. Phase 3: Deployment and Continuance Phase**

#### **4.8.3.1 Method and Time of Deployment**

*“Rwanda government first decided to carry out a pilot project as a roll out plan”.* Says the REB official, *“The main intention was to “test the device, more than to learn how to deploy and use it in education. A secondary aim was to identify the requirements of the project before a large scale deployment was made to all primary schools.<sup>81</sup> The school selected for the trial was Rwamangana primary school in the eastern province of Rwanda. The trial involved 96 students in level five and four teachers. It started with a training session that was conducted ten days before the deployment.”* It later emerged that the team performing the training sat down with the teachers and students, focusing on basic functions such as “switching on, switch off, and going from one activity to another, nothing deep.” The trial came to a halt on 22nd November 2007

#### **4.8.3.2 Support Infrastructure**

From the trail phase, RDB says *“We noted that the teachers needed a great deal of support in how to use the laptop in the classroom. It was also noted that due to the lack of support, the kids were playing around with the laptops themselves; teachers not being present to supervise the use. This can be contrasted with the teachers who did not use the laptops at all.”* Also, in the maintenance section, a number of problems were registered: Software that malfunctioned and froze Internet bandwidth that was too low, “jumping” mouse pointers (due to malfunction in the mouse pad) and break-downs in the mesh network. This was, however, explained by OLPC as being due to the laptop model yet not being ready for serial production.

To evaluate which schools were suitable for the initial expansion of the project, a survey was conducted throughout all primary schools in Rwanda. For any school interested in receiving laptops, a basic criterion was the availability of electricity. With Rwanda’s electrical infrastructure reaching only six percent (6%) of the population by 2008, this severely prohibited the deployments to rural schools. The criterion of electricity as a must-have caused some controversy; complaints were heard that the project is too focused on urban Kigali, thus not reaching the intended general public of all primary schools. Internet coverage, however, has not

been declared vital by Ministry of Education and does not prohibit deployment. As of 2009, only one public primary school had connection to the Internet

#### **4.8.3.3 Teacher Training**

From the pilot project, RITA official says, *“We realized that the teachers would need ongoing support on all locations where the laptops were being deployed. This need for long-term support was acknowledged and formalized in the establishment of the core team, which was created to serve as a full-time maintenance function. There had been a group composed for the deployment during the trial, with the purpose to train the teachers in laptop usage before the initial deployment. However, with this formalization of the core team, their duties were extended. It now also included post-deployment support; to go to schools and help teachers in person”*

The project coordinator simply explains that *“teachers in our schools must adapt to this new way of teaching. To prepare for the adaption process, the core team conducts a three week long pre-deployment training with every teacher involved in the project. The training includes both general computer skills and guidance on how to use the software effectively in the classroom. A possible problem with the pre-deployment training is the delay between the training and the deployment. Training sessions are being held with teachers from many different schools simultaneously, where some of them will start using the laptops directly while others have to wait for several weeks until the deployment starts at their school. Once the deployment is done, the teachers are kept up-to-date on the laptops by continuous training. This training is performed during the semester as well as during some holidays.”*

From the records obtained, researcher realized that during the time of introductory training, one teacher is also selected and trained as a local technician for the school. His responsibilities include being a representative for the school in technical matters. Any teacher who has a problem with the laptop can get in contact with the representative to resolve the problem. However, if the problem not can be resolved locally, it will be escalated to the core team for further assistance.

His responsibilities include being a representative for the school in technical matters. Any teacher who has a problem with the laptop can get in contact with the representative to resolve

the problem. However, if the problem not can be resolved locally, it will be escalated to the core team for further assistance.

*“To help with the training of teachers”, MinEduc officer says, “a hundred volunteers were also been recruited from computer science programs around Kigali. As part of their community attachment (obligatory community service), they are first taught in the basics of the laptop and then sent to schools in their area to help with training. In the future, there is also a plan for these volunteers to handle basic maintenance of the laptop since the current budget does not cover an enlargement of the core team. Depending on the current need of the school, a group of student specialized in either training or maintenance can help out. However, this initiative has also faced some problems; some of the volunteers have not attended training due to the school they are supposed to help being too far away, some never showed up at all and yet some said it is too expensive to get there”*

#### **4.8.3.4 The Continuance Phase**

Continuance is about maintaining the laptops and keeping the schools including the teachers up to date in how to use them. This responsibility falls under the core team, which MinEduc is financially responsible for.

