

**ANALYSIS OF SUCCESS FACTORS IN INTEGRATION OF INFORMATION
COMMUNICATION TECHNOLOGIES IN PUBLIC SECONDARY SCHOOLS IN THE
URBAN INFORMAL SETTLEMENTS**

PAULINE ASHIOYA YATOLI

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SUPERVISOR

PROF. ROBERT OBOKO

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DECLARATION

This research project is my original work and has not been presented for the award of degree in any other university or institution or for any other purpose.

Signature_____

Date_____

Pauline Ashioya Yatoli – P54/85608/2016

Supervisor’s declaration

This research project has been submitted for review with my approval as a university supervisor.

Signature_____

Date_____

DEDICATION

This work is dedicated to my dear parents, husband and children for their undying support throughout my study.

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ABSTRACT

In Kenya, quality education is a basic human right. Over the years, several strategies to improve provision of education through efficient curriculum roll-outs have been initialized, however, only a few have successfully been implemented. ICT integration is one such, whose implementation is still largely lacking in schools within the urban informal settlement. This study therefore, sought to analyze the success factors in the integration of information communication technologies in public secondary schools of the urban informal settlements. Data was collected from a sample of 10 principals, four deputy principal and 71 class teachers. The study found that most secondary schools (50%) had more than 16 while less than 14.3% had less than 5 computers. This therefore meant fewer impediments towards integration of ICT since computers are a major tools towards integration of ICT in teaching and learning. Physical observation of other ICT materials revealed their existence in majority of the schools. Majority of the schools have woofers, radios, Radio number, television, DVD Player, projectors and public address system. This was positive in terms of integration of ICT in secondary schools. In all the schools that the data used for this study was done, they teacher there stated that they had internet connections. Most of the teachers used the internet to search for teaching and learning materials. About 44.7% of schools used the computers for typing. These materials includes; examinations, letters, and memos among others. This was followed by browsing (31.8%) and research (18.8%) implying high integration of ICT. The least use on ICT was record keeping (5%) implying most schools are still relying on the old methods of information keeping where files were mostly used. The study established that 45.5% of the schools mainly use internet that are provided by the ministry of education. Regarding to factors influencing the integration of ICT in teaching and learning in public schools, the study ascertained that both factors, external and internal have an effect.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---------------|---|
| CDE | County Director of Education |
| CD-ROM | Compact disk Read Only Memory |
| CFSK | Computer for Schools Kenya |
| GoK | Government of Kenya |
| ICT | Information Communication and Technology |
| MOE | Ministry of Education |
| MOEST | Ministry of Education, Science and Technology |
| NCST | National Council for Science and Technology |
| USAID | United State Agency for International Development |

DEFINATION OF TERMS

Implementation- The execution of a plan or policy. The process of integration of ICT in secondary schools

Integration- The use and association of ICT techniques and tools in school processes.

Education- The process of receiving and giving systematic instruction, the theory and practice of teaching.

Urban area- The city or town

Urban informal settlement - Areas heavily populated and differ in size and other characteristics, most lack reliable sanitation services, supply of clean water, reliable electricity, law enforcement and other basic services within an urban center.

Public secondary school – Government sponsored schools.

CHAPTER ONE

1.1 Background

To prepare learners for the current knowledge economy, quality education is fundamental. The Kenyan government itself gives it importance and that's why it is enshrined in the constitution article 53 (1). To ensure this, educational institutions are therefore tasked to mold learners for a dynamic digital "knowledge society". The need to integrate information and communication technologies (ICT) in the curriculum is inevitable (Tondeur, *et al.*, 2017). Past sector policies formulated have pointed the need to balance the education system with ICT. In a global context, there has been an increasing access and influence of ICT in various spheres of life. Most nations view integration of ICT as an opportunity to raise the standards of their education (Kelley and Knowles, 2016). Presently, countries, both developing and developed are cognizant of the worth of ICT tools for their economic development. Kenya for instance, recognizes that ICT integration in teaching and learning has the potential to impact the production of information and knowledge sharing among school communities (Tondeur *et al.*, 2016). This had been buttressed by Ramesh and Dibaba (2017) whose highlights guided the Kenyan government's initiation of projects to integrate ICT in schools. Full integration of such projects however, hasn't been achieved over time with challenges of project effectivity cited in various instances (Tarus, Gichoya, & Muumbo 2017). Even in that, the Kenyan Ministry of Education Science and Technology has coined their vision around this aiming at expediting integration of ICT in its curriculum as a universal tool for training and education. The ministry has formulated a policy to ensure equipping of every educational institution with suitable ICT infrastructures. As it is in its mission, the ministry also strives to integrate ICT in educating and training of students with an attempt to improve access of education materials, and execution of administration policies. As explained by Arkorful and

Abaidoo (2015), integration of ICT is the utilization of any information technology instrument to aid in the teaching, a practice that, according to (Valtonen *et al.*, 2015), result into many benefits. However, this cannot be done in isolation of the teachers whose hard work, innovativeness and creativity is crucial in using ICT in their daily classrooms activities. It must also be underscored that the integration of ICT is demanding and a costly affair and as Hosman (2010) puts it forth, there must be proper infrastructure and well formulated policies in place. Incidentally, studies have it that this has been the major missing link in most African states. To avert such therefore, proper implementation guidelines must be set up to help integrate ICT in teaching and learning. ICT integration needs profound planning entailing effective preparation of teacher through sustained systematic professional support and idealistic leadership that recognize the need to prepare learners to live and work in the technologically oriented world (Kirskoii, 2015).

ICT integration has been tipped to have progressive effect in the education sector. According to the UNESCO 2014 report, ICT enhances learning as it provides learners with novel skills. Besides, the use of ICT helps in reaching many learners with poor or no access (More so those in countryside areas that are inaccessible) with educational materials. ICT also facilitates and improves the training of teachers as it minimizes the costs associated with the delivery of traditional instruction. Even in that, a study by Kirkok and Karanja (2018) impressively divulged the parasail existence of ICT infrastructure in most Kenyan schools, both primary and secondary. However, according to Haque and Abu-Ghazaleh (2016) simple settings of hardware and/or software might not be a guarantee to smooth ICT integration. Hamdan, (2017) augmented this assertion by highlighting that the major failures in ICT integration in teaching and learning was that most learning institutions in African have been offered with necessary equipment however, there isn't sufficient backing for teachers in terms of professional development to implement

certain ICT policy requirements. As ICT integration in the education sector progresses in the Western and Asian countries, Africa is still experiencing a delay which is widening the digital and knowledge gap among her citizens.

1.2 Problem statement

As explicated by Mwanaszumbah and Magoma (2016), the main deterrence to African countries use of ICT is inaccessibility to amenities. Ndethiu *et al.* (2017) emphasized that the usage of computers in Kenyan tutorial room is still in its very early stages. In the study Ndethiu *et al.* also observed that most African states aren't cognizant that education stakeholder's experiences play a significant role in the use of computers. They concluded that successful integration of ICT teaching and learning is reliant on the grounding of teachers, pupils and other stakeholders.

Schools in urban centers like Nairobi are expected to have ICT resources owing to their ease of access to the government and donors. However, this isn't the case in most informal areas within the city where such resources are very scarce. Incidentally, these areas are highly populated and have a high number of schools per unit. Studies have it that such areas can have the highest integration of ICT if policies are well implemented. Whereas some nations have attained over 45% integration of ICT in learning institutions, in Kenyan schools this percentage remains dismal (Leonard, 2018). In informal settlements of Nairobi County for instance, the case is not different as the implementation level is at 16% in in Public Secondary Schools, and worst 8.5 % in the informal settlements (Faye, Fonn, and Levin 2019). Efforts to avert these cases scenarios haven't been so fruitful. The Computer for Schools Kenya (CFSK) which is the main institution tasked to bridge the student to computer ratio in public school hasn't attained its projected goal of fully achieving ICT integration in education institutions. This as it may, it must equally be acknowledged that public education institutions in the informal settlements (slums) of Nairobi

have a lot of limitations with reference to ICT integration in teaching and learning. Just to mention, most have poor infrastructure, a lot of insecurity and financial issues thus posing a lot of impediment to them integrating ICT. This study sought to analyze the factors affecting successful integration of ICT in public secondary schools in urban informal settlements of Kasarani Sub County.

1.3 Objective

1.3.1 General Objective

To explore factors affecting successful integration of ICT in public secondary schools in urban informal settlements of Kasarani Sub County

1.3.2 Specific Objectives

1. To determine the current status of ICT integration in public secondary schools in urban informal settlements of Kasarani Sub-county.
2. To determine internal (Institution condition) factors affecting the integration of ICTs in public secondary schools in urban informal settlements of Kasarani Sub-county.
3. To determine external (Government role) factors affecting the integration of ICTs in public secondary schools in urban informal settlements of Kasarani Sub-county.
4. To assess how scarcity of resources challenges integration ICTs in public secondary schools in urban informal settlements of Kasarani Sub-county.