A core team member says, *“Our main objective is to keep the laptops in working condition, in other words, have them functioning in terms of both software and hardware. To achieve this, the core team conducts a technical survey every one to two months. The survey takes place country-wide and aims to grasp any problem the teachers may have encountered during the time of usage. Issues are registered and taken care of; they usually revolve around lack of training or broken laptops. If the laptop has a hardware failure it is taken back to the repair center where spare parts from other broken laptops are used for substituting the malfunctioning part.”* Initially, a failure rate of four percent was set as a maximum and according to the core team coordinator, this goal been achieved with the fail rate being around

A ministry official notes that, *“Rwanda is one of the first countries to acquire the OLPC technology. This makes it difficult to learn from other deployment experiences in terms of how to expand and develop the project.”*

The policy document Economic development and poverty reduction strategy 2008-2012 states a their goal was that by 2012, fifty percent of all primary school students will have access to OLPC laptops which was not achieved

However, an official at the MinEduc explains, *“The government is injecting around 100,000 new laptops every year to expand the project. In an interaction with the RDB-IT official, it appears like the aim of full saturation surely will be reached and that the students and teachers are well aware that they will receive laptops at some point”*

#### **4.9 Project Implementation Process in Kenya**

The section will chronologically describe a sequence of key events that the Laptops for School children project have gone through in Kenya. The three sections are initiation, vendor selection and deployment. It’s only some elements of deployment that has been done including infrastructural preparations and teacher trainings.

##### **4.9.1: Project Initiation and technology selection**

###### **4.9.1.1 Initiation**

The researcher found out, that the history of Kenya’s laptop project had its genesis to 2013 presidential campaigns. It was part of the Jubilee coalition pre-election manifesto, that would see all class one going kids being given laptops from January 2014. The jubilee coalition won the elections, and quickly embarked on plans to making this promise a reality.

###### **4.9.1.2 Cost and Infrastructural Factors**

*“In June 2013, the Cabinet approved a Sh15. 3 billion budget to implement the first three phases of the project aimed at providing 6,000 primary schools with laptops. The entire project was estimated to cost some Sh75 billion and to target over 1.3 million pupils in public primary schools”*. A government official at the Ministry of Education says. He also indicates that some 425,000 pupils will be the first beneficiaries.

The initial plan by the ministry was to have the gadgets be sent to schools by December 2013 about one month ahead of the first school term in 2014; however this did not see light due to failed tendering processes. Then the second and third phase batch was to have 7,000 schools targeted for the second and third year respectively.

## **4.9.2. Vendor Selection**

### **4.9.2.1 Tendering Processes and Laws**

From the retrieved newspaper advert, it emerged that the ministry advertised an International Tender on 2<sup>nd</sup> August 2013, for procurement of 1.3 million laptops, 20,367 projectors and 20,367 printers for the schools, which was to be purchased before the end of the first quarter in 2014.

The findings show that a total of 126 firms bought the bid document, out of which only 20 returned the tender bids and only three met the technical specifications, however all the quoted tender bids were considered high by the ministry. The lowest bidder quoted a price of KSh32 billion (US\$ 376m) against an anticipated budget of KSh12 billion, creating a deficit of KSh20 billion. HP Commercial was the lowest bidder quoting KSh32 billion, with a unit price of KSh23000 which was almost double what the government had budgeted for, while Chinese company Huawei PTE Ltd was the highest bidder, quoting KSh60.5 billion. Some of the other firms included in the tendering process were Samsung Electronics, Symphony Technologies, Haier Technologies, ZTE Corporation and Telkom Kenya. There was also a concern that the bidders may have collaborated to hike the prices.

The Ministry therefore found it prudent to terminate the tender in accordance with the provisions of the Public Procurement and Disposal Act of 2005.

The second bid was advertised on October 30, 2013, and the international competitive bidding process closed on November 21 2013 with the final negotiations with all the bidders closing on December 10



By January 2014, the government had shortlisted three firms, with China's Haier Electrical Appliances Corporation quoting the highest at KSh24 billion (US\$278 million), Hewlett Packard (HP) quoting KSh23 billion (US\$266 million) and Indian device manufacturer Olive Telecommunications quoting KSh22 billion (US\$254 million).

On Feb 7th 2014, the Education Ministry awarded Olive Telecommunications PVT Limited the tender for supply of laptops to public primary schools at a cost of Sh24.6billion. The ministry confirmed that indeed this was the lowest bidder compared to Haier Electrical Appliances Corporation Limited and Hewlett-Packard, HP who were also shortlisted. As a result of this, Ministry official says the government saved about Sh8billion compared to the previous cancelled tender which quoted at Sh32 billion.

The Olive Telecommunications PVT Limited was expected to distribute 425,000 laptops to 6000 selected schools in the first batch before the end of March 2014.

On March 11 2014, the Sh24.6 billion tender that had been awarded to Olive Telecommunications PVT Limited was cancelled again. The Public Procurement Administrative Review Board cancelled the tender award. In a ruling made the board, they reversed the tender and ordered the procurement committee to retender within 45 days. The board said its decision was informed by the fact that Olive Technologies lacked financial ability to carry out the project.

The Public Procurement Administrative Review Board ruled that Olive Telecommunications Pvt Limited did not win the tender fairly as the probe unearthed irregular dealings and found the Indian firm was favored. Olive, which was awarded the tender by the Ministry of Education, Science and Technology, did not have the financial capability to supply the 1.2 million gadgets. The board said the annual turnover of the firm between 2010 and 2012 was between Sh6 million and Sh768 million, which was below the Sh8 billion minimum required for supply of the gadgets.

The board also found that Olive had received preferential treatment. Information on feedback on the progress of tendering was not the same to all bidders as Olive obtained more detailed

information. It was also determined that the committee that awarded the tender to Olive did not consider the fact that the last quotations had been altered from the initial asking price, contrary to the Procurement Act. The Board also found out that Olive was not in a joint venture with another Chinese firm, as they submitted to the review board.

The Ministry of Education had to undertake a fresh re tendering and complete the entire process within a period of 45 days. The process was not yet complete by the time of concluding this research.

#### **4.9.2.2 Capability and History of Deployments**

*“For all the three companies, the Ministry of education officials made site visits to the companies that had been pre-qualified to establish their capacity before the final tender is awarded and in its evaluation,”* the ministry official says. They used what he termed as Specially Permitted Procedure which takes the negotiations approach in order to arrive at the selected bidder.

#### **4.9.2.3 Donor Considerations**

This was not relevant in Kenya’s case as the project was largely funded by the government. However, this was the opposite in the case of Rwanda where the decision on the choice of the supplier was largely based on donor considerations

#### **4.9.3: Deployment**

The preparations are going in all other factors that would see the project succeed among them teacher training and the school infrastructural development.

##### **4.9.3.1 Method and Time of Deployment**

An officer we interviewed at the ministry of education indicates that the, *“The ministry plans to have the project take a phased whole-school access approach from the second and subsequent years of implementation, where all class one students will access the laptops on a 1:1 ratio. The ministry is also planning to have the assembly of the devices for the second round of the laptop programme done locally in a bid to boost the uptake of local technology. It will be initiated in*

*four phases over four years and has been allocated an annual budget KSh17.4 billion (US\$201 million), with remaining funds being used in the development of digital content in order to improve the curriculum”.*

#### **4.9.3.2 Trial Phase**

In Kenya, a pilot project was done at Our Lady of Mercy Primary School South B in Kenya's capital where they received 16 of these computers from the One Laptop per Child organization. The trial period lasted for a period of 2 months. According to the ministry officials, *“the trial was successful, though it unearthed myriad of challenges ranging from poor conceptualization by standard 1 kids, insecurity of the laptops etc.”* As quoted from the principal, Security is a big issue in Nairobi's South B neighborhood. Sister Kariuki says *“About three times we have had very serious break-ins and they have interfered with the previous computers that we have been using in the offices,”* she said. *“They have stolen parts of those computers, which mean grounding them.”* She says, the packages did not come with the proper gadgets to recharge the laptops but she sees big potential with the laptops, especially once the national syllabus Msingi Pack is installed. *“Children are curious. They want to know how to use the computers and to learn through computers,”* she said. *“They also want to be in the modern technology.”*

#### **4.9.3.3 Teacher Trainings**

By March 20<sup>th</sup> 2014, the Kenyan government has so far trained 150,000 primary school teachers to oversee the project in public primary schools, with another batch of 300,000 teachers lined up to undergo the same program.

Ministry is also carrying out the sensitization program about the laptop project to the various stakeholders in ICT integration.

#### **4.9.3.4 E-Content development**

The researcher established that Kenya Institute of Curriculum Development (KICD) has indeed developed the e-content for standard one and has been piloted in readiness for pre-loading onto the laptops. The institute is just awaiting the completion of the tendering processes and the supply of the laptops so, that they can carry out the installations.

The ministry has also launched the ICT training curriculum for teachers which identify the key areas in ICT literacy and integration skills which shall facilitate the training of teachers.

#### **4.9.3.5 Electrification program**

The ministry of Education confirmed that it had entered into collaboration with the Ministry of Energy and Petroleum where a total of 10,157 schools have been connected to the national grid with another 4,000 envisaged for connection before June 2014.

## **CHAPTER FIVE**

### **DISCUSSIONS**

#### **5.1 Introduction**

This chapter provides the discussion of the study based on the objectives of the study.

#### **5.2 Discussions**

##### **Comparison of the Teachers E-Readiness in Both Countries**

The study revealed that the general skills and knowledge on usage of computers was higher in Kenya than in Rwanda, with Kenya having a mean of 3.2 out of 5 while Rwanda has a mean of 2.1 out of 5. Though in both countries, the teachers lacked the advanced ICT skills. This is in agreement with Pelgrum (2002) argues that lack of ICT-related knowledge of teachers is a major obstacle to the realization of their ICT-related goals. Formal Training on Computer Skills was carried out in both countries due to the launch of laptops project however the training was more in Rwanda than in Kenya whereby in Kenya, the training had been for less than a month with Rwanda carrying out training for a period exceeding one month.

The study further revealed that 39% of the respondents in Rwanda have used laptops to teach in class while none of the Kenyan counterparts had done so. The awareness of the project was very high in Kenya where all respondents knew about the project compared to Rwanda where 6.3% of the respondents had never heard about the project. This shows that Kenya has a higher publicity and the project drew a lot of media attention. 29% of the teachers in Kenya had used/ Accessed laptops/computers at home while only 4.5% of the teachers In Rwanda had the reach to laptops/computers at home. The study however established that the ownership of personal laptops generally remained low among teachers and that those who had them had been using them for less than a year.