1.4 Justification of the study

ICT integration is fundamental in the implementation of any curriculum. The attempt by Kenya to embrace the use of ICT in teaching hasn't been very successful owing to the many challenges, most of which haven't been properly documented. This study sought to analyze and document the factors affecting the integration of ICTs in public learning institutions in the urban informal settlements. These insofar to aid ascertain the existing gap in the implementation of emerging ICT teaching innovation modeled in line with the vision 2030. This study finding illuminates the degree with which the usage of ICT in learning institutions has been embraced. Similarly, it can be used by education stakeholders in developing appropriate ICT policies consistent with the existing ones including the National ICT Policy of 2006. School administrators for instance can utilize this study's results in making decisions about the kind of ICT infrastructures to procure. The curriculum designers on the other hand can use this study outcome in designing a curriculum that is ICT based in order to maximize the potential of ICT in education. Teachers would value the effects of technology on their instructional resources in class and may find it necessary to integrate the available ICT tools in their learning institutions. Teachers training colleges can find the results necessary in coming up with courses to improve pre-service ICT training on better application of ICT projects enablers in classrooms and schools. The study provides recommendation on the possible ways the informal communities around the schools can be engaged to take part in the integration of ICT in teaching and learning.

1.5 Scope of study

The study delved mainly on analysis of the level of ICT integration in teaching and learning in schools in the informal settlement of Kasarani Sub-county. Data used by the study was collected from all public selected secondary schools in Kasarani sub-County. The study also relied on qualitative reviews available for analysis on the various research tools both online and offline.

1.6 Assumptions of the study

- i. The respondents participated at will without any form of coercion and therefore there wasn't biasness, prejudice or fear;
- ii. The respondents provided responses that were true;
- iii. The MOEST supported the implementation and offered necessary support.

CHAPTER TWO

2.0 Literature Review

2.1 Trends in use of ICT in education

Discussing the trends of information in information dissemination in Kenya cannot be done in isolation of the global arena owing to the internet infiltration in the country. In the past few years, there have been remarkable advancements in computing technologies around the world (Tarus, Gichoya and Muumbo, 2015). The development of broadband communication services and merging of media transmissions with computers have created numerous opportunities to utilize various innovative tools in education. ICT has turned out to be an essential necessity in the modern societies. As such, many countries are now employing ICTs in improving the delivery and mastering of elementary skills and as part of learning (Collins and Halverson, 2018). Apparently, the misapprehension that ICTs refers to computers and computing related activities has seen the term 'computers' change to 'Information Technology (IT)' signifying a change of attention from computing technology to an innovation that has the capacity to store and retrieve information. The introduction of the term ICT commenced at the time when the availability of electronic mails to the general public was experienced. A report by the United Nations in 1999 divulged that ICT encompasses the use of internet service and telecommunications equipment such as CD ROMs, audiocassettes, just to mention which have all been used in the education process for several reasons. Such developments in meaning have seen the evolution of formal, non-formal, informal and invisible learning that all exist today in a developed education systems all of which can be simulated through networks.

Information and Communication Technologies are more than ever, living in our society and they are becoming integral parts of the education system (Cullingford, 2017). According to Nnadi *et*

al., 2018; Ngavana, Mutua, and Koech, 2018; Salam *et al.*, (2018), ICT has the prospective to speed-up and expand innovativeness among learners with skills that can easily make them link school experience to work practices. As outlined by Ottenbreit-Leftwich., Kopcha, and Ertmer, (2018) such are the influence that ICTs have had in teaching and learning. Similarly, Pavel, Fruth, and Neacsu (2015) harangued that ICTs have the prospective to increase access to quality and relevant education in the developing country. They extend further to outline that effective use of ICTs can be an equalizing strategy for developing countries. However, the reality of the digital divide in these countries makes the integration of ICT in teaching not tenable (Florida, 2017). As argued by Warschauer (2004), technology enhanced education can alleviate poverty, reduce social division besides improving living standards. Technology supported education can deliver academic programs cheaply as compared to the conventional education systems (Hirsh and King, 2017).

2.2 Literatures on integration ICT in education.

Literatures exist on ICT initiative by both government and non-governmental organizations (Nakawuka *et al.*, 2018). Through commitments made by the Kenyan Ministry of Education in coordination with the USAID, attempts have been in place to improve education standards in the country through use of ICT. This purpose has been aimed at accelerating and improving the quality of 21st century education in learning institutions. A case in point was the establishment of the School Technology Innovation Center (STIC) in Nairobi County to be the hub of access to latest and proven technological information to education stakeholders. The center has seen roll out of innovative education that improve skills needed by students to prosper in the 21st century (Winthrop *et al.*, 2016).

A study conducted by the Second Information Technology in Education Study (SITES) in 2015 revealed an increasing number of personal computers in schools and so was the access to affordable internet. Same was echoed by Forkosh-Baruch (2018) who divulged that ICTs are actively being adapted in school set-ups to the extent that it can change pedagogical practices. Study findings by Gil-Flores *et al.*, (2017) however, revealed contrasting results in the underdeveloped countries. In it, access to ICT infrastructure and the internet is weak and limited in such countries. Similar was Crook (2018) highlights that the distribution of personal computers in education centers in underdeveloped countries is much less than needed and so is the availability of trained personnel with computer literacy skills.

In 2011, the Kenyan ministry of education established a guide for teachers and school administrators outlining strategies to encourage usage of ICT materials in education. The guide gave priority to capacity building where schools identified in all the stages of ICT integration were to be funded and their principals taken for training on the procurement, specification and maintenance of ICT Equipment. Such capacity buildings were then to be cascaded to the school level where structured trainings were to be conducted under the supervision of ICT champions in the Districts. The Ministry of Education then continued to support ICT infrastructure in Secondary Schools by funding at least a school per constituency. Another strategy adopted by the ministry to promote ICT use in the education sector was the enactment of the infrastructure fund set aside to construct computer laboratories. Unfortunately, these strategies have not fully been felt in the informal settlement (Scott et al., 2016).

A report by Mupondi (2018) highlighted that notwithstanding the willingness and determinations by the Kenyan government to encourage ICTs as tools for instructions, their use had fallen short of what was expected. The report also underscored the education ministry's 2008-2012 strategic

plan lack of so much attention on the integration of ICT programmes in teaching. This was seen as seen as a major weakness on the part of the Kenyan ministry of education. As such, Otenyo (2017), in the study of ICT integration in Kisumu East suggested that schools needed to develop partnership with corporate institutions such as Communication Commission of Kenya (CCK), Safaricom and Microsoft to influence funding to improve on ICT infrastructure in educational institutions.

2.3 Challenges facing ICT Integration

Information and Communication Technology is a supposed pre-condition for development (Lechman, 2016). This is reflective in the comparative analysis of the gap in usage of ICT in underdeveloped and developed countries. A 2006 parliamentary committee on science and technology of referred to this gap as ‘The Digital Divide’. In the developed countries, the ICT environment surrounding the education sector is enormous. Contrastingly, in poorly developed country the infrastructure is week and is characterized by limited access to internet. Whereas studies delineate the infiltration of ICT in most, the education sector in Kenyan appears to be lagging behind. A report by NACOST (2010) showed that the use of computer in learning premise is still in its very stages of take-off. The report gives importance to the views and experiences of education stakeholders in the use of computers. The report highlights several challenges facing the attempt to integrate ICT in the Kenyan secondary schools including the inability to sufficiently buy enough computers or update those which are obsolete. This is overly influenced by lack of finances, high overhead costs of purchasing computers, fast changing technology and congested curriculum which are an impediment to the preparation of ICT integrated lessons. On the same note, issues have been raised on lack of integrated curriculum schools and laxity by tutors to use ICT in learning coupled with lack of government employed teachers forcing schools to hire thus

draining the scarce resources which could have been used for upgrading the ICT facilities (Tondeur *et al.*, 2017). A study by Jagannath, Hemmings-Jarrett and Jazayeri, (2018) reported that 93.18% of the teachers believe that the main challenge hindering their implementation of ICT strategies was lack of skills caused by lack of proper training on use of ICT. Diffidently, the demand for ICT integrated learning hasn't in the recent past equaled the demand for professionally trained teachers. This is evident as there are few available teachers able to transfer computing skills to the learners in spite of many of them willing to learn.

The spirited efforts by various agencies charged with support of ICT integrated learning notwithstanding, computers are still very expensive and thus, there still remain a number of schools not capable of acquiring computers to their pupils (Minja, 2015). According to Turban *et al.* (2017), most education institutions still consider computers expensive luxuries that aren't necessary. As such most schools, even those that have benefited from computer donations haven't adequately equipped their labs with repair and maintenance of the same very minimal. It is therefore common to find school computer laboratories replete with worn-out irreparable computers. With this as a problem, governments have to device stringent measures to corporate bodies or entities with intentions to offer used computers to education institutions (Wilhelm, 2006).

2.4 Theoretical frameworks

According to Zheng *et al.*, 2018, the use of ICT has the prospective to enhance the quality of education. Accordingly, the strategies and frameworks modeled and applied in the developed world have allowed for an effective integration of ICT in teaching and learning. Just to mention, the Australian Department of Education developed a national framework for ICT that was expected to offer a significant and maintainable transformations in the education system in the Australian learning institutions (Worthington, 2017). The framework was also meant to enhance learners'

reporting, appraisal, besides quantifying the learners' skills on ICT. Ultimately, it addressed the technical hitches that were earlier on encountered in integration of ICT in education sector by ensuring that education procedures were followed (Hayes, 2018). Although this framework by the Australian government had vital elements that strove to address technical barriers to integration of ICT in teaching and learning, its focus was so limited on teachers and school administrators' factors (Clinton and Dawson, 2018). Kenya can borrow from elements of this framework however; its succinct infrastructure may pose challenge in the implementation (Mutegi, 2016).