On the support and training of teachers, the study revealed that Rwanda established a fulltime support team called Core team which operated in all schools in Rwanda but in Kenya, the support team structure had not been concluded by the time of this research however the ministry

of ICT was taking the lead in providing resources to do teacher training and project deployment. The study revealed that Rwanda has a learning team branch within the ministry whose work is to train teachers.

On the teacher perceptions to the success of the project, Rwandan teachers showed more optimism on the success of the project compared to their Kenyan counterparts. This was seen on the average means as tabulated by the researcher. But teachers from both countries agree that this will ultimately improve the performance of the students and expose students to better opportunities in life. They both also agree that the project should be expanded to cover all classes/ units.

On the challenges faced by the teachers, major challenges in Rwanda include insufficient laptops/ computers, insufficient training of teachers, computer breakdowns and repairs taking so long. On Kenyan teacher's challenges, key points that came out were: Insufficient infrastructure, foreseen security challenge of the laptops, learner's limited ability being class one pupils and teacher limited trainings.

### **Laptops Project Implementation in Both Countries**

In Rwanda, the project has progressed well, amid challenges. What persists though, and speaks on Rwanda's behalf, is a strong will to pursue the objectives. At all interviews, the researcher met with deep conviction that the project will succeed. Sometimes the conviction almost seems a bit naïve. The only main threat to the project is the lack of skills. Rwanda's educational system is still under re-construction from the devastating genocide of 1994 and has not yet produced the number of skilled personnel that the country is in need of. The available IT competence *has* increased though and it is obvious that both quality and quantity of the ICT graduates will grow rapidly the forthcoming years.

In the study, the Kenya's failure in the project is in the implementation process. The project is 6 months late (as when writing this report), and the go live dates are uncertain. The respondents in Kenya disagreed that the project objectives has been achieved so far while those in Rwanda had strongly agreed. The respondents indicated that the implementation process was behind schedule

hence the implementation plan was not adhered to. The tendering process had slowed down the implementation process and as this report is written, the future of the project is uncertain. It was established by this study that infrastructural challenge was one of the major constrain in implementation of the project in Kenya. However, efforts were underway to improve the infrastructures through initiatives like the rural electrification programme.

The study findings further revealed that Laptops project implementation was being done in phases in both countries, with Kenya planning to have it in 3 phases while Rwanda had phases already d the third phase to be rolled out in 2015. The study further revealed that during the initiation phase, Rwanda engaged in initiation of the project which entailed setting up a goal to increase the number of computers in both primary and secondary school. Then hardware and Software Considerations were mad before official initiation. On the Model and Vendor selection, donor considerations were made which was a key decision point in the selection of the supplier in Rwanda as well as the tendering processes. The study established that the history of deployments and capability and tendering processes were evaluated which included; Method and Time of Deployment, Support Infrastructure, Teacher Training. The other phases are still ongoing. As established by the study, they sequence of key events that the Laptops for School children project have gone through in Kenya are three sections which include initiation, vendor selection and deployment. It's only some elements of deployment that has been done including infrastructural preparations and teacher trainings.

From the Ministry officials, the study found out that pilot project was indeed conducted in both countries as well as project evaluation and benchmarking. The study revealed that in both countries, Pilot project was very helpful in understanding the project needs, Prior evaluation was done on ICT technical preparedness within schools and that during the technical preparedness evaluation, common problems in ICT project implementation practice was considered e.g. Lack of sufficient supporting infrastructure. Teachers ICT skills capacity was considered at initial phase and the process of teacher training started immediately.

## **Comparison of the Laptops Project Implementation Process in Both Countries**

The study established that pilot project was conducted in both countries as well as project evaluation. No legislative law was passed in Rwandan parliament before the project was started but this was necessary in Kenya. With regard to the tendering process, the study established that there was there was a tendering process to select the successful vendor in Kenya but in Rwanda; the Ministry of Education together with REB indicated that the vendor was picked due to the donor funding considerations and subsidized cost considerations. The study found out that in both countries, bidders provided the sample before being awarded the tender and that cost amounts were key considerations in the vendor selection process. The study further established that the Ministries of education in both countries got involved in the laptop project from the start, where by the budgeting process was collaboration with the Ministry of Finance.

The study further established that technology increases the self-directed learning opportunities for both students and staff. The existing ICT infrastructure schools visited was insufficient for student learning activities using computers. The study established that the implementation process was faced with various challenges whereby the challenges were higher in Kenya than in Rwanda. Among the challenges cited include in both countries include lack of supporting infrastructure such as electricity and internet, insufficient training of teachers, insufficient laptops/computers for learners, lack of proper ICT policy and security of laptops and computers.

The study established that the Schools in Rural areas in both countries had no Internet access, with a less than 50% having power connection the study however established that the laptop deployment plan in Rwanda was largely dependent on power and electricity expansion and that areas that do not have electricity, the solar panels would/ has been used. This conform with Anderson (1997) who identified a range of physical and cultural factors that affect ICT in developing countries which include lack of reliable access to electricity, limited technology infrastructure (especially internet access, bandwidth, hardware and software provision) and geographical factors. The study established that the launch of the project greatly led to the increase in coverage of electricity in Rwandan primary schools.