2.4.1 Technology Acceptance Model Theory

A study by Nur *et al.*, (2017) in Indonesia reconnoitered the alterations that electronic learning that was established in the country changed the learning concepts. In their study, Nur *et al.* employed the Technology Acceptance Model theory as a guiding tool to predict and explain the usage of ICTs in accounts of the possible causes of probable adopters to accept or reject the use of IT. The theory provided a framework to predict a system user's attitudes to the willingness to use a system. Besides, it delves into the supposed usefulness which according Nur *et al.*, is the extent to which one has the conviction that using a certain technology would improve performance. Similarly, it highlights that the apparent user-friendliness of a technology is consistent to the degree to which one have confidence in that using a particular technology would be unproblematic. This model suggests that the two self-determining factors i.e. supposed ease of use and supposed usefulness have an impact on a dependent construct called intention to use and ultimately the usage behavior. They are both influenced by external variables as described in the figure 1 below.

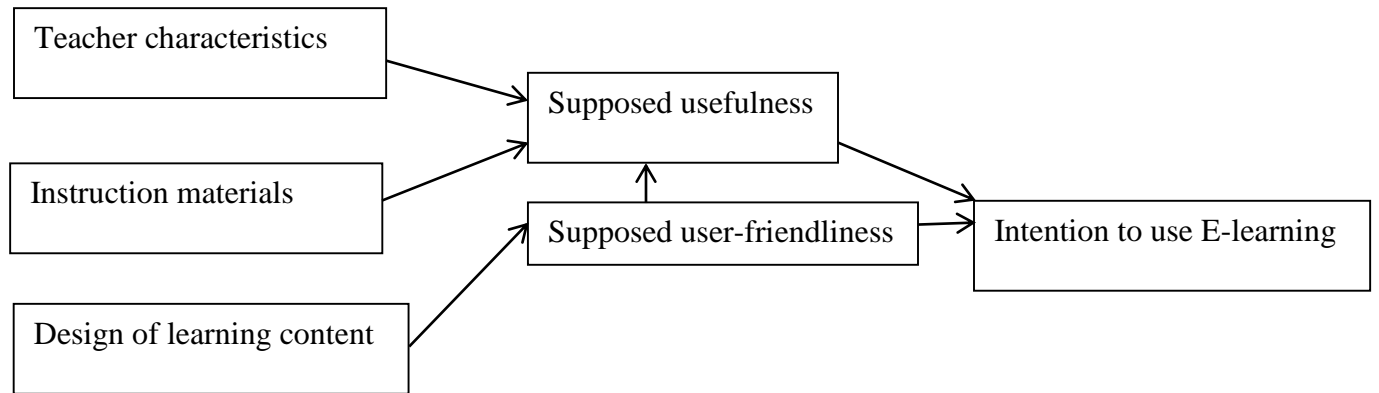


Figure 1: *The remodeled relationship between E-learning and satisfaction* (Nur *et al.*, 2017).

Contrastingly, Kenyan System is tutor oriented unlike the Indonesian model that facilitated the effective reactions of her teachers to learners’ overpopulation which was a critical matter in the education sector at the time. Nur *et al.* view ICT integrated e-learning as that which is economical, effective and that which offers an option to out-modeled learning as it links the gaps experienced in teaching and learning.

2.4.2 Technological, Organization and Environmental frameworks in integration of ICT

According to Wang and Lo (2016), technological, organization and environmental framework are the three identified features of a learning institution that influences the integration of technological innovations. The organizational context is characteristically defined by numerous descriptive measures including the school size, school formal structures in terms of administration, staff quality, and amount of internally available resources, school linkages, both formal and informal inside and outside the school. The technological context emphasizes on the internal and external technologies applicable to schools and their environment. This encompasses in place technologies available both in and out of the institution. The environment context on the other hand describes the school’s surrounding encompassing its ease of access to resources supplied by the government and other. All these have an effect on the school’s interpretation of the need to integrate ICT in the

teaching and learning process. The technological, organization and environmental framework described Wang and Lo is highlighted in the below diagram 2.

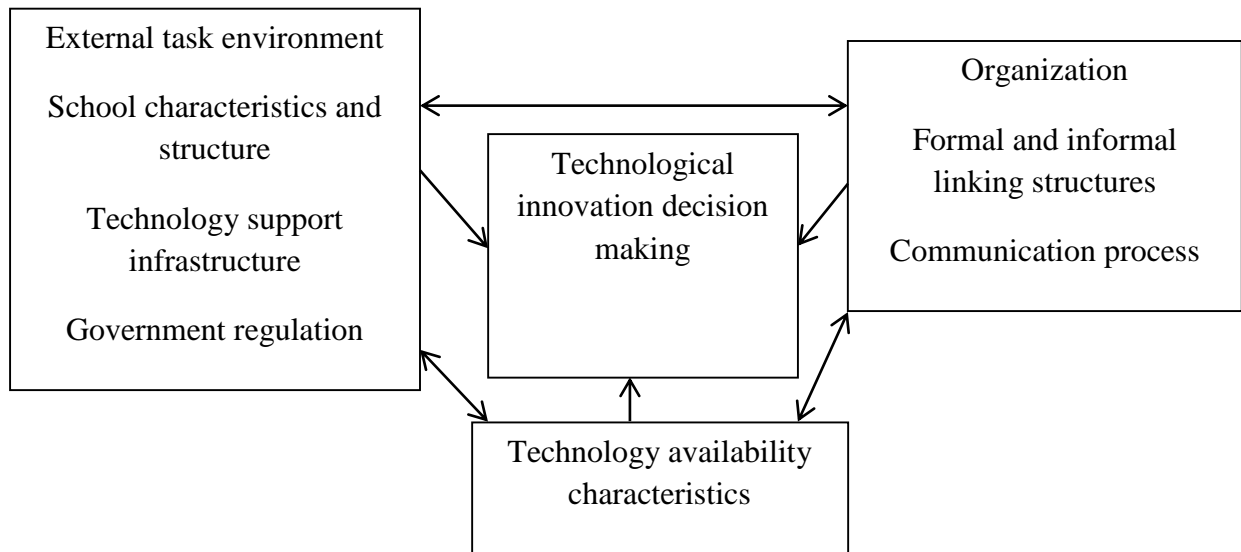


Figure 2: *Technology, Organization & Environment Framework (Wang and Lo 2016)*

2.4.3 Newhouse Framework

Resource availability, according to the Newhouse framework, has a strong relationship to the implementation of any curriculum. Resource availability can influence the support and provision of logistics on how a curriculum can be delivered in content and pedagogics. The framework was also emphasized by Albugami and Ahmed (2015) who highlighted the difficulty in integration of ICT tools in education in learning institutions. The Newhouse Framework took on a systematic approach with options that all components in integration of ICT are integral. It gives significance to availability of resources, personnel with technical knowhow on integration of ICT in education. The Newhouse framework however, does not play cognizance to the issues regarding to strategies and policies in the integration of ICT. Nonetheless, it does delve into the role of the society at large in relation to the integration of ICT in teaching and learning. The Newhouse framework offers numerous corresponding factors relating to this study objective (*See Figure 3*).