## **CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Conclusion**

With regard to teacher e-readiness in both countries, the study concludes that the general skills and knowledge on usage of computers is higher in Kenya than in Rwanda. The study however notes that, the teachers lack advanced ICT skills in both countries. The study also concludes that the teachers training initiative has been more elaborate in Rwanda than in Kenya partly due to the longer period in which the project has been existent in Rwanda. On the question of access to laptops/computers at home, it revealed that more teachers in Kenya had access compared to their Rwanda counterparts. The study concludes that the ownership of personal laptops generally remained low among teachers and that those who had them had been using them for less than a year.

On the Project Implementation process, the study concludes that Rwanda is more successful compared to Kenya. Both countries have executed the project in phases. These phases include initiation and technology selection, vendor selection and then the deployment phase followed. The key considerations in both countries before awarding the tenders included donor considerations (major factor in Rwanda), method and time of deployment, the ability of the firms to manage the project. In both countries, bidders provided the sample and that cost amounts were considered in vendor selection. Ministries of education in both countries got involved in the laptop project from the start, as well as ministry of finance and ICT. It's only in the case of Kenyan government where the legislature had been involved in decision making on the supplier choice. The pilot projects were indeed conducted in both countries. The study further reveals that the existing ICT infrastructure in schools is insufficient for student learning activities using computers however Rwanda is better positioned than Kenya. Challenges facing the project are higher in Kenya than in Rwanda. Among the common challenges in both countries include lack of supporting infrastructure such as electricity and internet, insufficient training of teachers, insufficient laptops/computers for learners, lack of proper ICT policy and for the case of Kenya is the security of laptops and computers.

## **6.2 Recommendations**

### **6.2.1 Recommendations - Rwanda**

The study established that financial limitations, teacher trainings on ICT skills and lack of supporting infrastructure were the main challenges in Rwanda but the biggest of them all were lack of enough training for the teachers on ICT skills. In order to reduce this major challenge, the Ministry of Education should consider increasing the duration of the training sessions and make them more frequent as possible.

Researcher noted that there is a very strong technological dependency on OLPC and the voluntary community surrounding it; the laptops are not likely to breakdown immediately, but when they do there will be no spare-parts readily available unless OLPC decide to sell them. There is, furthermore, no in-house development or understanding of the system, rendering it very difficult to produce software locally. The ministry needs to relook at this.

Research shows that the insecurity challenge was the least in Rwanda. Hence the researcher recommends that the students should be left to go home with the laptops rather than be locked up in the ward robes and considered government property. They should be given to the kids to use.

The study also established that the infrastructure in rural areas was a major hindrance to the implementation of the project. This study therefore recommends that the government should take measures to improve the infrastructures in schools such as power supply and internet access.

### **6.2.2 Recommendations – Kenya**

The study established that there was a strong recommendation by the teachers in Kenya that the project be expanded to involve pupils in other classes especially in upper primary, as the e-content will be more relevant and beneficial to them. This study therefore recommends that the project should be incorporated as soon as possible to cover the upper primary students

Findings of this research showed that very few teachers had achieved requisite levels of basic computer literacy. Therefore lot of focus needs to go into training teachers on IT skills and other

e-learning delivery modes to prepare them with necessary capabilities to teach IT at their relevantly designated levels.

The study found out that, the infrastructure in rural areas is a major hindrance to the implementation of project. This study therefore recommends that the government should take measures to improve the infrastructures in rural schools such as power supply and internet access.

The study noted that the process of issuance of laptop had been delayed. This study therefore recommends' that the Government should fast track the issuance of the laptops and to ensure those who will not get in phase 1 are able to get it as fast as possible. This will avoid resentment and failed promises among the children.

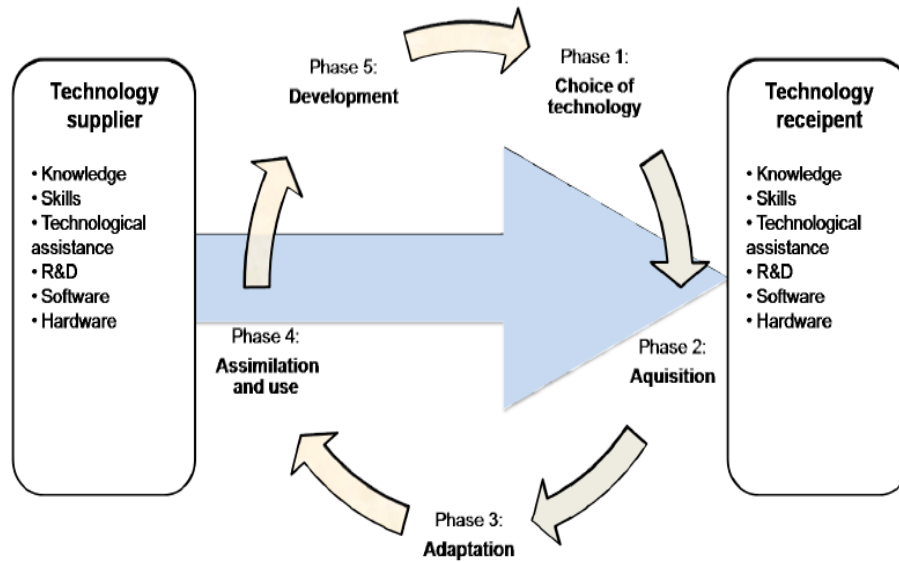
### **6.2.3 Recommended Descriptive Framework based on Project implementation Process findings – In relation to the Conceptual Framework**

This framework is developed by the researcher and has a combination of the stages (phases) presented by Al-Mabrouk *et al* and the cyclic behavior of the model presented by Barks et al. and the components of the stages in the conceptual framework of this research.

The researcher consider it important, due to the characteristics of ICT (mainly its rapid development and compatibility issues), to view such technologies as having a rather short life-cycle. This also tries to solve the weaknesses noted in the case of Rwanda where there has been more emphasize on expansion at the cost of losing the already existing deployments. It's not yet clear how the Kenya's deployments will shape up to be, since they are yet to officially launch the project.

The diffusion phase as suggested by Al Mabrouk (1998) has been left out in this model and it has same characteristics as it's covered in the Assimilation and Use phase of the recommended model.

Based on the data collected, the researcher notes that in both countries, there was no Needs Assessment carried out before the initiation of the project, as it was based on mandatory adoption in the choice of the technology. The researcher therefore recommends in this new model that needs assessment should be a key part of the choice of technology phase.



**Figure 6.1: Researcher’s proposed model**

This model is made up of two main stakeholders and five phases as discussed below, much like the ITT and ITL models presented in the previous section.

- *Choice of technology:* The choice of technology phase intends to identify opportunities and challenges involved in the sustainable adoption of a technology. It is important, during the early stages, that the recipient country carries out **Needs Assessment** and formulate a set of clearly defined goals. They should also estimate the probable impact of the technology in the local region. The goals and the expected outcomes should be codified into new policies or integrated with existing policies.

The most common method for doing this is by assessing suitability of any technology based on the set of goals that was previously defined. Another method involves analyzing the outcomes of similar transfers of the same technology in other countries. When the technology choice has been made, the phase ends with negotiation and signing of contracts.

- *Acquisition:* This phase is defined as where the actual acquisition of the technology is taking place, both in terms of time, space and methods of transfers. This includes establishing a time-frame guidelines, shipping methods and distribution within the country. Decisions in the technology acquisition process should be made hastily to avoid losing the advantage of the technology. Due to the complex characteristics of ICT it may also become obsolete after only a few years, thus further increasing the need of quick decisions
- *Adaptation:* This is an ongoing process spread over the whole life-cycle of the project. It includes matching and adjusting the transferred technology to the users and operators in that country. Such an adaptation spans from altering the physical form of the technology to adjusting inherent cultural assumptions. The recipient country must adapt to the new technology in areas such as human resource development and training and infrastructural development. They must also make sure that other technologies that are to be integrated with the new system will be compatible with the transferred technology, and that preparation of the physical environment is done in time
- *Assimilation and use:* This incorporates the diffusion phase that was suggested by Al Mabrouk (1998). It's the capacity to use, understand and absorb the details of the technology on their own, including its practical use. This includes the acceptance of the technology (mentally by local people, and physically within the environment) and the motivation to make it succeed (for example, where there exists a perceived need or benefit within the developing country, supported by appropriate government policy measures such as regulation and pricing to create a positive climate). The users of the technology get to appreciate it
- *Development:* The fifth and last stage is development stage. When this phase is reached, the technology has been fully understood and can not only be used as originally intended, but also developed and improved into new technologies. The control and evaluation of the newly developed technology is a crucial and difficult task in all organizations, and especially so in developing countries where a lack of appropriate institutions is common. At this phase, a cyclic effect is also seen, where the first phase also begins

#### **6.4 Recommendations for Further Studies**

When collecting data on the teacher's e-readiness for the project, the study concentrated on public primary schools in Langata constituency in Kenya and Muhanga sector in Rwanda. This study therefore recommends that another study be conducted on different sets of public primary schools in the 2 countries, for a more comprehensive establishment of the findings.

The study further recommends that in the future, a similar study be done incorporating the responses of the pupils so as to establish their views on the laptop projects.

Kenya is yet to fully launch the project; hence another comparative study ought to be done after the full operation of the project, so as to have a much better comparative result.

A number of other aspects in the project would also be interesting to evaluate in relation to Laptops for school children deployments e.g. an evaluation of the actual learning benefit from using the laptop and the impact of the project on its surroundings.

### **6.5 Limitations of the Study**

The laptops for school children ICT project were at different phases in the two countries and this posed a greater challenge to the study. However, to counter this limitation, the study confined itself to comparing the project implementations stages which had already been undertaken by both countries,

The study also faced a major challenge on the respondent's reluctance in providing information with regard to laptops for school children ICT project in both cases. However the researcher assured them that the information they gave was to be treated with utmost confidentiality and that it was for academic purposes only. A university introductory letter was used as an assurance tool in cases where the sensitive information especially from the ministry was sought. This would assure respondents that the information would be used for academic purposes only.