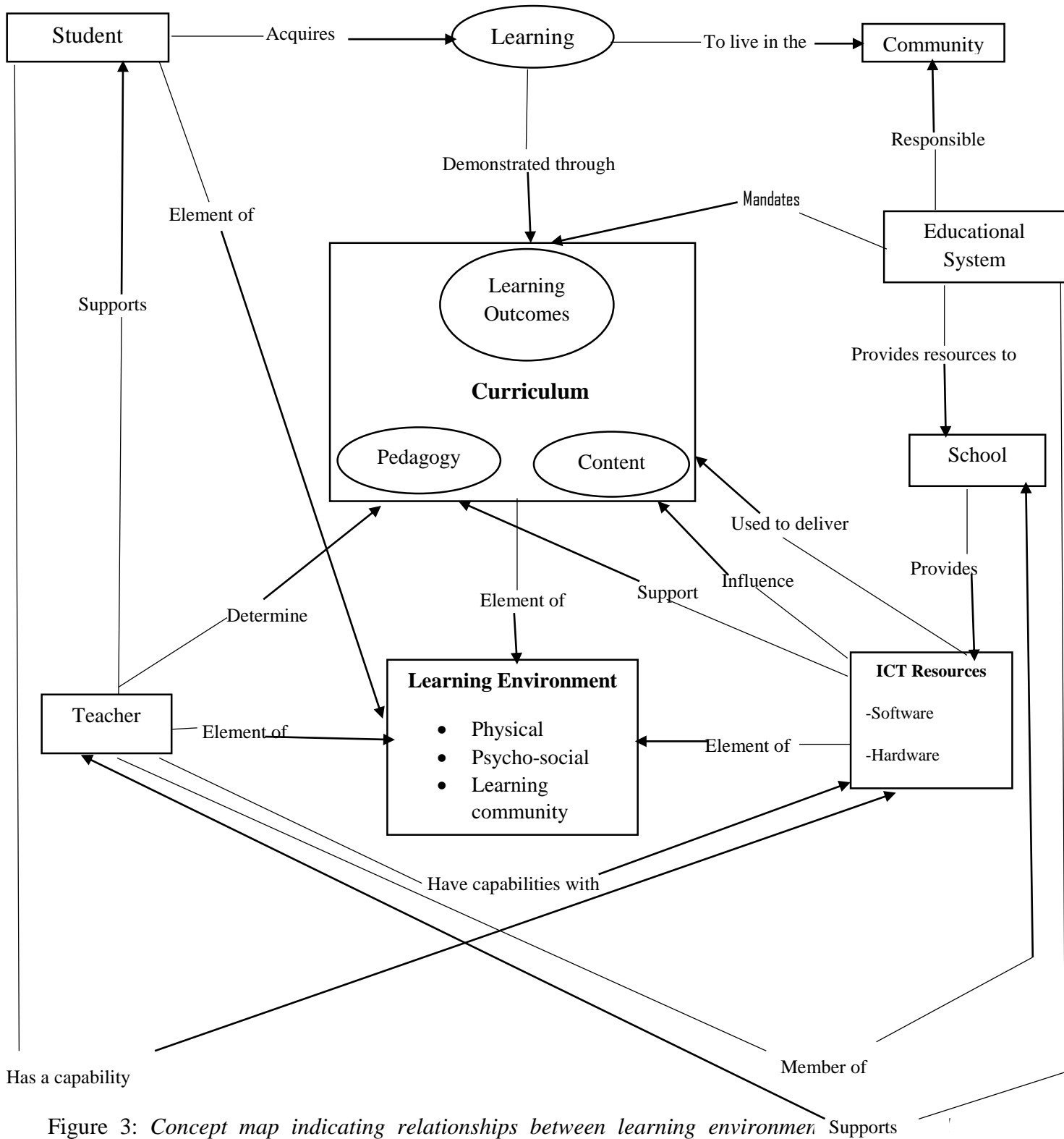


Figure 3: Concept map indicating relationships between learning environments and external entities (Newhouse, 2002)

2.4.4 Internal factors (institutional role)

The Integration of ICT in most education institutions cannot successfully be rolled out independent of the input of institutions' administration as they have a role in the planning of various activities at the school level. Institution leadership has a major role in making sure that initiated projects end to the implementation phase. For any ICT programme to be sustainable and effective, the institution leadership has to be proficient enough in usage of emergent technologies. They are obliged to have an extensive understanding of the administrative, curricular, technical, social and financial elements involved in the integration of ICT in education. A technologically prepared administration should be well equipped with a comprehensive blue-print of methods and steps required in the translation of school ICT framework into reality (McGarr and Johnston, 2019). The blueprint should be a guide to action and not a replacement to action itself and the existence of a well-documented blue-print does not guarantee a comprehensive integration of ICT in education (Alharbi, 2019).

Along with Tarus *et al.*, (2015) the costs incurred in establishment of institution infrastructure are also important when it comes to integration of ICT in education. Typically, investing in ICT should be cost involving affair. There has been a continuous increase in the cost of acquiring ICT components including hardware and software installation, maintenance and upgrading. Similarly, certain costs might include that of acquiring skills which also remain high in the developing countries. In as much as putting capital into the integration of ICT might be seen as extra cost, successful integration has far reaching benefits. As deluded by Francis, Ngugi, and Kinzi, (2017) the high cost of installing and maintaining ICT infrastructure has been a major deterrent to its integration in the education sector. Voogt *et al.* (2018) echoed the challenges to include insufficient balancing of school educational objectives with economic veracities. This was supported by the

fact that integration of ICT in the teaching process requires lots of investment in terms of capital and time. Institutions of education should therefore make conscious choices on models of ICT to integrate while maintaining the economies of scale.

According to Cosentino and Sridharan (2017), staff training/capacity building is also a crucial administrative function in improving teaching and learning. To prepare the teachers to empower the students with the advantage of technology then training them is bound. More to this, adequately trained teachers are more likely to establish classroom environments that facilitate students' use of technology to learn and communicate (UNESCO 2008). However, most studies have it that a number of teacher training modules mainly focus on fundamentals of computing at the expense of advanced computer skills and subject-specific pedagogical applications (Tröbst *et al.*, 2018).

2.4.5 External factors (government role)

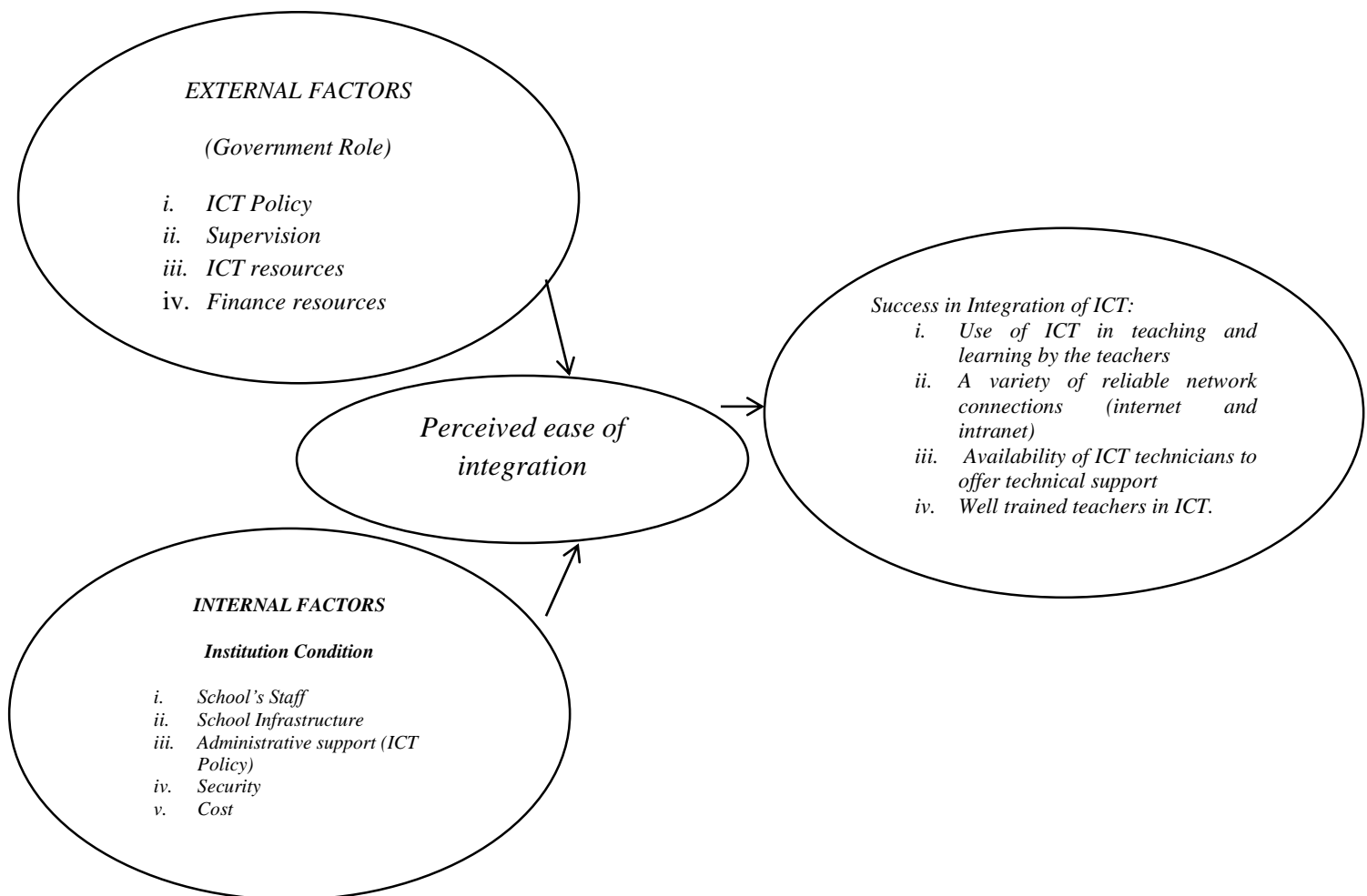
As outlined Barker (2018), the ministry of education is the main driver in the integration of ICT in teaching and learning. In this, its role to spear head the aforementioned agenda must be eminent through policy formulation. Developed in 2006, the Kenyan ICT policy sets out the principles, strategies and aims for the delivery of ICTs to improve the living standards of her citizens. The policy provides opportunities to establish grass root centered infrastructure for knowledge sharing (Mwanzia, and Strathdee, 2016). As outlined by Albugami & Ahmed (2015) an educational policy must be that which is understandable to all stakeholders. It must be that which is clear, well communicated and implementable. A policy that is not understood by the teachers and head of institutions cannot easily be applied on ground level. Such policies as buttressed by Kassem (2018) should be reviewed. In the same breath, Opoku, Badu, and Alupo (2016) emphasized that it is the sole responsibility of the government to provide ICT resources to school. In so doing, schools become equipped with the needed ICT set-up and in this they are able provide generations with

desirable resources and tools (Anshari, Alas, and Guan, 2016). Besides that, these institutions if well furnished with the myriad of technological infrastructure and electronic resources accessible, both hardware and software will be able to aptly roll out the ICT integrated curriculum (Johansen, Johansen, and Noll, 2018). As had been echoed by Wlodkowski, and Ginsberg (2017), lack of sufficient funds has been the major deterrence to use of ICT in classrooms. As such, the limited access to computers results to their ineffective use in class. The government should also provide finance resources in support of ICT integration being that it is an expensive affair (Timilsina and Shah, 2016).