## REFERENCES

- Afshari, M., Bakar, K. A., Su Luan, W., Samah, B. A., & Fooi, F.S. (2010). Factors affecting deployments of information and communication technology *International Journal of Instruction*.
- Al-Mabrouk, K., and Soar J., 2009: Building a Framework for Understanding and Improving Information Technology Transfer Process in the Arab Countries. Toowoomba: University of Southern Queensland.
- Baark, E. and Heeks, R., 1998: *Evaluation of Donor-Funded Information Technology Transfer Projects in China: A Life-Cycle Approach*. Manchester: Institute for Development Policy and Management University of Manchester.
- Bannister, F. and Remenyi, D., 2005. The Societal Value of ICT: First Steps Towards an Evaluation Framework. <http://www.ejise.com/volume6-issue2/issue2-art21.htm>. Reading, England: Academic Conferences Limited.
- Beggs, T. A. (2000). *Influences and barriers to the adoption of instructional technology*. In Proceedings of the mid-south instructional technology conference.
- Blass E. and Davis A. (2003). Building on Solid Foundations: Establishing criteria for e-learning development. *Journal of Further and Higher Education*, 27 (3).
- Cohen, G., 2004: *Technology Transfer: Strategic Management in Developing Countries*. New Dehli: Sage Publications.
- Cox, M., Preston, C. & Cox, K. (1999). *What Factors Support or Prevent Teachers from Using ICT in their Classrooms?* Paper presented at the British Educational Research Association Annual Conference, University of Sussex, Brighton, November.
- Davis J., Foxall G. and Pallister J. (2002). *Beyond the intention-behavior mythology: An integrated model of recycling*, *Marketing Theory* 2 (1), pp.29-113.
- Drent, M. and M. Meelissen (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively?" *Computers & Education* 51(1), 187-199.

Drent, M. (2005). In Transitie: Op Weg Naar Innovatief ICT-gebruik op de PABO [In transition: On the road to innovative use of ICT in teacher education] (doctoral dissertation). Enschede: University of Twente.

Duhaney, D. C. (2001). Teacher education: Preparing teachers to integrate technology. *International Journal of Instructional Media*, 28(1), 23–30.

Government of Kenya (2007), Kenya Vision 2030: A Globally Competitive and Prosperous Kenya, government of Kenya, Nairobi, Kenya

Government of Kenya (2006). National information and communication technology (ICT) strategy for education and training. Ministry of Education.

Government of Kenya (2005), National information and communications technology (ICT) Policy. Ministry of information and communications.

Government of Kenya (2004). *A policy framework for education, training and research*.

Government of Rwanda, 2007: *Economic Development & Poverty Reduction Strategy 2008-2012*, Kigali: Ministry of Finance and Economic Planning

Government of Rwanda, 2006: *The NICI-2010 plan*, Kigali: The Rwanda Information Technology Authority, 2006.

Government of Rwanda, *Rwanda Vision 2020*, 2000, Kigali: Ministry of Finance and Economic Planning.

Grabe, M., & Grabe, C. (2001). *Integrating Technology for Meaningful Learning*. Houghton Muffin Company. USA. Hadley, M. & Sheingold, K. (1993). Commonalities and Distinctive Patterns in Teachers' Integration of Computers, *American Journal of Education*, 101(3), 261-315.

J. D. Tinsley & T.J. van Weert (Eds.), World Conference on Computers in Education VI: WCCE' 95 Liberating the Learner (pp. 35-42). London: Chapman & Hall. Bhuiyan, S



Heeks, R., 2002: *Information Systems and Developing Countries: Failure, Success, and Local Improvisations*, The Information Society, Manchester: Taylor and Francis.

Heeks, R. (Ed.) 2001: *Reinventing government in the information age*, London: Routledge.

Heeks, R., 2005: *Sustainability and the Future of eDevelopment*, Development Informatics Group, University of Manchester.

Heeks, R., 2002. *Information Systems and Developing countries: Failure, success, and local improvisations*. <http://www.fes.uwaterloo.ca/crs/plan674d/isysanddcountries.pdf> edn. Philadelphia: Taylor & Francis.

Heeks, R. and Davies, A., 2000. Different Approaches to Information Age Reform. In: R. HEEKS, ed, *Reinventing Government in the information age*. London and New York: Routledge, pp. 22-48.

Kahen, G., 1996: *Building a framework for successful information technology transfer to developing countries*. International Journal of Computer and Applications Technology.

Kondo, M., 2005: *Networking for technology acquisition and transfer*. International Journal of Technology Management.

Marshal I MN. The key informant technique. *FamPract* 1996; 13: 92-97.

Mugenda, O. M. & Mugenda, A. G., (2003), *Research Methods; Quantitative and Qualitative Approaches*, Acts Press, Nairobi, Kenya.

Nugroho, D. and Lonsdale, M., 2009: *Evaluation of OLPC programs globally: a literature review*. Australian Council for Educational Research.