In a research finding by Naqvi (2018), the integration of ICTs alone may not seriously alter the traditional pedagogical techniques if sufficient support on innovation to enhance student self-reliance and active interaction is not put in place. And to moderate the apprehensions linked to use of technological innovations by the teachers, there must be a deliberate move by the government to put in reliable professional support. In providing support, technocrats must be able to do those that the educators might not be able or struggle to do. They should also be able to provide necessary support to learners in using software applications. Even if it is provided by residential or outsourced, the technocrats are key pillars in the continued integration of ICT in education. As had been highlighted by a study in the Philippines, the major stumbling block to using computer in optimization in learning institution has been lack of timely technical support. For instance, in some far-flung areas broken down computers might take so long to be repaired due to the absence of technical support within the vicinity. Computers therefore have to be taken to the cities, kilometers away for repair (Karimi, 2012).

2.5 Conceptual framework

The framework described below strives to pinpoint the hindrance to success factors in the integration ICT in the teaching and learning in public learning institution in informal settlements of Kasarani Sub-county. To the framework, the integration of ICT in education is dependent on both external and internal factors. However the ease of integration to attain success is the main intervening variable. The internal factors affecting the integration of ICT in education are mainly institutional. The government role is mainly external.



2.6 Summary and gaps to be filled by the study

Integrating ICT in education is vital in providing learners with opportunities. In as much as teachers have a strong aspiration to integrate ICT in their teaching most of them are faced with such hurdles including incompetency resulting from lack of confidence to use technological innovation besides insufficiency of resources. In the integration of ICT in teaching and learning, competency, confidence and accessibility of the said technology is important. As had earlier on been discussed, for an institution to effectively manage time and at the same properly roll out a curriculum, then the integration of ICT is paramount. It is out of this that the government of Kenya decided to initiate a lot of capital investment towards setting up of ICT centers to ease its integration in teaching and learning. Even though ICT integration is an expensive affair, the Kenyan government has put measures in place to fund this through partnership, locally and abroad.

Though tipped as the next frontier, ICT integration in the public education sector is still characterized by limited use of computers, inadequate infrastructure and shortage of skilled manpower, a gap that the government should come in strongly to provide support in. A review of the situation reveals that the existence of these gaps is merely not financially instigated but largely due to incoordination in various levels in making effective use of technological innovations. Such incoordination simply results into duplication if not proper ICT integration. Studying the hindrances to integration of ICT in teaching and learning is very important.

CHAPTER THREE

3.0 Research Methodology

This section introduces the study methodologies with main focus on research design, study location, population targeted, techniques used in sampling of the respondents and data collection instruments. It culminates by expounding on a test of the research tool's reliability and validity besides delving onto the techniques used in analyzing of data.

3.1 Study design

The study was mainly qualitative and quantitative correlational study. It analyzes the success factors in integration of ICTs in public learning institutions in the urban informal settlements. The study also used a descriptive analysis to achieve the research objectives.

3.2 Study area

The study was carried out in Nairobi's informal settlements of Kasarani. Kasarani is on the eastern side of Nairobi lying on an expansive 135.33 km² piece of land and is divided into six administrative units namely Ruaraka, Clay City, Kasarani, Mwiki, Ruai and Njiru as shown in the *Figure 5 below*.

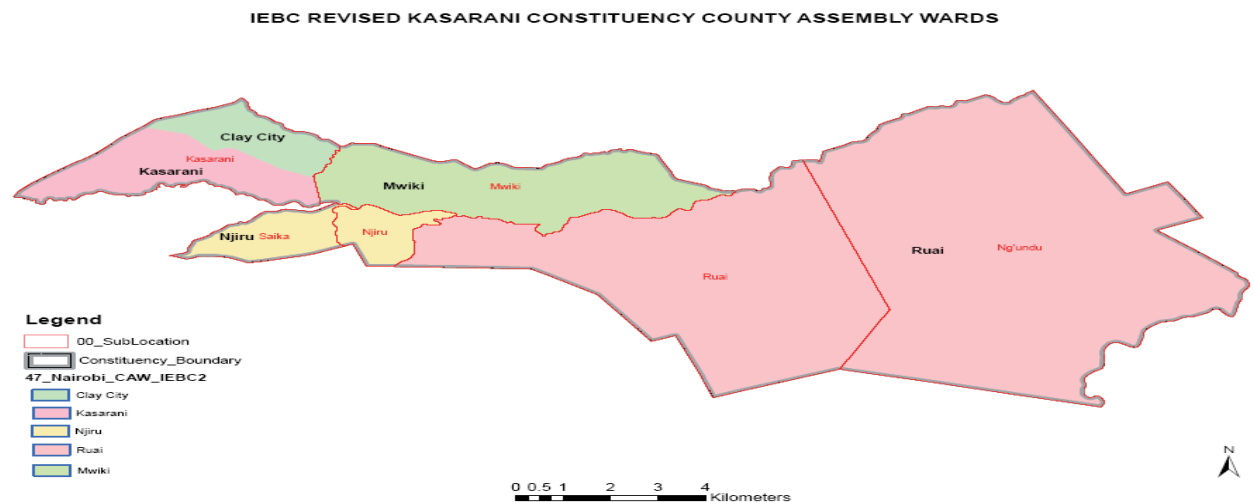


Figure 5: Study area

The sub-county harbors the known Mathare slums, Korokocho, Ngomongo and Baba Dogo slums that which are homes to a heterogeneous population whose children mainly attend the 13 public and over 50 private schools. Of the 13 schools, 7 offered computer studies as an examinable subject. These schools are faced with challenges of poor infrastructures due to low funding with most children faced with cases of absenteeism as a result of inaccessibility of schools due to insecurity.

3.3 Targeted population

Only public secondary schools in the sub-county were targeted. The schools were divided into two strata: those that offer computer studies as an examinable subject and those that do not. The study mainly targeted teachers, principals and ministry of education officials.

3.4 Sampling techniques and sample size

3.4.1. Sampling techniques

The study mainly utilized a pre-documented list of public schools in the sub-county to serve as the sampling frame. These schools were then stratified into two, those offering computer as an examinable subject in KCSE and those that do not. Purposive sampling was then used to sample the schools depending on the number of computers hardware owned. A total of fourteen schools were sampled.

3.4.2. Sample size

As outlined by Mugenda and Mugenda (2003) the study sampled the minimum 30% of the whole target population for the study. The fourteen schools had 14 principals and a total of 243 teachers.

The study therefore sampled 30% of the teachers and all the principals to make the sample population at 81 teachers.

3.5 Data collection procedures and tools

The study adopted interviews administered through questionnaires to collect data. As alluded by Nardi, (2018), questionnaires are mostly used to get information on contemporary issues and practices. Questionnaires also help in making inquiries regarding to opinions and attitudes in precise forms. According to McGuirk and O'Neill (2016), questionnaires also provide a low-cost method of data collection from an extensive target population. The study collected opinions from classroom teachers and principals/deputy principals. Secondary data were collected from literature review from the internet, relevant books and journals.

For ethical reasons, the study sought for a research authorization from the National Council for Science and Technology and the Ministry of Education Science and Technology. The County Director of Education of Kasarani sub-county was also informed of the research and the period it would be undertaken. Letters of introduction were then sent to round to the school administrators of the sampled schools for the study. This was aimed at creating rapport and putting forth data confidentiality agreement with the institutions. Each member selected was given instructions on the data filling procedures on the questionnaires. The respondents were given time limits within which they were expected to write out their responses. The filled up questionnaires were then collected, cleaned and prepared for coding.

3.7 Reliability of the data collection tools

Research tool's reliability is the degree to which it can yields consistent results if continual administrations are done (Hulland, Baumgartner, and Smith, 2018). To ensure this; the study

conducted a baseline to ascertain the relevance and clarity of the tools. This was done in three schools, selected purposively. The responses from each of the Principals, deputy Principals and the teachers were used as qualitative information to accentuate the association between the corresponding data for the two times the instruments were administered.

3.9 Empirical data analysis and presentation

Data analysis was mainly descriptive. Quantitative data was cleaned, coded and keyed into SPSS version 16.0, a statistical data analysis tool for analysis. Results from the analysis were presented in charts and tables. The degrees of correlation (r) between continuous variables are measured using Karl Pearson's coefficient while Spearman correlation have been used between discrete independent and dependent variables. Chi-square tests were also applied to analyze the interactivity between the study variables.

CHAPTER FOUR

4.0 Data Analysis, Presentation and Discussion

Introduction

This study explored on the success factors in the integration of ICTs in public secondary schools in the urban informal settlements of Kasarani, Nairobi, Kenya. It assessed the state of ICT infrastructures in public secondary school, determined the level of ICT integration, assessed the influence of ICT infrastructure on ICT integration in public secondary school and investigated the challenges facing ICT integration of public secondary school. This chapter presents the study findings under these themes and demographic attributes of the education stakeholders in the public schools to which the study was undertaken. It also discusses those findings in line with the views that had been advanced earlier in the study in the literature review.

4.1 Response rate

The school principal, deputy principals and teachers were the main respondents. A total 71 questionnaires were administered to the teachers and submitted back. Eleven were incomplete and therefore excluded from the study as shown the table 4.1 below. All the principals and deputy principals returned their filled questionnaires.

Table 1: **Questionnaires return rate**

| Respondent | Returned | Unreturned |
|-------------------|------------------|-------------------|
| Principals | 10(94.4%) | 0(0%) |
| Deputy principals | 4(99.2 %) | 0(0%) |
| Teachers | 71(94.4%) | 11(5.6%) |
| Total | 85(88.5)% | 11(11.45%) |

Only 87 % of the questionnaires were returned after the interviews. This was so as some of the teachers were not very receptive to feel the questionnaires on the spots. Even with that, this was relatively a good follow up.

4.2 Demographic Information for the respondents

This was based on gender, age, academic qualifications, and their years of teaching experiences.

4.2.1 Gender distribution of respondents

The gender distribution for the respondents was presented as in Table 4.2.

Table 2: **Gender Distribution**

| Respondent | Male | Female |
|-------------------|------------------|------------------|
| Principals | 2(20%) | 8(80%) |
| Deputy principals | 3(66.7%) | 1(33.3%) |
| Teachers | 55(77.46%) | 16(22.5%) |
| Total | 60(70.6%) | 25(29.4%) |

From the above table, most 70.6% of the respondents were males. A majority of the principals were females. This wasn't a very good gender distribution and therefore much needed to be done to ensure gender equity within the teaching fraternity.

4.2.2: Age distribution of respondents.

These are as described as in the table 4.3 below.

Table 3: Age distribution of respondents

| Age | Principals | Deputy principals | Teachers |
|----------------|-------------------|-------------------|-------------------|
| 20 – 25 years | 0(0%) | 0(0%) | 21(29.6%) |
| 26 – 30 years | 0(0%) | 0(0%) | 15(21.1%) |
| 31 – 35 years | 0(0%) | 0(0%) | 13(18.3%) |
| 36 – 40 years | 0(0%) | 1(25%) | 10(14.1%) |
| 41 – 50 years | 3(30%) | 1(25%) | 6(8.5%) |
| Above 50 years | 7(70%) | 2(50%) | 6(8.5%) |
| Total | 10(100.0%) | 4(100.0%) | 71(100.0%) |

From the table, over 70% of the principals interviewed were above 50 years. None of the principals and deputy principals was below 36 years of age. Majority of the class room teacher were below 30 years of age. This was auspicious as such group of teachers very responsive to technology and can easily integrate ICT into their day to day classroom activities.

4.2.3 Level of professional trainings (PT)

Table 4: Level of professional trainings

| Level of PT | Principals | Deputy principals | Teachers |
|-----------------|-------------------|-------------------|-------------------|
| Diploma | 0(0%) | 0(0%) | 2 (2.82%) |
| Degree and PGDE | 6(60%) | 1(25%) | 3 (4.2%) |
| Degree | 0(0%) | 1(25%) | 47 (66.2%) |
| Masters | 4(40%) | 2(50%) | 13(18.3%) |
| PhD | 0(30%) | 0(0%) | 1(1.4%) |
| Total | 10(100.0%) | 4(100.0%) | 71(100.0%) |

Majority, 66.2%, had acquired degrees. Only one class room teacher had PhD with two having diplomas. This result is similar to that of Huth *et al.* (2018) that highlighted that currently, all the teachers in secondary school have the prerequisite to teach in secondary schools and therefore integrate ICT in teaching and learning.

4.2.4 Level of ICT training

Table 5: Level of ICT training

| Level of ICT training | Principals | D/principals | Teachers | Total |
|---------------------------------|-------------------|------------------|-------------------|-----------------|
| No training | 0(0%) | 0(0%) | 6 (8.5%) | 6(7.1%) |
| Certificate Proficiency package | 6(60%) | 4(100%) | 53(74.6%) | 63(74.1%) |
| Professional ICT certificate | 0(0%) | 0(0%) | 9 (12.7%) | 9(10.6%) |
| Diploma in ICT | 4(40%) | 0(0%) | 3 (4.2%) | 7(8.2%) |
| Total | 10(100.0%) | 4(100.0%) | 71(100.0%) | 85(100%) |

Most of the respondents had certificates on proficiency packages with only 7.1% without any training. Incidentally all the teachers interviewed stated that they had knowledge on ICT integration in teaching and learning. Such results have a positive bearing on the integration of ICT in the education sector. For the teachers without ICT training, measure should be put in place to ensure that they go for further training on ICTs to facilitate the integration of ICTs in teaching and learning.

4.2.5 Teaching experience

Table 6: Teaching experience

| Level of ICT training | Principals | D/principals | Teachers |
|-----------------------|-------------------|------------------|-------------------|
| 5 years and Below | 0(0%) | 0(0%) | 25(35.2%) |
| 5-9 years | 0 (60%) | 0(0%) | 13(18.3%) |
| 10-14 years | 0(0%) | 2(50%) | 6(8.1%) |
| 15 years and above | 10(100%) | 2(50%) | 27(38.0%) |
| Total | 10(100.0%) | 4(100.0%) | 71(100.0%) |

All the principals of the schools had over 15 years of teaching experience. About 38.0% of the classroom teachers had over 15 years of teaching. The number was almost the same to the teacher who had five years and below of teaching experience. Cumulative teaching has an advantage in the integration of ICT in the application of various pedagogies (cite). There was however, no notable relationship between level of ICT training and teaching experience. The study found a significant relationship between level of ICT training and professional training ($\chi^2=31.374806$, $df=12$, $p= 0.002^{***}$). This implied that as teachers develop professionally, so do they develop and

acquire more training on ICT skills. This, as highlighted by Bronswisky and Bruce (2018) has an influence on their delivery of pedagogy.

4.2.6 Average teaching lessons per day/week

Table 7: Average teaching lessons per day/week

| Average T/L per Week | Principals | D/principals | Teachers |
|----------------------|------------|--------------|------------|
| Below 10 | 10(100%) | 3(75%) | 0(0%) |
| 11-15 lessons | 0 (0%) | 1(25%) | 5(7.0%) |
| 16-20 lessons | 0(0%) | 0(0%) | 8(11.3%) |
| above 21 lessons | 0(0%) | 0(0%) | 58(81.7%) |
| Total | 10(100.0%) | 4(100.0%) | 71(100.0%) |

Over 81.8 % of the teachers had more than 21 lessons per week with 86.4% having about 4-6 lessons averagely per day. This is reflective of a high workload that might be a stumbling-block to the implementation of ICT policies. The result is also justified by Jacob *et al.* (2016).

4.3 The state of ICT infrastructure in public secondary school

The first objective for this study was to determine the current status of ICT integration in public secondary schools in urban informal settlements of Kasarani Sub County. The principals and class teachers were posed with items that sought the same.

Data was presented in the preceding section

4.3.1 Number of computers.

The study tried to find out the number of computers in schools in this area. When the principal and their teachers were asked to indicate the same, their responses were presented in Table 4.8.

Table 4.8: Number of computer in the schools

| Number of computers | Frequency | Percent (%) |
|---------------------|-----------|-------------|
| None | 0 | 0 |
| 1-5 | 2 | 14.3 |
| 6-10 | 3 | 21.4 |
| 11-15 | 2 | 14.3 |
| above 16 | 7 | 50.0 |
| Total | 14 | 100.0 |

Majority of the schools whose teachers were interviewed were County day. All the schools had at least a computer. This is positive in relation to the implementation of ICT policies and the integration of ICTs in the education sector. Most of the County day schools had more than 16 computers in the school. County boarding schools had the least number of computers as per this study.

4.3.2 Computer position

The study also found out the locations in which the computers were placed in the various institutions and presented it in the table 4.9 as follows:

Table 8: Computer position

| Computer position | Frequency | Percent (100%) |
|-------------------|-----------|----------------|
| Offices | 3 | 21.4 |
| Computer lab | 10 | 71.4 |
| Staffroom | 1 | 7.1 |
| Total | 14 | 100.0 |

In most schools, the computers were placed in the computer labs. It was in only 7.1 % of the total number schools that the interview was done were there computers were positioned in the staffroom. Incidentally, most of the school with the computer found in the computer labs, had computer studies as a subject offered to the students. In all the schools however, there was none that had a computers in the class. Asked, the teachers stated that if they had to have an ICT integrated lesson then they were poised to relocate the lesson to the computer labs. This, nonetheless was a challenge as in many instances, there were clashes in the lessons.

4.3.3 Frequency of computer access

Table 9: Frequency of computer access

| Frequency of computer access | Never | Daily | Weekly | Monthly | Total |
|-------------------------------------|---------|-----------|-----------|-----------|--------------|
| Principals | 0(0%) | 4(4.7%) | 6(7.1%) | 0(0%) | 10(100%) |
| Deputy principals | 0(0%) | 3(3.5%) | 1(1.2%) | 0(0%) | 4(100%) |
| Teachers | 6(7.1%) | 26(30.6%) | 20(23.5%) | 19(22.4%) | 71(100%) |

About 30.6% of the teachers interviewed had a daily access to the computers. Only 7.1% didn't have access to computers in the school. This happens though all the schools had computers either in their labs, staffrooms or offices. A teacher harangued that his lack of access to the computers was due to the limited numbers that were available in the school. One of the teacher however stated that she had phobia to use of the computer. Regular exposure to the computers could help correct this. A correlation analysis done revealed significant relation between frequency of computer access and level of training ($\chi^2=35.119249$, $df=9$, $p=0.000***$). Most of the teachers with high level of professional development had less access to computer. This could be qualified by the explanation that most of them also had low level ICT training.

4.4 Level of ICT integration in public secondary school

The study also aimed to accentuate the level of ICT Integration in Public secondary school.

Findings on the same item are presented in the following section.

4.4.1 Use of computers

The teachers and principals were asked what they mainly used the computers for. Their responses were as follows.

Table 10: Use of computers

| Use of Computer | Frequency | Percent |
|-----------------------|-----------|---------|
| Typing | 43 | 50.6 |
| Research | 16 | 18.8 |
| Browsing the internet | 27 | 31.8 |
| Total | 85 | 100 |

Most of the computers available were used for typing, 50.6%. Only 18.8% of the teachers used the computers for research. In preparation of teaching materials, majority of the teachers used the computers to give assignments and set tests and exams. Most teachers highlighted that the materials mainly typed were examinations, letters, and memos among others. This was followed by browsing (27%). In preparation of teaching and learning, majority of the teachers used the ICT materials for assignment and tests. The study also ascertained that 92.4% of the schools interviewed had internet connections provided mostly by the ministry. Schools without internet connectivity were bound to have problems with ICT integration.

Asked what they used the internet for, the following were the responses as in table 4.12

Table 11: use of internet

| Use of internet | Frequency | Percent |
|--|-----------|---------|
| Communicate with friends and family | 21 | 24.7 |
| communicate with teachers, students on school | 8 | 9.4 |
| search for personal information | 12 | 14.1 |
| Search for Teaching and learning materials | 35 | 41.2 |
| Downloading Video material for teaching/learning | 9 | 10.6 |
| Total | 85 | 98.5 |

About 41.2% of the teachers use the internet to search for learning and teaching materials. Most of the teachers used the internet to communicate with friends and families with only 9.4 % using it to communicate with other teachers and students. Cross communication between teachers and the students should therefore be encouraged. This as had been opined by Zarman, *et al* (2011) which reported that, when used appropriately, ICT can help strengthen the importance of education to increasing networked society.

Even in that, about 8.4% of the teachers used the computers for purposes not highlighted including computer games and watching movies. There aren't studies that have ever been done to ascertain the influence of such results on integration ICT in education.

Table 12: Use of computer in preparation for teaching

| Prep of T/L material | Frequency | Percent |
|-------------------------|-----------|---------|
| PowerPoint presentation | 10 | 11.8 |
| CD-ROM materials | 8 | 9.4 |
| Assignment and tests | 38 | 44.7 |
| Video (Clips/Programs) | 9 | 10.6 |
| Audio | 12 | 14.1 |
| None | 8 | 9.4 |
| Total | 85 | 100.0 |

4.5 Effects of internal (Institution condition) factors on ICT integration in public secondary schools in urban informal settlements of Kasarani Sub County.

The second objective of this study was to assess the effect of internal (institutional) factors on ICT integration in secondary school in the urban informal settlements. To attain this objective, the respondents were required to point out their opinion concerning the given statements on a 5- Likert scale where; U – Undecided, D -Disagree, and SD- Strongly Disagree, A – Agree, SA-Strongly Agree.

The respondents were asked for their opinions on if internal factors (within their various institutions) could affect the integration of ICT in teaching. Their responses were as follows in table 4.13:

Table 13: Teachers response on effects of internal factors on integration of ICT In education

| Statement | SA | A | U | D | SD | Total |
|-------------------|-----------|-----------|----------|-----------|-----------|--------------|
| Principals | 4(40%) | 4(40%) | 1(10%) | 1(10%) | 0(0%) | 10(100%) |
| Deputy principals | 1(25%) | 2(50%) | 1(25%) | 0(0%) | 0(0%) | 4(100%) |
| Teachers | 20(28.2%) | 26(36.6%) | 6(8.5%) | 10(14.1%) | 9(12.7%) | 71(100%) |

About 36.6% of the students agreed that internal factors affect the integration of ICT in the education sector. Only 12.7% of the teachers strongly disagreed that internal factors have no influence on the integration of ICT in teaching and learning. Fifty per cent of the deputy principals agreed with the statements.

The teachers had the following responses on the internal factor affecting the integration of ICT in teaching.

Table 14: Internal factors affecting the integration of ICT in teaching and learning

| Statement | SA | A | U | D | SD | Total |
|--|-----------|-----------|-----------|-----------|-----------|--------------|
| Inadequate number of computers | 36(42.3%) | 25(29.4%) | 10(11.8%) | 8(9.4%) | 6(7.1%) | 85(100%) |
| Lack of internet connectivity | 23(27.1%) | 26(30.1%) | 11(12.9%) | 10(11.8%) | 15(17.6%) | 85(100%) |
| Lack of access to computers | 23(27.1%) | 30(35.3%) | 16(18.8%) | 8(9.4%) | 8(9.4%) | 85(100%) |
| Insufficient or irregular power supply | 28(32.9%) | 20(23.5%) | 16(18.8%) | 13(15.3%) | 8(9.4%) | 85(100%) |

| | | | | | | |
|--|-----------|------------|-----------|-----------|----------|----------|
| High cost of hardware and software | 28(32.9%) | 19(22.4%) | 14(16.5%) | 15(17.6%) | 9(10.6%) | 85(100%) |
| Unavailability of appropriate software | 28(32.9%) | 27(31.8%) | 20(23.5%) | 6(7.1%) | 4(4.7%) | 85(100%) |
| Structural arrangement of computers | 33(38.8%) | 12(14.1%) | 20(23.5%) | 14(16.5%) | 6(7.1%) | 85(100%) |
| Computers are very old and slow | 22(25.9%) | 28(32.94%) | 14(16.5%) | 12(14.1%) | 9(10.6%) | 85(100%) |

About 42.3% felt that inadequate number of computers affected the integration of ICT in teaching and learning. Only 7.1% of the same teachers strongly disagreed to this statement. About 30.1% of the teachers agreed that lack of internet access had an influence on integration of ICT while 17.6 strongly disagreed to this statement. Only 35.3 % felt that lack f access to computer had an influence on ICT integration. Asked why, majority stated that ICT integration goes beyond the use of only computers; it is broad. Only 32.9% of the teachers had the opinion that insufficient or irregular power supply influence ICT integration.

4.6 Effects of external (Government role) factors on ICT integration in public secondary schools in urban informal settlements of Kasarani Sub County

The factors highlighted below are mainly functions of the ministry of education in coordination with the teacher’s employer, TSC. Those that have an effect on integration of ICT have been tabled as in 4.15.

Table 15: external factors affecting the integration of ICT in teaching and learning

| Statement | SA | A | U | D | SD | Total |
|--|-----------|-----------|-----------|-----------|-----------|--------------|
| Lack of finance to train on use of ICT programs | 28(32.9%) | 33(38.8%) | 16(18.8%) | 7(8.2%) | 1(1.1%) | 85(100%) |
| Insufficient amount of pre-service training on ICT | 21(24.7%) | 35(41.2%) | 20(23.5%) | 8(9.4%) | 1(1.1%) | 85(100%) |
| Lack of time for in-servicing staff on ICT | 18(21.2%) | 27(31.8%) | 22(25.9%) | 8(9.4%) | 10(11.8%) | 85(100%) |
| Few technician to help teachers with the computer hardware or the software | 30(35.3%) | 22(25.9%) | 18(21.2%) | 9(10.6%) | 11(12.9%) | 85(100%) |
| High cost of computer maintenance and upgrading | 40(47.1%) | 25(29.4%) | 13(15.2%) | 5(5.9%) | 2(2.4%) | 85(100%) |
| Lack of time for training and exchange ideas with experts on how to use new technologies | 12(14.1%) | 13(15.3%) | 28(32.9%) | 15(17.6%) | 17(20.1%) | 85(100%) |
| Lack of enough workshop/seminar on ICT integration on teaching and learning | 39(45.9%) | 21(24.7%) | 16(18.8%) | 4(4.7%) | 5(5.9%) | 85(100%) |

About 38.5% agreed that lack of finance to train teachers and school technicians on use of ICT programs has an effect on integration of ICT in teaching. Only 1.1% strongly disagreed that the

statement did not hold. About 24.7 % of the teachers had the opinion that insufficient amount of pre-service training on ICT had an effect on integration on ICT integration while 23.5% were undecided. Currently, it is the responsibility of the ministry of education to employ all the technicians who work. Teachers were asked if the number of technicians helping them on organization of ICT materials during lesson had an effect of ICT integration revealed the following results. About 35.3 % strongly agreed to the statement while 12.9% strongly disagreed to the same. Those strongly disagreeing stated that most of them had insight on ICT materials installation and therefore did not see the need to even employ the technicians.

These results confirms that External factors affects the integration ICT in teaching and learning

CHAPTER 5

Summary, Conclusions and recommendation

5.2 Summary

This study aimed at assessing the success factors in the integration of ICTs in teaching and learning in the public secondary schools of the urban informal settlements. It was guided by four research objectives; to determine the current status of Information Communication Technology integration, to determine internal (Institution condition) factors affecting the integration, to determine external (Government role) factors affecting the integration of ICTs and to assess how scarcity of resources challenges integration ICTs in public secondary schools in urban informal settlements of Kasarani Sub-county.

Data was collected from a sample of 10 principals, four deputy principal and 71 class teachers. The study found that most secondary schools (50%) had more than 16 while less than 14.3% had less than 5 computers. This therefore meant fewer impediments towards integration of ICT since computers are important tools towards integration of ICT in teaching and learning. Physical observation of other ICT materials revealed their existence in most of the schools. Majority of the schools have woofers, radios, Radio number, television, DVD Player, projectors and public address system. This was positive in terms of integration of ICT in secondary schools.

In all the schools that the data used for this study was done, they teacher there stated that they had internet connections. This was auspicious. Most of the teachers used the internet to search for teaching and learning materials. The study also shown that majority that is 44.7% of schools used the computers for typing. These materials includes; examinations, letters, and memos among others. This was followed by browsing (31.8%) and research (18.8%) implying high integration of ICT. The least use on ICT was record keeping (5%) implying most schools are still relying on the

old methods of information keeping where files were mostly used. The study established that 45.5% of the schools mainly use internet that are provided by the ministry of education. With regards to factors influencing the integration of ICT in teaching and learning, the study ascertained that both factors, external and internal have an effect.

5.3 Conclusion

The study concludes that many schools have sufficient number of computers, with internet connectivity. However, some school teachers are unable to access the internet irregular availability. Some schools had few computers due to the s high cost of hardware and software needed in ICT installation. This was an impediment towards integration of ICT in secondary schools. The researcher also concluded that many schools use the computers for typing materials only. These materials include; examinations, letters, and memos among others. This implies that there is less use of internet in most schools. It was finally concluded that, the challenges facing adoption of ICT in many schools includes; lack of enough computers, lack of computer knowledge among many principals and teachers, lack of internet connectivity and lack of power among others.

5.4 Study recommendations

- i. The schools and government should have a clear policy for the integration of ICT infrastructure for administrative purposes.
- ii. The schools should have policies put in place on school staff development both the teaching and non-teaching staff.
- iii. The government should support the use of ICT in school and provide them with financial means and equipment.

5.5 Suggestion for further research

Further research can be done on the following;

- i. The impact of using computer-assisted learning in achieving learning objectives in specific subjects.

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APPENDICES

Appendix 1

Introductory Letter

P.O BOX 1458-00515,

NAIROBI

TEL.NO. 0722521730

Dear Sir/Madam,

REF: RESEARCH PROJECT

I am an ICT integration officer and technician pursuing a Masters in Information Technology Management from University of Nairobi. I am undertaking a research project on analysis of success factors in integration of information communication technologies in public secondary schools in the urban informal settlements from the perspective of Principals and teachers. The information gathered will be confidential and strictly used for academic purpose only. Please provide honest and correct information according to your own views objectively in the questionnaire provided. Thank you.

Yours Faithfully,

Pauline Ashioya Yatoli

Appendix: 2

Questionnaire for Teachers

INTRODUCTION

The researcher is carrying out a research analysis of success factors in integration of information communication technologies in public secondary schools in the urban informal settlements. Please don't write your name on the questionnaire. Answer the questions objectively and provide accurate information to the best of your knowledge. Use a tick (✓) to show your response where applicable, response can also be written.

A. BIO-DATA

(i) Gender Male Female

(ii) Level of professional training

Masters Degree and PGDE

Degree Diploma

(iii) Teaching experience

15 years and above 5-9 years

10-14 years Below 5 years

(iv) What is the level of ICT training?

Certificate Proficiency packages

Diploma in ICT

(v) What is the average teaching lesson per week?

(vi) What is the average lesson per day?

B. SCHOOL BACKGROUND

i) Category of the school

County Boarding

County day

Sub-county boarding

District day

ii) Does your school have computers?

Yes

No

If yes how many?

iii) Where are the computers placed?

Office

Staffroom

Computer lab

Classroom

iv) How often do you access the computer?

Weekly

Monthly

Never

v) How do you use the computers available?

a. Micro-soft Office

b. Research

Browsing the internet

Encyclopedia

c. Preparation of teaching- learning materials

PowerPoint presentations

CD-ROM materials (VCD/DVD)

Assignments and tests

(vi) Do you have internet connection in schools? Yes No

If yes, how are you connected?

Pre- paid modem

Internet server

(vii) How do you use the internet?

a) Communicate with friends and family

b) Communicate with other teachers or students on school related matters

c) Search for personal information

d) Search for teaching and learning materials

(ix) Apart from computers, what are other telecommunication facilities in school?

| Facility | RADIO | TV | DVD | PROJECTOR |
|----------|-------|----|-----|-----------|
| Number | | | | |

(x) How are the facilities used?

Entertainment

Access broadcast lessons

Access CD- ROM learning materials

C. ICT INTEGRATION IN TEACHING AND LEARNING

Indicate the extent to which you agree with the following on ICT integration in teaching and learning. **SA-Strongly agree, A- Agree, U- Uncertain, D- Disagree,**

SD- strongly disagree

| NO. | Impact | SA | A | U | D | SD |
|-----|---|----|---|---|---|----|
| 1. | There is increased use of micro-soft office applications | | | | | |
| 2. | There is increased instructional materials in the internet | | | | | |
| 3. | ICT would improve the presentation of work in class | | | | | |
| 4. | Students use the multimedia technology | | | | | |
| 5. | Provision of professional support through the internet(Online learning) | | | | | |
| 6. | Improve productivity | | | | | |

D. ICT INFRASTRUCTURE AND ACCESS

Indicate the extent to which the following factors affect the use of ICT in teaching and Learning. **SA-Strongly agree, A- Agree, U- Uncertain, D- Disagree, SD- strongly disagree**

| NO. | Factor | SA | A | U | D | SD |
|-----|--|----|---|---|---|----|
| 1. | Inadequate number of computers | | | | | |
| 2. | Lack of internet connectivity | | | | | |
| 3. | Lack of access to computers | | | | | |
| 4. | Insufficient or irregular power supply | | | | | |
| 5. | High cost of hardware and software | | | | | |
| 6. | Unavailability of appropriate software | | | | | |
| 7. | Structural arrangement of computers | | | | | |
| 8. | Computers are very old and slow | | | | | |

E. ICT KNOWLEDGE AND SKILLS

Can computer improve the efficiency and effectiveness in teaching and learning in schools?

Yes No

If yes, why do you think this has not been achieved? **SA-Strongly agree, A- Agree, U- Uncertain, D- Disagree, SD- strongly disagree**

| NO. | Reasons | SA | A | U | D |
|-----|--|----|---|---|---|
| 1. | Lack of finance to train on use of ICT programs | | | | |
| 2. | Insufficient amount of pre-service training on ICT | | | | |
| 3. | Lack of time for in-servicing staff on ICT | | | | |
| 4. | Lack of familiarity with good practice rooted on understanding of how learners learn | | | | |
| 5. | Lack of adequate students training on how to use the computers | | | | |

F. TECHNICAL SUPPORT

Indicate to what extent the following factors influence integration of ICT in teaching and learning.

SA-Strongly agree, A- Agree, U- Uncertain, D- Disagree, SD-strongly disagree

| NO. | Factors | SA | A | U | D | SD |
|-----|--|----|---|---|---|----|
| 1. | Lack of technician to help teachers with the computer hardware or the software | | | | | |
| 2. | High cost of computer maintenance and upgrading | | | | | |
| 3. | High cost of staff training on computer maintenance | | | | | |
| 4. | Fear of computer and technology breakdown during teaching process | | | | | |
| 5. | Frequent breakdown of computer and other digital equipment | | | | | |

G. SCHOOL ADMINISTRATION

Indicate the extent to what do you agree that the following reasons influence the adoption of ICT in school. **SA-Strongly agree, A- Agree, U- Uncertain, D-Disagree, SD- strongly disagree**

| NO. | Factors | SA | A | U | D | SD |
|------------|--|-----------|----------|----------|----------|-----------|
| 1. | Lack of enough time to research and prepare digital materials for the class | | | | | |
| 2. | Inadequate scheduled time and opportunities to interact and share experience of rising new technologies with peers | | | | | |
| 3. | Lack of time for training and exchange ideas with experts on how to use new technologies | | | | | |
| 4. | | | | | | |

THANK YOU

Appendix: 3

Interview Guide for Principals

1. Gender

Male

Female

2. Year of experience as a principal

Above 15 years

11-15 years

6-10 years

1-5 years

3. Does your school have ICT policy and plan?

Yes

No

4. Does your school have a culture of technology use i.e. in teaching and learning?

5. How many computers do you have in your school?

6. How did you acquire them?

7. Is your school connected to the internet?

8. What is the main use of the internet?

9. What is the estimate budget of ICT in you school and how do you finance the budget?

10. Does the government grant any extra funds for the ICT education at your School?

Yes No

11. If yes how do you use the budget allocation?

a. Classroom infrastructure; the purchase of hardware and software

b. Supplement of running and working expenses

c. Human resource development including hiring and training teachers

12. What tasks are undertaken by use of computers by both teaching and non-teaching staff?

13. Does your school have a teacher(s) who specialize in ICT education?

14. Who pays him/her? PTA/BOG Government

15. Are the teacher given a chances and opportunities to learn to integrate computers into their classroom practices?

16. Do you believe that teacher are motivated adequately to use ICT in teaching and learning in terms of:

Training Administrative support

17. Do you think teaching load for teaching influence use of technologies in teaching and learning

Appendix: 4

Observation Schedule

Upon visiting the schools the researcher will seek to make the following observations in the schools.

1. Presence of a computer laboratory
2. The number of computers in the school
3. The main location of computer
4. Presence of other telecommunication facilities
5. If there is electricity supply and a generator for power back-up