Riley, T.B., 2000. *Electronic governance and electronic democracy: Living and working in the wired world*. London: Commonwealth Secretariat.

Rogers, E.M. (1995). *Diffusion of innovations*. 5th edition. The Free Press. New York.

Van Akkeren J. and Cavaye, A.L., (1999). *Small business IT market readiness and overcoming their fear factor*.

### **Internet Resources**

Camfield, J., *One Laptop Per Child News*:

[http://www.olpcnews.com/implementation/plan/cost\\_of\\_olpc\\_in\\_haiti.html](http://www.olpcnews.com/implementation/plan/cost_of_olpc_in_haiti.html) :23 Jan 2014.

Hughes, E. *The Inquirer*: <http://www.theinquirer.net/inquirer/news/1038484/venezuela-portugal-sign> 22 Jan 2014.

Government of Rwanda: <http://www.gov.rw/>, 2<sup>nd</sup> Feb 2014

Ministry of Education website: <http://www.mineduc.gov.rw/spip.php?article33423> Jan 2014.

Rwandan Development Gateway, *Rwandan Development board*:

[http://www.rwandagateway.org/article.php3?id\\_article=10614](http://www.rwandagateway.org/article.php3?id_article=10614), 25<sup>th</sup> Jan 2014

Rwanda Civil society Platform – <http://www.rcsprwanda.org/spip.php?article130>; 1<sup>st</sup> Feb 2014

The Insider's guide to Rwanda, *Vision2020*: [http://www.theeye.co.rw/vision\\_2020.php](http://www.theeye.co.rw/vision_2020.php), 25<sup>th</sup> Jan 2014

The One Laptop Per Child Blog, *Refocusing on our mission*:

<http://blog.laptop.org/2009/01/07/refocusing-on-our-mission/> 25<sup>th</sup> Jan 2014.

The One Laptop per Child Website, *Vision*: <http://laptop.org/en/vision/index.shtml>, 25<sup>th</sup> Jan 2014

The World Bank, *Data & Research*:

<http://econ.worldbank.org/external/default/main?theSitePK=477916&contentMDK=20562060&menuPK=546432&pagePK=64168182&piPK=64168060>, 20<sup>th</sup> Jan 2014.

## Appendix I: Introductory Letter



**UNIVERSITY OF NAIROBI**  
**COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES**  
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P. O. Box 30197  
00100 GPO  
Nairobi, Kenya

Our Ref: UON/SCI/MS/IS/2012

26 February 2014

To Whom It May Concern

Dear Sir/Madam

**KIPLAGAT K. VICTOR– REG. NO. P56/73861/2012**

The above named is a bona fide student pursuing a M.Sc in Information System degree at the School of Computing and Informatics, University of Nairobi. As part of the course, students are required to undertake a research project. Hence, Mr. Kiplagat is currently carrying out his research on the project entitled: *"Rwanda's One - Laptop per - Child (OLPC) ICT Project; A Comparative Study to Kenya's Laptops for Children Initiative"*.

We would be grateful if you could assist Mr. Kiplagat as he gathers data for his research. If you have any queries about the exercise please do not hesitate to contact us.

Yours faithfully

School of Computing & Informatics  
University of NAIROBI  
P. O. Box 30197  
NAIROBI

**PROF. W. OKELO-ODONGO**  
**DIRECTOR**  
**SCHOOL OF COMPUTING AND INFORMATICS**

WOO/jsn

## **Appendix II: Informed Consent**

Dear Respondent,

### **Voluntary participation**

#### **What is this research about?**

Thank you for agreeing to participate in this research study. As part of requirements for MSC–Information Systems course at the University of Nairobi, it is required that a student should carry out research in the relevant area of the study, aimed at addressing societal challenges, putting into practice what has been learnt on coursework and adding to the body of Knowledge.

My study is a comparative study analyzing the One Laptop per Child ICT project both in Kenya and Rwanda. The findings of this research will help policy makers in drafting relevant approaches to the project implementation based on its successes and failures in both countries

#### **What is expected of you?**

You are requested to participate in the study by answering the questions on the attached questionnaire. However, you may respond only when you want to, as a response is not compulsory.

#### **What are your rights as a participant?**

Your participation is completely voluntary and you can refuse to participate at any time without stating any reason.

#### **Confidentiality**

All information retrieved during the course of this study will be treated as strictly confidential. Data that may be reported on in the research report will not include information that identifies you as a participant in the study. Your informed consent form will be filed in a safe place and it will only be accessible to the research team.

**Approval**

I hereby confirm that the researcher, Mr. Victor Kiplagat has informed me of the nature of this study. I have received, read and understood the consent form.

I understand that:

- My identity will remain anonymous during the analysis, processing of data and reporting of the study.
- I am free to withdraw from the study at any point, without giving any reason for my termination of the interview.
- I will have sufficient opportunity to ask questions.

I, .....declare myself prepared to participate in the study

Participant's signature: .....

Date:

I, Victor Kiplagat, hereby confirm that the participant has been informed in full of the nature and the manner in which the study will be conducted.

Researcher's signature: .....

Date: