SCHOOL FACTORS INFLUENCING ADOPTION OF INFORMATION COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING IN SECONDARY SCHOOLS IN WESTLANDS, KENYA

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DECLARATION

This project is my original work and has not been presented for a degree in any other university.

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This study is dedicated to my parents, Ibrahim Sa'adallah and Khadija Hajj Anyasi, who firmly put me on the path of education through sacrifice and endurance.

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ABSTRACT

The advent of Information and Communication Technology (ICT) has opened up tremendous opportunity and challenges in our quest for meeting the global demands of globalization and economic development. The purpose of this study was to determine school based factors that influence adoption of ICT in teaching and learning in secondary schools in Westland's Sub-County, Kenya. The specific objectives were as follows, To determine the influence of in-service support offered to teachers on adoption of ICT in teaching and learning in secondary schools in Westland's Sub-County, to identify the influence of teachers' attitudes towards adoption of ICT in teaching and learning in secondary schools in Westland's Sub-County and to examine if subject area is influences the adoption of ICT in teaching and learning in Westland's Sub-County. The research was anchored on Innovation Diffusion Theory (IDT), which is used in studying individual's technology adoption. This study adopted a descriptive methodology design where by quantitative tools were used to collect data. The target populations of this study was 16 private and 10 public secondary schools, 160 teachers and 16,830 students in Westland's Sub-County. The study used a sample of 8 secondary schools, 23 teachers and 110 students. Questionnaires were used to collect data from teachers and students, Quantative data was analyzed using descriptive statistics as well as inferential statistics which included Chi Square. The findings from different data sets were synchronised during the presentation and discussion.From the foregoing, Study found out that adoption of ICT was a major influence on teaching and learning, which was a clear indication that schools appreciated the role of ICT in education. However, there was a small number of respondents who felt that ICT had no major influence on teaching and learning. It is essential to note that the respondents only differed on the degree of influence of ICT on teaching and learning. The study found out that secondary schools offered different kinds of support to their teachers, especially those who have adopted ICT in their teaching and learning. There was a relatively even distribution in terms of area of support by schools to the teachers who have adopted ICT in teaching. The study revealed that the teacher's attitude influenced their levels of adoption of ICT as a tool in teaching and learning. The study found out that the science oriented subjects were most compatible in terms of curriculum with ICT adoption. The main conclusion from the study was that from the findings, the study found that adoption of ICT influences teaching and learning positively. Teachers were also supported in adopting ICT as a tool in teaching and learning. Teacher's attitude influences their adoption of ICT whereby their attitude is determined by their education levels. The use of ICT as a tool in subject's areas was determined by the subject's content and the study concluded sciences followed by Humanities were compatible with ICT. The study recommends that the institutions alongside the ministry of Education should find a way to increase the time period of class lesson. This will increase the teacher/ student exposure to the technology thus improves on the learning and teaching rate. The institutions environment should be designed to accommodate ICT. Infrastructure such as laboratories should be equipped well than the current status to be able to accommodate more number of students.

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Abreviations and acronyms

ICT   Information and Communication Technology

MOEST   Ministry of Education Science and Technology

GoK   Government of Kenya

EU   European Union

UK   United Kingdom

UNESCO   United Nations Educational, Scientific and Cultural Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The advent of Information and Communication Technology (ICT) has opened up tremendous opportunity and challenges in our quest for meeting the global demands of globalization and economic development. Provision of education to citizens by nations is one of the prerequisite for economic and social development. Globalization and shift to a 'knowledge- based economy' requires that existing learning institutions develop individuals with the ability to transform information into knowledge and to apply that in a dynamic, cross-cultural context and ICT is a means for meeting these challenges. ICT offers both challenges and promises for social and economic development (Ng, Miao & Lee, 2006). The most dominant aspect of ICT in education is its capability in supporting every aspect of the teaching learning process.

ICT is becoming increasingly necessary in different facets of our daily lives and the education sector is no exception. According to Omwenga (2007) educational systems around the world are increasingly becoming pressurized to incorporate Information and Communication Technology (ICT) to teach students the knowledge and skills required in the 21st century. The 21st century has offered people many choices, opportunities as well as new challenges with the revolution of technology. The rapid growth in ICT has influenced remarkable changes in the world today and affected how things are done in the modern society (Omwenga, 2007).

Our increasingly technology-rich world raises new concerns for education while at the same time expecting schools to become vanguard of knowledge societies (Scheurmann & Pedro, 2009). ICT has without doubt shaken the traditional methods of teaching and learning as well as presented new challenges to learning institutions. Yusuf (2005) asserts that the field of education has been affected by ICT, which undoubtedly has affected teaching, learning and research.

Realizing the effect of ICT on the workplace and everyday life, educational institutions are aligning their educational structures and facilities in order to bridge the existing technological gap in teaching and learning. Adoption of ICT as a tool to support teaching and learning will inevitably require from teachers and students changes in teaching approaches and teaching paradigms; and such changes will necessitate the adoption to new methodological approaches, educational concepts and management aspects- which all will have to be in technologically enriched environments (Yusuf, 2005).

In many Kenyan schools, teachers prefer the traditional pedagogical approaches over the use of ICT oblivious of the fact that ICT can significantly enhance the quality of teaching and students' learning experiences. Somekh (2008) argues that ICT is a powerful driver for educational change if used in the right manner, and help to create a less stressful environment for both teachers and students. With ICT being a driver in the global economy, schools have started adopting ICT in their systems as they prepare students for the job market (Somekh, 2008).

Establishment of a computer supply program that will equip students with current ICT skills was among the Flagship Education and Training Projects in 2012 as indicated in

Vision 2030 (GoK, 2007). This is a clear testimony of the fact that ICT use in schools is supported at the government policy level. In the Sessional Paper No. 1 of 2005 the government appreciates and recognizes that ``an ICT literate workforce is the foundation on which Kenya can acquire the status of a knowledge economy''(GoK, 2005:79). Education is identified as the viable platform for equipping the nation with ICT skills. It is believed that successful introduction and use of ICT in education and training institutions will play a major role in disseminating skills to the wider society and thus create positive impacts on the economy (Kipsoi *et-al*, 2012). The policy framework envisages the following for a change:-

"Information and communication technology has a direct role to play in education and if appropriately used, ICT can bring many benefits to the classroom as well as education and training processes in general. Its use will provide new opportunities for teaching and learning, including, offering opportunity for more student centered teaching, opportunity to reach more learners, greater opportunity for teacher-to-teacher, and student-to-student communication and collaboration, greater opportunities for multiple technologies delivered by teachers, creating greater enthusiasm for learning amongst students, and offering access to a wider range of courses..(Republic of Kenya, (2005:80)

McGorry (2002), documented the following as reasons for adoption of ICT in education: reducing costs for students, making education more affordable and accessible, increasing enrollment, improving the quality of courses and meeting the needs of employers. Another impetus is the pressure of competition and the positive experiences of early adopters. These reasons are the incentives that would encourage institution into adopting

ICT, but the school based factors affecting the adoption of ICT are yet to be extensively researched on.

Though it is worth to note that ICT phenomenon has relatively not taken root in the developing world. Available data, suggest that the majority of developing countries such as Kenya in sub-Saharan Africa are lagging behind in the information revolution (Zhao & Frank, 2003). Not surprisingly, the quest for adoption of ICT in educational has been problematic and will require fundamental shifts in the regulatory environment, as well as renewed attention to the factors that affect its adoption. For example, developed countries have 80 per cent of the world's Internet users, while the total international bandwidth for all of Africa is less than that of the city of São Paulo, Brazil (Campbell & Sellbum, 2002).

Adopting ICT into classroom teaching and learning is not as easy as it may sound. The process is complex and often run into difficulties. Schoepp (2005) called these difficulties "barriers" and defined them as conditions that make it difficult for a person or organization to progress or achieve an objective. School managers, teachers and students are confronted with challenges that include acquisition of skills and literacy in the usage of ICT and delivery of the requisite tools that will lead students to become knowledge creators and users (Schoepp, 2005). This forces learning institutions to adopt different strategies in the setting up of ICT infrastructure. The first strategy that many schools have adopted is the establishment of the technical infrastructure. Bates (2001) says that the strategy adopted by many schools in establishing ICT infrastructure should consist of physical elements such as desktop computers, laptops, software, projectors, data servers, networks, telecommunication links, as well as human resources. Green (2000) identified

infrastructure as a critical catalyst for the adoption of ICT in teaching and learning process. He also noted that establishment of technical infrastructure is usually considered the first strategy that most institutions adopt.

Zhao and Frank (2003) opined that more schools and communities have access to ICT resources that enable them to join the global economy as demanded by the 21st century and inspired by life-long learning. The adoption of ICT as a tool to enhance teaching and learning by educational institutions is a powerful way to contribute to educational changes, better prepare students for the information age, improve learning outcomes and competencies of the learners, and equip students with survival skills for the information society (Daniels 2002). Therefore, schools are expected to integrate ICT into their teaching and learning process.

ICT adoption in secondary schools and how to effectively use it as a tool in teaching and learning is a key challenge to many institutions. Kenya as a country seeks to build a development oriented information society. The then Ministry of Education in conjunction with the Ministry of Information Communication and Technology sought to better incorporate ICT into secondary school curricular by coming up with a policy framework in 2006 (GoK, 2006).

A lot of research has been carried out in connection with ICT use in education in several ways. For example, The BECTA group (2003) researched on the barriers to using ICT globally and in its findings reported that the barriers can be classified into four factors; resource-related factors; factors associated with training, skills, knowledge and computer experience; attitudinal and personality factors and school and cultural factors.

Unfortunately the report did not go further into identifying the school based factors affecting the adoption of ICT in schools. The UNESCO report (2002) found out that ICT adoption in the education sector is lagging behind and identified the following factors as barriers to adoption of ICT: mission or purpose of a particular system, programs and curricula; communication and interaction, system support and distribution, students, tutors, staff and other experts, management, facilities and equipment and assessment.

A number of challenges currently facing access and use of ICT in Kenya are identified in the Sessional paper No. 1 of 2005 which include; high levels of poverty that hinder access to ICT facilities, limited rural electrification and frequent power disruptions. Where there is electricity, high costs of Internet provision, costs associated with ICT equipment, inadequate infrastructure and support hinder the application of ICT (GoK, 2005: 79).

From the examples above on the challenges facing the adoption of ICT into our secondary schools, there is a clear need to research on the school based factors affecting the adoption of ICT in Secondary schools in Kenya. The scenario pointed above proves the need for this research to plug in the existing gap on the school factors influencing adoption of ICT in teaching and learning.

1.2 Statement of the problem

Developments in the education field globally and challenging demands that come with the adoption of ICT have made a considerable shift in the structuring of ICT environment and the utilization of ICT technologies in learning institutions (Tomei, 2005). According to Daniels (2002) ICTs have become within a very short time, one of the basic building

blocks of modern society. This is majorly the reason many developing nations are integrating ICT in their education system to enhance access to education and learning.

Education policy frameworks in many countries, Kenya included have laid emphasis on promoting the infusion of ICT in teaching and learning, mostly in tandem with curriculum reforms that aim to enhance the development of 21st century skills.

ICT Education policy in Kenya started in early 1980s but started taking shape in 2000s. The structuring of ICT policies in education is seen as a very crucial step in preparing individuals in school for work place (Were, Rubagiza, Denley & Sutherland, 2007). Kenyan government developed a National ICT policy in 2006 for education and training with an overall objective of the plan being to ensure that systematic efforts are made towards strengthening adoption and use of ICT in the education sector (MoE, 2006). This research seeks to answer the question on whether the legal framework on ICT matches with the reality on the ground.

Adoption of ICT by learning institutions has progressed from acquisition of basic computer skills to use of computer as an aid to teaching and research. This progression has been influenced by various efforts that include integration to education curriculum, as determined by social and economic conditions of different institutions.

The area of ICT use in education has attracted quite a number of researchers in the recent past. Several researches demonstrate that there are varied factors affecting the adoption of ICT in schools that range from, lack of strong support from government at national and local level by relevant institutions and education authorities, technical difficulties, cost,

lack of strategies and coherent actions from the governments (Farrell et-al, 2007: Makhanu 2010& Tedla, 2012).

This means that many researchers have looked at other factors generally and availability of ICT infrastructure in the schools, but school based factors affecting ICT adoption in secondary schools has received very little attention if any. This study seeks to investigate school factors affecting the adoption of ICT in secondary schools.

1.3 Purpose of the study

The purpose of this study was to determine school based factors that influence adoption of ICT in support teaching and learning in secondary schools in Westlands Sub-County, Kenya.

1.4 Objectives of the study
The objectives of the study were:

1. To determine the influence of ICT in teaching and learning in secondary schools in Westlands Sub-County.

2. To determine the influence of in-service support offered to teachers on adoption of ICT in teaching and learning in secondary schools in Westlands Sub-County.

3. To identify the influence of teachers' attitudes towards adoption of ICT in teaching and learning in secondary schools in Westlands Sub-County.

4. To examine the influence of subject area in the adoption of ICT as a tool in teaching and learning in Westlands Sub-County.

1.5 Research questions

This research was guided by the following questions:

1. How does ICT influence teaching and learning in secondary schools in Westlands Sub-County?

2. What support is offered to teachers who have adopted ICT as a tool in teaching and learning in Westlands Sub-County?

3. How does teachers' attitudes towards ICT influence adoption of ICT in secondary schools in teaching and learning in Westlands Sub-County?

4. To what extent does subject area influence the adoption of ICT in teaching and learning in Westlands Sub-County?

1.6 Significance of the study

This study sought to generate useful insights that can be used by the government, learning institutions and other players in the education sector to promote the use of ICT in the Kenyan education curriculum which is one of the pillars in the attainment of Vision 2030. The attainment of Vision 2030 will be driven by ICT related skills and education is crucial in imparting this skills. The report of the research may also be published in different journals, books or materials which may be used as reference in scholarly research.

1.7 Limitations of the study

The research was confined within the Westlands sub-county, which is just one of the many sub-counties in Kenya. Another limitation was that the sample size for the research is only 16 out of the possible 60 schools in Westlands.

1.8 Delimitations of the study

This study was conducted in Westlands Sub- County in Kenya. The researcher targeted secondary schools in this area because Westlands Sub-County has both the schools for the affluent and those that are poorly funded. The sample population included head teachers, teachers and students. The study confined itself on the school factors influencing the adoption of ICT.

1.9 Assumptions of the study

The researcher assumed that the respondents would be co-operative and provide accurate information when filling the questionnaire which will be used as a data collection tool. It was also assumed that the time frame in which the research is expected to be done will be sufficient.

1.10 Definition of significant terms

Adoption refers the act of starting to use ICT

Information and Communication Technology (ICT) refers to an umbrella term that includes any communication device or application encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services application associated with them, such as video conferencing and distance learning.

Information communication and technology: refers to an integrated set of components for collecting, storing, processing, and communicating information.

School factors refers to factors within the school such as the principal's attitude towards ICT

In-service refers to training that one undergoes while working as teachers.

Subject area refers to a branch of knowledge offered in an institution of learning.

In-Service Support refers to aiding the cause through facilitation of the necessary requirements while one is already on the job.

Teachers' attitude refers to the opinion and feelings the teachers have towards the adoption of ICT

Teaching and learning refers to the process of imparting and receiving knowledge

Training refers to offering of skills to individual(s) that would lead to skilled behaviour in a specific area.

Influence refers to affect the way something develops or behaves.

1.11 Organization of the study

The research comprises five chapters, as follows: In chapter one, background information to the study on school factors that affect the adoption of ICT in secondary schools, statement of the problem, research objectives and research questions that the study seeks to answer, purpose of the study, and significance of the study, delimitations and scope of the study are discussed. Chapter two entails a review of the related literature on the school factors that affect the adoption of ICT as a tool that supports teaching and learning in secondary schools.

Chapter three deals with research designs and methods. A discussion of the research tools used in the study and the selection of the sample will be included. Details of the compilation and administration of questionnaires as well as an analysis of data will be presented. In chapter four, the results of questionnaires and interviews are presented. The results were analysed to find answers to the research questions. The chapter also entails a summary of the research findings, conclusions and recommendations. Chapter five entails the discussion of the findings, the conclusion and recommendations as a result of the findings from the study. This is followed with references and appendices sections.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter the researcher presents a review of the literature related to the subject under study. The researcher will extract information from several sources both electronic and written thought to be closely related to the topic and concepts under study "School factors affecting the adoption of ICT as a tool to support teaching and learning in secondary schools in Westlands Sub-County. In the process of reviewing literature in the study, the researcher will derive topics in this chapter from the objectives of the study.

2.2 Concept of ICT in Education

Information and communication technology (ICT) has fundamentally changed the practice and procedures of nearly all forms of life and education is no exception. The adoption of ICT in education lends itself to more student centered learning settings and with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance cannot be gainsaid (Daniels, 2002).

The advent of Information and Communication Technology (ICT) has opened up tremendous opportunity and challenges in our quest for meeting the global demands of globalization and economic development. Provision of education to citizens by nations is one of the prerequisite for economic and social development. Globalization and shift to a 'knowledge- based economy' requires that existing learning institutions develop individuals with the ability to transform information into knowledge and to apply that in a dynamic, cross-cultural context and ICT is a means for meeting these challenges. ICT

offers both challenges and promises for social and economic development (Ng, Miao & Lee, 2006). The most dominant aspect of ICT in education is its capability in supporting every aspect of the teaching learning process.

Information and communication technology (ICT) is increasingly playing a crucial role in shaping the 21st century global strategies in education and its impact on learning and teaching cannot be ignored. Bayindir and Inan (2009) feel that ICT is in essence affecting the way people teach and learn. Technology can influence the teaching and learning in our schools. Volman and van Eck (2001) observes that ICT creates a powerful teaching, research and learning environment and it transforms teaching process in which students deal with knowledge in an active but self directed and constructive way to benefit the people.

 OECD (2008) points out that the role of ICT is linked to educational attainment and its significance in advancing teaching and learning strategies. ICT is also seen as a tool for the support of personalization strategies in teaching and learning.

ICT in education globally covers a wide range of spectrum which include; thematically, administration and pedagogical.

In today's world, technology has always been presented as the driving force of the transformation of education and carries positive overtones that information and communication technology (ICT) will contribute to this transformation "for the better" (Fisher, 2006; Nivala, 2009; Ottestad, 2010).

ICT adoption into schools has been a focus of a wide range of policy initiated by different government globally. Tearle (2004) argues that the adoption of ICT into schools needs a

whole-school vision for ICT use, along with a role for school characteristics (internal structures), culture and ethos that support change, all with the expected support and the involvement of the school leadership.

Cuban (1986) asserts that factors that influence the adoption of ICT in schools comes from both the inside schools but mainly from the outside on the part of software, hardware and government.

Numerous studies across continents and cultures have documented different factors that affect the adoption of ICT into learning institutions as quoted by Ahmad (2008). For example; mismatch between available ICT and existing curricula (Albirini, 2006); lack of institutional support (Ageel, 2011); lack of funds and budget allocation (Alwani & Soomro, 2010); insufficient training (Al-Oteawi, 2002; Taylor & Corrigan, 2007); computer anxiety, ICT efficacy, and lack of confidence (Becta, 2004); teacher beliefs and attitudes (Chen, Tan, & Lim, 2012). Teachers' use of ICT for professional purposes focuses on improving their subject in order to enrich how they teach with a range of ICT applications. Teachers gain confidence in a number of generic and specialized ICT tools that can be applied to the teaching of their subject area. The opportunity to apply ICT in all their teaching is often limited only by a lack of ready access to ICT facilities and resources, which is why it is not fully adopted into all lessons for all students (Albirini, 2006).

According to Plomp et al. (2007), there is a great world-wide need to adopt ICT in education in order to improve pedagogy and to reflect social changes. Some of the reasons cited for adoption of ICT in teaching and learning include, reducing costs for

students, making education more affordable and accessibility, increasing enrollment, improving the quality of courses and meeting the needs of employers.

It is worthy to note that ICT has great potential of transforming the education through knowledge dissemination, effective learning, and the development of more efficient educational services. Adoption of ICT in teaching has been seen as a powerful way to contribute to educational change, better prepare students for the information age, improve learning outcomes and competencies of learners, and equip students with survival skills for the information society. Therefore, teachers are expected to adopt ICT into their teaching and learning processes.

2.3 Teachers use of ICT

The growth and spread of Information and Communication Technologies has brought about so many possibilities in establishing new approaches in teaching and learning. When ICT is used to promote student's knowledge construction and thinking, it can have positive impact on students' learning. Andoh (2012) opines that ICT has huge potential for knowledge dissemination, effective learning, and the development of more efficient educational attainment. The adoption of ICT is also seen as a powerful way to contribute to changes in education, prepare students for the information age, improve learning outcomes and competencies of learners, and equip students with survival skills for the information age. Therefore, teachers are expected to use ICT into their classrooms (teaching and learning process) (Andoh, 2012).

The successful adoption of ICT in learning institutions is largely dependent on teachers' support and attitudes. Onchwari (2008) believes that teachers' perception about

technology is a major factor in its adoption in the teaching and learning process. If they are positive about its use in education, then they can provide strong insight about its adoption into teaching and learning process and vice versa. Teachers' beliefs and skills are crucial with regard to the question whether or not to use ICT in classroom and the role of ICT in the teaching and learning process. Teachers have to see advantages of ICT use in order to be motivated to implement it in their teaching practice. Apart from this, if teachers are not confident about their capabilities in handling computers, this may hamper their willingness to introduce technology in their classroom. Teachers want to ensure that their students are learning and if technology can be a resource to enhance students' achievement and interest in learning, teachers are more likely to invest their time and energy to learn to use it in teaching (Onchwari, 2008).

Use of ICT by teachers challenges the traditional whole-class teaching, which leads to rise of individualized learning and cooperative learning. This requires specific teachers' skills in terms of individual management. Teachers are expected to move from traditional whole-class teaching to facilitating individualized, interactive; media based learning, stimulating students to accept far greater responsibility for their own learning (Corrigan, 2007). Teachers' lack of knowledge is the main hindrance to the adoption of ICT in education both in the developed and developing countries (Mamun & Tapan, 2009).

The adoption of ICT can help revitalize teachers and students. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with ICT as a tool to support teaching and learning. According to Zhao and

Cziko (2001) three conditions are necessary for teachers to adopt ICT into their classrooms: teachers should believe in the effectiveness of technology, teachers should believe that the use of technology will not cause any disturbances, and finally teachers should believe that they have control over technology. However, research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005).

Research has revealed that teachers' attitude towards technology influence the adoption of ICT in teaching and learning (Huang & Liaw, 2005).In a research conducted in EU involving six countries, number of participants believed that the use of netbook had positive impact on their learning, promoted individualized learning and helped to lengthen study beyond school day. However, evidence suggests that small number of teachers believe that the benefits of ICT are not clearly seen. The empirical survey revealed that one fifth of European teachers believed that the use of ICT in teaching did not benefit their students' learning (Korte & Husing, 2007). A survey of UK teachers also revealed that teachers' positivity about the possible contributions of ICT was moderated as they became 'rather more ambivalent and sometimes doubtful' about 'specific, current advantages' (Becta, 2008, p.45).

2.4 Support for teachers who have adopted ICT

The successful adoption of ICT in education depends largely on the skills and knowledge of teachers. Adopting ICT requires knowledge of the subject area, an understanding of how students learn and a level of technical expertise. Therefore, lack of knowledge,

support and skills regarding the adoption of ICT and lack of training have slowed the use of ICT tools in teaching and learning (Pelgrum, 2001).

Research in Portugal show different views from teachers regarding the most important support required for the adoption of ICT in education. The views differed depending on the level of experience. The experienced and new teachers stressed the need for technical skills and attitude, the innovative teachers' emphasized curricula and didactic competences and the student-teachers cited technical competence and pedagogical efficiency as significant to integrate ICT in teaching and learning processes (Peralta & Costa, 2007).

The issue of teacher support and training in ICT is quite a complex one because it contains several components to be considered to ensure the effectiveness of the training and support for easier adoption (Becta, 2004). The training and support can be staggered into pedagogical training, skills training and an ICT initial teacher training (ibid). Research conducted by Gomes (2005) concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in classroom, and lack of training concerning the use of technologies were obstacles to the adoption of ICT as a tool to support teaching and learning.

Providing pedagogical training for teachers, rather than simply training them to use ICT tools is an important aspect in the adoption of ICT as a tool to support teaching and learning in schools (Bacta, 2004). Research by Balanskat et al. (2006) indicates that if teachers are to adopt ICT as a tool to support teaching and learning, they need to be convinced of the value of using ICT in their teaching, thus their training in this area

should focus on the pedagogical issues. The results of this research showed that after teachers had attended professional development courses in ICT they still did not know how to use ICT in their classrooms; instead they just knew how to run a computer and set up a printer. They explained that this is because the courses only focused on teachers acquiring basic ICT skills and did not often teach teachers how to develop the pedagogical aspects of ICT. Balanskat et al. (2006) indicated that inappropriate teacher training and support is not helping teachers to adopt ICT in their teaching practice. They assert that this is because training programmes do not focus on teachers' pedagogical needs in relation to ICT but on the development of ICT skills.

However, Becta (2004) asserts that despite focusing the teacher training and support on the pedagogical aspects, it is also important to provide the teachers with specific ICT skills. Some initial training is needed for teachers to develop appropriate skills, knowledge, and attitudes regarding the effective use of ICT to support learning by their students (Newhouse, 2002). He argued that this also requires continuing provision of professional development to maintain skills and knowledge. This will built their confidence and enhance the adoption of ICT as a tool to support teaching and learning. Balanskat et al. (2006) observes that inadequate or inappropriate training leads to teachers being neither sufficiently prepared nor sufficiently confident to adopt ICT in their teaching practices.

According to Newhouse (2002), teachers need training in technology education (education focusing on technologies themselves) and educational technology (education focusing on the support for teaching and learning in the classroom). Similarly, Sicilia (2005) found out in a research that teachers want to learn how to use ICT in their

classrooms as a tool to support teaching and learning but lack of opportunities for professional development obstructed them from adopting ICT. Other problematic issues identified by Belanskat et al. (2006) related to ICT teacher training and support are that the training courses are not differentiated to meet the specific needs of teachers and the sessions are not regularly updated. Information Communications and Technology can heighten teaching efficiency through a multitude of pre-service training and programs that are pertinent and indispensable to the needs of the education system (GAID, 2009). The inclusion of such training as a pre-requisite for teachers enables them to have adequate content knowledge, a repertoire of teaching methodologies and strategies with a preparation of life-long learning. It is necessary to expose teachers to concurrent and new modern channels of information allowing self-learning to occur.

Successful adoption of ICT requires strong support from government at national and local level by relevant institutions and education authorities within the schools (Cross et al., 2007). According to: (Sharma, 2003) "political strength of each nation affects the introduction of any new technology. He also explained that cost is an issue that defines and drives the adoption and growth of ICT especially in developing countries".

Support mechanism for teachers in relation to ICT adoption, is needed to realize trainings and to promote gradual adoption".

Law & Chow (2008) opine that self reported pedagogical ICT competence was the best positive precursor of the teacher's adoption of ICT in the classroom. They also suggest that in most systems, teachers with a stronger traditionally important orientation were less

likely to make use of ICT in their teaching while those with a stronger 21st century orientation were more likely to do so.

The majority of teachers in classrooms today trained before ICT became a significant development in education. As a result, in-service programmes need to be developed to provide the requisite skills and understanding. Alongside this, teacher training institutions must develop programmes designed to provide student teachers with the necessary competence and confidence to at least begin to use ICT within their practice (GAID, 2009).

2.5 Contextual factors that influence the use of ICT by teachers

ICT adoption in schools is affected by general contextual factors that influence its adoption such as access and support for ICT tools, and the support and guidance from the leadership in policy or school culture. We know from research that the technology context at those sites does affect whether student teachers use ICT in their teaching (Bullock, 2004: Dexter & Riedel, 2003; Grove, Strudler & Odell, 2004). Several key technology contextual aspects noted across studies are: an expectation to use technology during field placements, access to ICT tools, and technical support.

While it is always assumed that all teachers would want to adopt ICT as a tool to support teaching and learning in their practice, it can be overlooked unless there are clear expectations in terms of policy or school culture for ICT use in content area lessons (Dexter & Riedel, 2003). Bullock, (2004) notes that teachers who believe they are not adequately prepared may view it as an unfair additional challenge. So establishing clear

expectations for ICT use whether by the schools, the school's leadership or a combination of sources is a factor that needs to be identified.

Another factor that may hinder the adoption of ICT is the insufficient access to ICT. Access and age of computers were clearly noted as obstacle preventing successful adoption of ICT (Kay, 2006). Access levels can vary greatly across institutions and levels. Configurations can include from one or several computers in a classroom, access to a portable laptop cart for classroom use or access to a computer lab in the building. Teachers with a single computer in the classroom noted development of personal productivity skills such as keeping grade books, lesson planning and delivering presentations but few opportunities to develop, and learn how to facilitate lessons that involved teachers use of technology with content-area topics (Dexter & Reidel 2003; Grove et al., 2004), while those with access to computers during class noted higher frequencies of their students' use of technology (Grove et al., 2004).

Technical support is crucial in influencing the adoption of ICT by teachers in school. For teachers who may be unfamiliar with new labs, new tools, or different software versions, providing technical and instructional support is a key factor for successful integration of technology (Bullock, 2004). While teachers may have good personal productivity skills, their knowledge of how to use ICT for instruction is often limited. Technical support for instructional use can come from cooperating teachers, other on-site personnel, or school resources. Dexter & Riedel, 2003 noted that instructional support was a significant predictor of whether or not teachers use technology.

Preparing teachers to use ICT in teaching is clearly a complex process with a myriad of factors interacting to impact the outcome. It is clear that greater collaboration is needed between teacher preparation programs and their schools that provide field experience settings and administrators in order to identify factors for optimal placements for teachers so that they will learn to teach effectively in digital classrooms. In addition, greater collaboration can result in implementation of joint ICT development projects such as: developing communities of technology-using teachers in urban schools (Radinsky et al., 2005), creating teams of university faculty, clinical faculty and pre-service teachers to explore and develop effective uses of ICT in classrooms (O'Bannon & Nonis, 2002), or supplementary virtual field experiences using video conferencing (Karchmer-Klein, 2007). Clarifying our current status regarding ICT in initial teacher preparation is a welcome step towards improvement.

Infrastructure was identified by Green (2000) as a major catalyst for the adoption of ICT in teaching and learning process in schools. Establishment of technical infrastructure is usually the first strategy that most institutions adopt. Quoted by authors (Bushati et al., 2012) "ICT as a tool for modernizing teaching and learning, students associated the use of ICT with changes in the nature of classroom relations, as well as a reshaping of learning and teaching, they identified a variety of factors that hinder this process".

2.6 Subject area influence

ICT has been identified as the principal driver of economic development and social change worldwide (Kozma, 2005; Leech, 2008). In many countries, the need for economic and social development is used to justify investments in educational reform and

in educational ICT which is dictated by the curriculum that is being offered. Kelles-Viitanen (2003) observes that ICT plays a major role in all aspects of national life: in politics, in economic life, as well as in social and cultural development. There seems to be insuperable social or economic obstacles to wider use of ICT that affect whole categories of schools based on the curriculum on offer. Circumstances vary between schools depending on the education system on offer, so ICT adoption must take account of these variations. The adoption is strongly influenced by the cultural, societal and institutional factors presented by the curriculum on offer (Kozma, 2005; Leech, 2008). Curriculum type will influence flexibility and the demand for ICT adoption in the teaching and learning process thus influencing its use in the learning institution. Adoption of ICT in teaching has its base on development of related infrastructure as a precondition of necessity, it is that creates conditions for connection to the internet, but to succeed, in addition, there are many problems associated with new mentality and habits to be created in the our society for giving its full impact.

Studies suggest the benefits of adopting and use of ICT in schools all over the world has not been automatic. The effective implementation of ICT in schools is a multifaceted, complex process that just not involves providing the technology to schools but also involves teachers' competencies, schools readiness, long term financing and curriculum restructuring, among others (Zaman et al, 2011). In practice, the usual teaching and curricula approaches still remain basically unchanged in many schools, while the technology is typically poorly adopted and underused in classroom (Dzidonu, 2010). It appears that the emphasis is on students ICT capabilities rather than application of ICT knowledge and skills to other subjects across the syllabus. Keengwe, & Onchwari, (2011)

notes that, despite rapid growth in ICT access by teachers and students both at home and school, and substantially improved school ICT infrastructure (connection to internet, computer labs, availability of educational software, etc.) most teachers are not keen in adapting and using ICT tools during teaching and learning. It appears that their skills and attitudes towards ICT remain a challenge for them to adopt and use efficiently the technology in classroom.

2.7 Personal characteristics of teachers

Personal characteristics of teachers such as educational level, age, gender and attitudes towards ICT can be a major influence in the adoption of ICT in teaching and learning, Schiller (2003). Teachers are expected to adopt ICT in the teaching and learning activities, but their preparedness to adopt ICT into teaching determines the effectiveness of the technology and not by its sheer existence in the classroom (Jones, 2001).The attitudes of teachers towards technology greatly influence their adoption and integration of computers into their teaching. Anxiety, lack of confidence and competence and fear often implies ICT takes a back seat to conventional learning mechanisms. Therefore, an understanding of personal characteristics that influence teachers' adoption and integration of ICT into teaching is relevant. Sandholtz & Reilly (2004) think that teachers' technology skills are strong determinant of ICT adoption in the teaching process, but they are not conditions for effective use of ICT in the classroom. They argue that training programs that concentrate on ICT pedagogical training instead of technical issues and effective technical support, help teachers adopt ICT as a tool to support teaching and learning. Research studies revealed that quality professional training program helps teachers implement technology and transform teaching practices (Brinkerhoff, 2006;

Diehl, 2005). Lawless and Pellegrino (2007) claim that if training program is of high quality, the period for training lasts longer, new programs in ICT for teaching and learning are offered, educators are eagerly involved in important context activities, teamwork among colleagues is improved and has clear vision for students attainment. Teachers may adopt and integrate ICT into their teaching when training programs concentrate on subject matter, values and the technology.

2.8 Summary of the reviewed literature

ICT has immensely contributed to an increase in developing knowledge, providing an enabling environment for innovation and building great potential knowledge economy. (Ng, Miao & Lee, 2006) However the adoption of ICT has not been without challenges that affect its adoption in the learning institutions.

The review of the related literature indicates that ICT adoption as a tool to support teaching and learning in secondary schools faces a lot of challenges. For successful adoption school systems must change to ensure that ICT is adopted into the teaching and learning process in a meaningful way and this research may provide useful information about this (Rogers, 2003).

Review of the literature further revealed that infrastructural support is imperative but at the same time school leadership is a stronger predictor of teachers' adoption of ICT in teaching (Anderson & Dexter, 2005). Yee (2000) believes that a leader who implements technology plans and also shares a common vision with the teachers stimulate them to use technology in their lessons. Schiff and Solmon suggest that for effective utilization of ICT by teachers, there is the need for a strong leadership to drive a well designed

adoption plans in schools (as cited in Lai & Pratt, 2004, p.462). Becta report on the effect of ICT on teaching in basic schools in United Kingdom also stressed on significance of good leadership (as cited in Lai & Pratt, 2004, p.462). In addition Becta, identified five factors that were essential to be present in schools if ICT was to be utilized properly (as cited in Lai & Pratt, 2004, p.462). These factors were ICT resources, ICT teaching, ICT leadership, general teaching and general school leadership.

2.9 Theoretical framework

The research will be anchored on Innovation Diffusion Theory (IDT) by Rogers (2003). The theory is used in studying individual's technology adoption. This theory is based on four elements of diffusion which includes innovation, time, communication channels and social systems. In expounding the theory, Rodgers (2003) opines that an individual's ICT adoption is determined by several factors ranging from perceptions regarding relative advantage, compatibility, complexity, triability to social and cultural norms of an institution. According to Rogers (2003) "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system." He cites compatibility of the ICT needs to align with individual's current values and experiences as a prerequisite to adoption. The more compatible ICT will be to students and educators the less a change of behaviour is required, therefore, allowing for faster adoption of ICT into the educational setting. If ICT requires users to adjust their existing behaviour or is in contrast to their attitudes the more unlikely they are to adopt. This study will be anchored on this theory as it seeks to find out how different factors influence the adoption of ICT.

2.10 Conceptual framework

Teachers' attitudes

Subject area influence

Internal characteristics of the institution

Institution's adoption and use of ICT

Support offered to teachers who adopt ICT
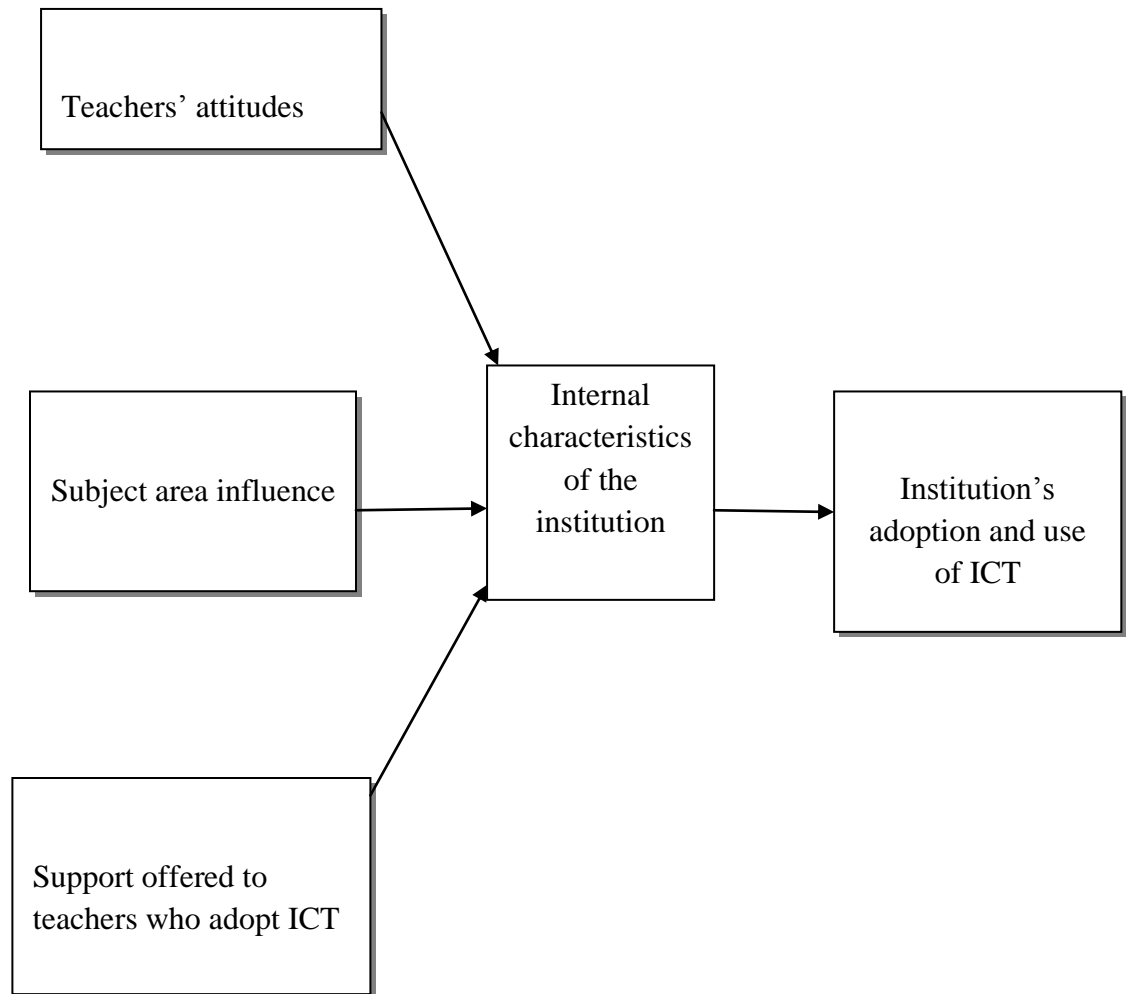
Fig 2.1: Conceptual framework of the ICT adoption in secondary schools

As seen in the conceptual framework, there are different contexts that influence the process by which an institution adopts and implements ICT as a tool to aid in teaching and learning. The leadership attitude looks at descriptive measures about the organization, such as managerial structure, perceived financial cost and technical competence. Structural characteristics of the institution refer to the current practices and approaches internal to the school as well as their relevance. The environmental context

refers to both the opportunities and constraints that occur in the process of adopting the

technology. All the above will feed into institution's internal adoption of ICT.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section described the research design, study population, sampling design and procedure, data collection instruments, data collection procedures and data analysis. It explains various scientific methods used in achieving the study objectives.

3.2 Research design

In this study the researcher used descriptive survey design. The main advantage of this type of design is that it enables the researcher to assess the situation within the study area at the time of the study. The researcher, therefore, used the design to assess the school factors affecting the adoption of ICT as a tool to support teaching and learning in Westlands sub-county. According to Cooper (1996), a descriptive study is concerned with finding out who, what, where and how of a phenomenon which is the concern of this study. Thus, the researcher deems the design appropriate for the study as it allows for investigation of how different school factors affecting the adoption of ICT as a tool to support teaching and learning in the area of study.

3.3 The Target Population

Orodho, (2008) opines that specifying the population that is targeted for study is crucial as it helps researcher to make decisions on sampling and resources to use. The target population for this study based on the list obtained from the District Education Office, Westlands area will be 26 secondary schools with a population of 16,618 students. Out of the 26 schools, 10 are public secondary schools and 16 are private secondary schools (Source: D.E.Os Office, Westlands area, 2015).

3.4 Sample size and sampling technique

A sample is a small population. Any statement made about the sample should also be true of the population, (Mugenda & Mugenda 2003). If the population from which a sample is taken is to be drawn does not constitute homogenous group, then stratified sampling technique is applied so as to obtain representative sample (Orodho, 2010). The population involved being a smaller one, 8 schools representing 30% of the whole population (26 schools). Mugenda and Mugenda, (2003) also say that a population sample of between 10-15% is adequate. Similarly the schools have an average population of 20 teachers, therefore, 8 schools had an estimated number of 160 teachers qualifying for the study and 15% of that gives us 24 teachers (respondents).

3.5 Research instruments

The main tools for this study were questionnaires for teachers and for the students. Once the questionnaires were constructed they were pre-tested in six schools outside the sample but identical to it. The questionnaires were divided into different sections where section A will contained data on the background information on the respondents, section B contained school factors that influence adoption of ICT as a tool that supports teaching and learning, section C contained items on school system, section D contained items on training and development and section D contained factors on work situational factors. Likert scale was used in questions tested on the degree of respondents' agreement with variables in the study. The questionnaires were used with the students and teachers.

3.6 Validity of the research instruments

A valid instrument should accurately measure what it is supposed to measure. After administering the instruments to the selected respondents, the data obtained should be a true reflection of the variables under study. According to Mugenda and Mugenda (2003), validity is the degree to which results obtained from the analysis of data actually represent the phenomena under study. The researcher ascertained instrument validity by comparing the pilot study responses to the expected responses. Discrepancy was addressed by adjusting, correcting and rephrasing of the statements where necessary. Content validity was also used to determine whether the questionnaire answered the research questions. It involved scrutinizing the questionnaires to ascertain that the content was comprehensively representing the elements to be measured. The instrument was designed to include all the elements under the study (Borg & Gall, 1989).

3.7 Reliability of the research instruments

The research tools were tested for their reliability, which was meant to find out if they were capable to bring out the required information. Mugenda and Mugenda (2003) define reliability as a measure of the degree to which an instrument yields consistent results or data after repeated trials. The piloting enabled the researcher to test the reliability of the instruments to ensure their reliability. The researcher used the test- retest technique. This involved administering the test to one group selected randomly as stated and then after sometimes i.e after two weeks administers the test to the same group. The two sets scores would then be regressed using the Pearson's Product Moment Correlation Coefficient formula to determine the correlation (r) between the two sets of scores.

$$r = \frac{n\sum XY - \left(\sum X\right)\left(\sum Y\right)}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

Where

X= first set of scores

Y= the second set of scores

$\sum X$ =the sum of the first set of scores

$\sum Y$ = the sum of the second set of scores

$\sum X2$ = the sum squared of the first set of scores

$\sum Y2$ = the sum squared of the second set of scores

$\sum XY$ = the sum of the cross product of x and y and n= the total number of respondents.

According to Orodho (2004) a correlation co-efficient of about 0.8 is high enough to judge the instruments as reliable for the study and this will apply in this study.

3.8 Data collection procedure

The researcher obtained a letter from the National Council of Science and Technology allowing him to go to the field. He made appointments with principals of the sampled schools to notify them and request for permission to carry out the study in their schools and arrange for the dates for data collection.

3.9 Data analysis techniques

Primary data from the field was edited to eliminate errors made by respondents. Coding will be done to translate question responses into specific categories. Coding was meant to

organize and reduce research data into manageable summaries. Quantitative data was analyzed using descriptive statistics while content analysis techniques were used to analyze qualitative data collected using interview schedules. Statistical Package for Social Sciences (SPSS) was used to analyze the quantitative data. Descriptive statistics such as frequencies and percentages was used to describe the data while inferential statistics referred to as Chi Square was used to check the relationship between dependent and independent variables. The analyzed data was presented in form of tables, pie-charts and bar-graphs where applicable.

3.10 Ethical considerations

The researcher observed ethics in relation to conducting the research. He first sought permit from National Commission for Science and Technology to legitimize his research. He wrote a letter of introduction to the principals of sampled school in order to be allowed to collect data. The respondents were assured that the information they provided would be treated with utmost confidentiality and could only be used for the purpose of this research.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1 Introduction

This chapter presents analysis of data, data interpretation and presentation. The purpose of this study was to determine school based factors that influence adoption of ICT in teaching and learning in secondary schools in Westland's sub-county. The specific objectives were to determine how ICT influences teaching and learning in secondary schools, to determine the influence of in-service support offered to teachers on adoption of ICT in teaching and learning, to identify the influence of teachers' attitudes towards adoption of ICT in teaching and learning and to examine if subject area influences the adoption of ICT in teaching and learning in Westlands Sub-County. The analyzed research findings are presented in frequency tables and figures.

4.2. Questionnaire return rate

Completion rate is the proportion of the sample that participated as intended in all the procedures. Twenty three teachers and 86 students returned duly filled out questionnaires that were used in the analysis of data as presented in Table 4.1.

Table 4.1

Questionnaire Return Rate

Respondents	Sample	Respondent	Percentage
Teachers	24	23	95.8
Students	110	86	78.1
Total	134	109	86.95

As indicated in Table 4.1, 95.8 % of teachers and 78.1% of students returned their questionnaires. Therefore the average response rate achieved for the two sets of questionnaires was 86.9%. The return rate was considered adequate in providing valid and reliable analysis. Mugenda and Mugenda (2004) suggests that any research whose return rate is above 70.0% is an adequate representation of a sample. This 'good" response can be interpreted to show a willing participation from the sampled respondents. This was attributed to the fact that the researcher administered the questionnaires personally and so was in a position to handle any queries from participants as well as encouraging them to participate in the study.

4.3 Demographic characteristics of the respondents

The research instruments solicited background information on demographic details of the teachers and students. These included their gender, age, level of academic qualification, and type of school(public/private) for teachers while for students class, gender, age and type of curriculum (IGCSE or 8-4-4). This background information of the respondents was imperative to confirm whether the research reached the targeted audience and whether or not the research captured the information it effectively sought. The information is presented in Tables 4.2 and 4.3 respectively.

Table 4.2

 Demographic background of teachers

Variable	Type	Frequency	Percentage
Gender	Male	14	60
	Female	**9**	40
	Total	23	**100**
Age	26-34 Years	7	28.3
	35-44 Years	7	28.3
	45-54 Years	5	23.3
	Above 60 Years	4	20.2
	Total	**23**	**100.0**
Type of school	Public	10	43.4
	Private	13	56.6
	Total	**23**	100.0
Educational Level	Degree	13	56.6
	Post Graduate	10	43.4
	Totals	**23**	100.0

Among the teachers, 60% were male while 40% were female teachers. This shows the dominance of the male gender among the respondents.

The age distribution of the respondents (teachers) was also varied. About 28.3% of the respondents were aged between 26-34 years, 28.3% was aged between 35-44 years, 23.3% was aged between 45-54 years and 20.2% was above 60 years of age. About 56.6% of the total number of the respondents was from private schools while public

secondary schools constituted 43.4%. This can partly be attributed to the fact the research targeted schools that offer either 8:4:4 or IGCSE systems of education.

Most respondents, 56.6% among the teachers had education up to the Degree, while those with education up to Post-Graduate level constituted 43.4% of the total respondents. This shows that education level of those teaching at secondary schools are degree holders at minimum.

Table 4.3

Demographic background of students

Variable	Type	Frequency	Percentage
Class	Form3	46	54.0
	Form4	40	46.0
	Total	86	**100.0**
Gender	Male	46	56.0
	Female	40	44.0
	Total	86	**100.0**
Age	Below 14 Years	32	36.7
	14-17 Years	54	63.3
	Total	**86**	**100.0**
Type	IGSE	15	18.0
	8.4.4	71	82.0
		86	100

Most of the respondents (46%) were Form Four students and in the 8-4-4 system with 31% of the respondents being from the IGCSE system of learning.

The age distribution of the students was varied with 63.3% of the respondents being between the ages of 14-17years, 36.7% were below 14 years. This finding reinforces the fact that many of the students in high school are between the ages of 14-17 years.

The data revealed that most of the respondents were from the public schools. This can be attributed to the fact that majority of the Kenyans prefer the 8:4:4 system of education.

4.4 Adoption of ICT in secondary schools
Since the main purpose of the study was to determine school based factors that influence adoption of ICT in teaching and learning in Public and Private Secondary schools in Westland's Sub-County, the researcher sought to begin by establishing the status and the level of adoption or use of ICT by teachers in teaching and learning in the sampled secondary schools, level of use of ICT by teachers in teaching and learning and preparedness to adopt the ICT.

4.4.1 Level of adoption of ICT in secondary schools
Figure 4.1 shows the adoption of ICT in both the public and private secondary school as reported by students. The question targeted students since they are the end users of ICT and therefore they are in a more appropriate position to describe the level of adoption in the schools by themselves, their teachers or the school administrators. The research rated the adoption level of ICT using a four level Likert scale where highest 4= Very Good, 3= Good, 2=Fair, 1=Poor. The findings are as shown in Fig 4.1
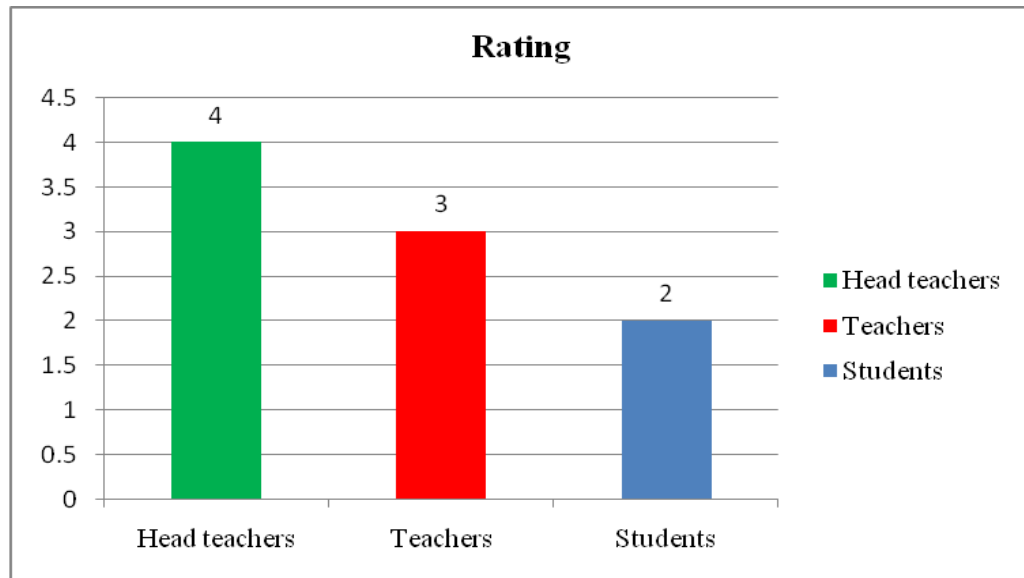
Fig 4.1 Level of adoption by head teachers, teachers and students

Most of students rated the level of adoption of ICT in their respective public secondary schools as highest, level 4="very good" for head teachers , followed by level 4=" Good", for the teachers while students rated the level of adoption as " fair" which was the lowest for themselves. This was a relative assessment considering that in the past most secondary schools that had adopted ICT was only in administrative departments. Adoption of ICT by teachers for pedagogical purposes as a tool to support teaching and learning in schools has happened recently (K.I.E, 2015).

4.4.2 Teachers use of ICT in teaching as expressed by students

The research sought to rate the teachers use of ICT by examining how often teachers uses ICT in teaching from the students perspective. Respondents (students) were asked to indicate on a three-point scale ranging from sometimes (1) to regularly (3) their views on the teachers use of ICT in their teaching and learning situation.

Table 4.4

Teachers use ICT in teaching as expressed by students

Variable	Frequency	Percent	Mean	Standard deviation
Sometimes	38	44.0	2.9	.79
Rarely	31	36.0	2.8	.75
Regularly	17	20.0	2.6	.70
Total	86	100.0	2.7	.74

As shown in Table 4.4, the majority of the respondents perceived that teachers used ICT in teaching sometimes (Mean = 2.9, SD= 0.79) and regularly (Mean = 2.6, SD= 0.76). The respondents also felt that teachers rarely use ICT in teaching (Mean = 2.6, SD= 0.76)

This finding are in agreement with Ngibuini (2012) in a study about adoption of ICT in teaching and learning in both secondary schools in Machakos that the adoption and use of ICT for instructional purposes in Kenya learning institutions is still at "nascent level"

4.4.3 Teachers preparedness to adopt ICT in teaching

The teachers rated their level of preparedness to adopt ICT in teaching and learning in both secondary schools in terms of ICT proficiency support (through provision of software and hardware), training and academic levels.
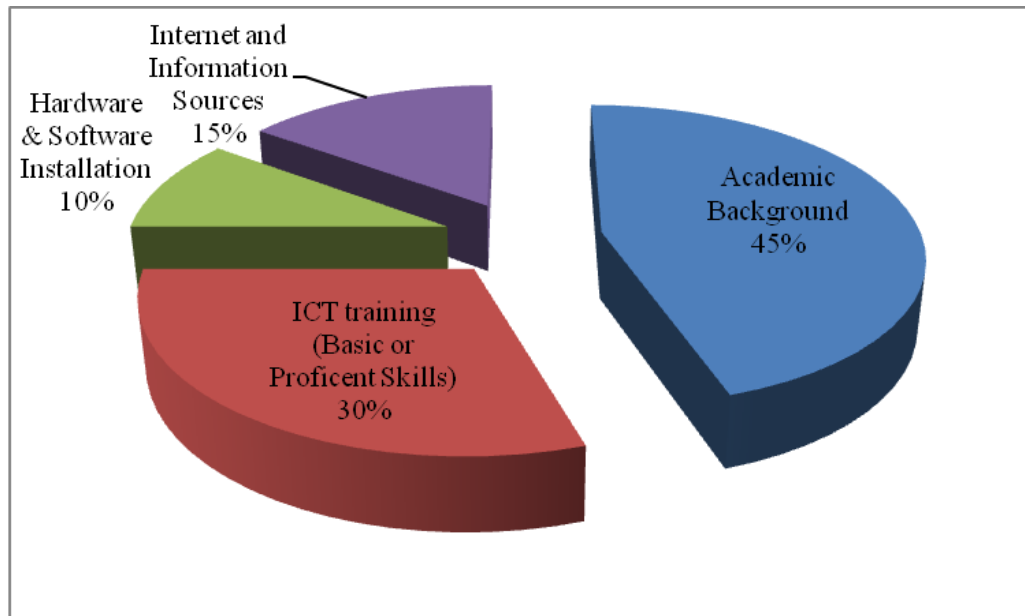
Fig 4.2 Teachers' preparedeness to use ICT in teaching

From the findings in Fig 4.2 45% of secondary schools teachers indicated that they were prepared to adopt ICT for teaching and learning purposes. Teachers who indicated that they have ensured that they have undertaken extra training in ICT from basic to proficient level was at 30.0%. Fifteen percent of teachers indicated that they were able to utilise ICT technology like internet, email and other information sources to build their capacity while the rest 10.0% of teachers indicated that they had acquired both hardwares and computer software at personal level to further enhance their skills   at personal level. Bullock, (2004) notes that teachers who believe they are not adequately prepared may view adoption as an unfair additional challenge. So establishing clear expectations for ICT use whether by the schools, the school's leadership or a combination of sources is a factor that may influence the adoption of ICT in teaching and learning.

4.5 In-service support for teachers and adoption of ICT

The first objective of the study was to determine the influence of in-service support offered to teachers on adoption of ICT in teaching and learning in secondary school. Respondents were asked to indicate the kind of in-service support offered to teachers who have adopted ICT in the process of teaching and learning in their respective schools. The results were tabulated as shown in Table 4.6.

4.5.1 Support provided by institutions in adoption of ICT

The study also sought to establish the level of support provided by institutions to aid in adoption of ICT by teachers in teaching and learning. The support ranged from provision of basic training in computer to provision of software that support teaching and learning.

Table 4.5

Support provided by institutions in adoption of ICT

Area of support	Frequency	Percentage	mean	Standard deviation
Basic computer training	5	20.0	4.3	.86
Internet provision	6	28.0	4.1	.81
Equipment provisions	5	22.0	3.9	.76
Software training	3	15.0	3.4	.73
(ICDL & CIS (0))	3	15.0	3.1	.71
Total	23	100	3.8	.89

There was a relatively even distribution in terms of area of support by schools to the teachers who have adopted ICT in teaching. From the above data, it is clear that most common support is the basic computer training (M= 4.3, SD= 0.86), followed by internet

provision (M= 4.1, SD= 0.81), equipment provisions (M= 3.9, SD= 0.76), software training (M= 3.4, SD= 0.73) and other advanced training (M= 3.1, SD= 0.71). Teachers indicated that institutions offered some form of support although it was not adequate as indicated in table 4.5. While it is always assumed that all teachers would want to adopt ICT as a tool to support teaching and learning in their practice, it can be overlooked unless there are clear expectations in terms of provision of ICT tools and skills for use in delivering of lessons (Dexter & Riedel, 2003).

4.5.2 Support and incentive offered to teachers who have adopted ICT in the teaching process

The researcher sought to establish the kind of support or incentive offered to teachers as a boost or motivation to those who adopt ICT or were prepared to adopt ICT in teaching and learning process as shown in Table 4.6

Table 4.6

Support offered to teachers who adopt ICT in the teaching process

Content text	F	Percentage	Mean	SD
Professional Development Courses	7	30.0	3.9	.79
Sponsorship of ICT Courses	3	18.0	3.8	.75
Hardware & Software	6	22.0	4.3	.65
Provision of Professional support	7	30.0	2.5	0.02
Total	23	100.0	3.7	.56

From Table 4.6 most teachers indicated that as a motivation for using ICT in teaching, administration support came in opportunity of either enrolling for professional development courses in ICT or provision of professional support in order to develop skills for using ICT for teaching and learning as mentioned by teachers (M= 3.9, SD= 0.79) while either while teachers (M= 3.8, SD= 0.65) indicated that they were given incentive to acquire either hardware and software's as well as being sponsored to undertake a course of their choice

4.5.3 School leadership and use of ICT

The study sought to establish how school leadership support teachers to use ICT for teaching and learning in sampled public and private secondary schools the findings are in Table 4.7.

Table 4.7

School leadership and use of ICT

Variable	F	%
Head teachers offer monetary incentives to teachers who are ready to use ICT tools	5	20.0
teachers are recommended for further education and training by head teachers to learn ICT	6	28.0
The willingness of the head teacher to assist to acquire a study leave	5	22.0
Head teachers involve teachers in policy formulation in the school on matter concerning ICT	7	30.0
Total	23	100.0

The findings in table 4.7 indicates that school leadership offers support to teachers in the use of ICT in various different ways, 30.0% indicated that school leadership offers support to teachers through involving them in policy formulation on matters concerning ICT in the schools , 28.0% of teachers indicated that school leadership offers teachers support in use of ICT through recommending them for further education or training on

ICT, 22.0% of teachers indicated they are offered help by school leadership through being allowed to take a study leave to advance skills in ICT as well as 20.0% indicating school leadership give them monetary incentives and other allowances which help the teachers to advance their skills. According to Kanyenyani (2009), ICT adoption in schools is affected by general contextual factors that influence its adoption such as access and support in provision of ICT tools, but mainly the support and guidance from the leadership in policy or school culture.

4.5.4 ICT infrastructure in institutions

The study sought to establish status of ICT infrastructure in Institutions in order to find out if it influenced the adoption of ICT in secondary schools.

Table 4.8

ICT infrastructure in institutions as indicated by the students

	Frequency	Percentage
Computer lab	9	40.0
Laptops	3	10.0
Desktops	7	30.0
Projectors	4	20.0
	23	100.0

Many schools reported to have a computer lab as the major infrastructure with a percentage of 40.0%, followed by desktops (30.0%) the least projectors and laptops with either 20.0% or 10.0% of the respondents. The study also established that schools had

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basic quantity of ICT tools as shown in Table 4.8. It is apparent from the Table 4.8 that quite a number of secondary schools were equipped with basic ICT infrastructure.

4.5.5 Number of computers as indicated by students

The study sought to establish status of ICT infrastructure in Institutions by number of computers found in an institution.

Table 4.9

Number of computers

Number	F	%
11 – 20	2	18.0
21 – 30	3	22.0
31 – 40	9	30.0
40 >	9	30.0
Total	23	100.0

From table 4.8 18% of the respondents indicated that they had between 11 – 20 computer, 22% had been 21 – 30 computers, 30% had between 31 – 40 computers and lastly another 30% had 40 and above computers. The respondents thought the variations in numbers were as a result of demographics.

4.5.6 Software for supporting teaching and learning in schools

The study sought to establish whether there are software designed to support teaching and learning in schools at the sampled schools which may influence the adoption of ICT in teaching and learning.

Table 4.10

Software designed to support teaching and learning in school

	F	%
Yes	5	21.8
No	18	78.2
Total	23	100.0

It was noted that the there are no adequate provision of common software's for teaching and learning in either public or private secondary in Westland Sub-County as indicated by 78.2% of teachers, amongst the available software's there are referred by names like Raspberry pie, Enchanta 2014, Cambridge Teacher Training software and Noteworthy. Other software for the various subject areas need to be developed.

4.6 Teachers' attitude and its influence on adoption of ICT in teaching

The second objective was to identify the influence of teachers' attitudes towards adoption of ICT in teaching and learning in secondary schools. This was to establish whether it was a factor in the adoption of ICT within the schools.

4.6.1 Necessity of ICT in teaching and learning

The researcher sought to establish from teachers on whether they find ICT necessary for teaching students, which was necessary because teachers can only adopt ICT for teaching if they are convinced of the value of using ICT in their teaching

Table 4.11

Value of ICT in teaching and learning as explained by teachers

	F	%
Yes	23	100
Total	23	100

The respondents among teachers overwhelmingly (100%) agreed that ICT was of great value in teaching and learning process. Some thought it made learning easy, it was used in research; it animated the lessons, made demonstrations easy and many other positive reasons supporting the 100% response rate. Research by Balanskat et al. (2006) indicates that if teachers are to adopt ICT as a tool to support teaching and learning, they need to be convinced of the value of using ICT in their teaching, thus their training in this area should focus on the pedagogical issues.

4.6.1: Influence of teachers' attitudes on the use of ICT in teaching and learning

The study sought to find out how attitudes of teachers affect the use of ICT in teaching and learning. The students were targeted in this section since they were in a position to judge their teachers since they are the recipient of teaching and learning experiences.

4.6.2 Influence of teachers' attitude on adoption of ICT according to students

Through a yes or no question, the researcher sought to find out from the students the extent to which teachers' attitude influence the adoption of ICT in teaching and learning as indicated in Table 4.12.

Table 4.12

	F	Percentage
Yes	86	100
No	0	0
Total	86	100

The teachers' attitude seemed to significantly influence the adoption of ICT in teaching and learning as indicated by the students. The successful adoption of ICT in learning institutions is largely dependent on teachers' support and attitudes. Onchwari (2008) believes that teachers' perception about technology is a major factor in its adoption in the teaching and learning process. If they are positive about its use in education, then they can provide strong insight about its adoption into teaching and learning process and vice versa. Teachers' beliefs and skills are crucial with regard to the question whether or not to use ICT in classroom and the role of ICT in the teaching and learning process.

4.6.3 Teachers attitude and adoption of ICT in teaching and learning

The researcher sought to establish different teacher's attitudes and their influence on the adoption of ICT in teaching and learning in secondary schools.

Table 4.13

Teachers' attitude and adoption of ICT in teaching and learning

	Frequency	Percentage
Teachers who view perceived usefulness of ICT in teaching end up using ICT to a great Extent	10	12
Teachers who Trust ICT tools as an enabler in their Teaching practices uses ICT to a great Extent	26	30
positive attitude towards use of ICT and ICT experience have a direct positive influence on the innovative use of ICT by the teacher	15	18
teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching	34	40
TOTAL	86	100

From the findings regarding different teachers attitude and their influence on adoption of ICT, most respondents accounting to 40.0% indicated that teachers' attitudes towards technology influence their acceptance of the usefulness of technology and its integration into teaching , followed by another 30.0% of the respondents who indicated that teachers who Trust ICT tools as an enabler in their Teaching practices uses ICT to a great Extent as well as 18.0% of the respondents who indicated that a positive attitude towards use of ICT and ICT experience have a direct positive influence on the innovative use of ICT by the teacher and another 12.0% of respondents who indicated that teachers who view

perceived usefulness of ICT in teaching end up using ICT to a great Extent. Teachers have to see advantages of ICT use in order to be motivated to implement it in their teaching practice. Apart from this, if teachers are not confident about their capabilities in handling computers, this may hamper their willingness to introduce technology in their classroom. Teachers want to ensure that their students are learning and if technology can be a resource to enhance students' achievement and interest in learning, teachers are more likely to invest their time and energy to learn to use it in teaching (Onchwari, 2008).

4.6.4 Attitude and education levels

The study sought to establish whether education levels of teachers influence their attitudes towards ICT adoption in teaching through a yes or no question.
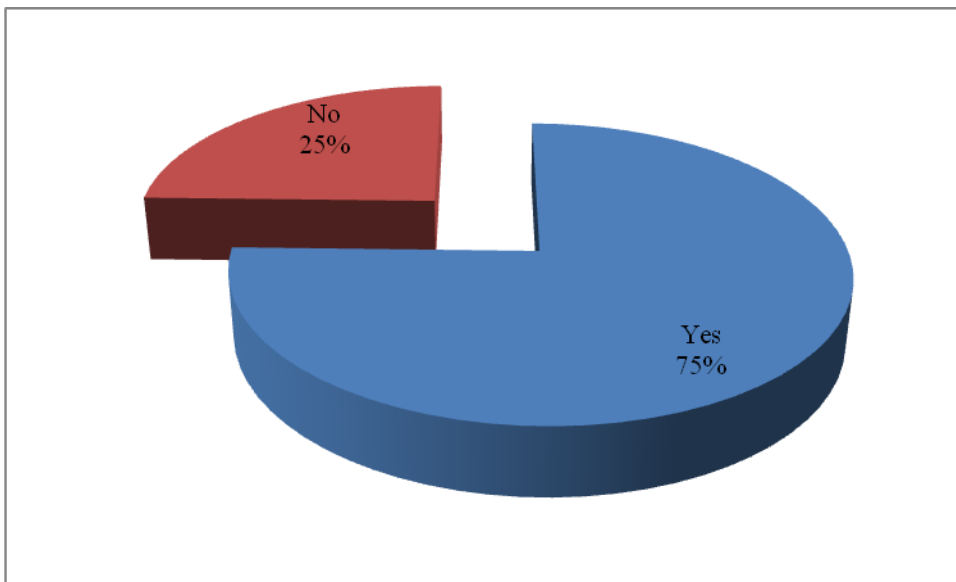
Fig 4.3 Education and ICT adoption

The findings in Fig 4.3 indicate that education of the teachers is related with their attitudes towards adoption of ICT and there by implying that the education level influences attitudes towards ICT adoption. The successful adoption of ICT in education

depends largely on the skills and knowledge of teachers. Adopting ICT requires knowledge of the subject area, an understanding of how students learn and a level of technical expertise. Therefore, lack of knowledge, support and skills regarding the adoption of ICT and lack of training have slowed the use of ICT tools in teaching and learning (Pelgrum, 2001).

4.6.5 Challenges of ICT adoption in teaching and learning as perceived by teachers

The study sought to establish the challenges of ICT adoption in teaching and learning schools which can affect the teacher's attitude towards ICT adoption in teaching and learning in schools

Table 4.14

Challenges of ICT adoption in teaching and learning schools

	Frequency	Percentage
ICT can be disruptive to traditional methods of teaching, power reliance	5	22.0
Most teachers requires continuous training	5	20.0
ICT make teaching to lack participatory interaction	6	28.0
ICT can interfere with students oriented teaching methods	5	20.0
Cost of acquisition , installation and maintenance	2	10.0
TOTAL	23	100

From the findings it was established that some teachers perceive ICT application in teaching and learning to have several problems with most mentioning that ICT make students to be lazy since all learning materials are provided in advance as opposed to the traditional teaching methods as indicated by 20.0% of the teachers, some indicates that ICT can be disruptive to the traditional methods of teaching especially where teachers are trained in the traditional methodology as indicated by 20.0% of respondents, other mentioned that ICT requires teacher to be trained continuously since technology change regularly (10.0%), other teachers perhaps used to traditional teaching methods indicated that that ICT do not support participatory interaction and students oriented teaching methods. Several studies indicates that despite willingness of teachers to adopt ICT several challenges can hinders this endeavor for example technical support is crucial in influencing the adoption of ICT by teachers in school. For teachers who may be unfamiliar with new labs, new tools, or different software versions, providing technical and instructional support is a key factor for successful integration of technology (Bullock, 2004). While teachers may have good personal productivity skills, their knowledge of how to use ICT for instruction is often limited. Technical support for instructional use can come from cooperating teachers, other on-site personnel, or school resources.

4.7 Influence of subject area in the adoption of ICT

The third objective was to examine if subject area is a factor in the use of ICT as a tool in teaching and learning in Westlands Sub-County.

4.7.1 Subject areas influence on adoption of ICT according to teachers

The study sought to establish whether subjects taught at schools which include either arts or sciences influence the level of adoption of ICT in the school shown in Figure 4.4
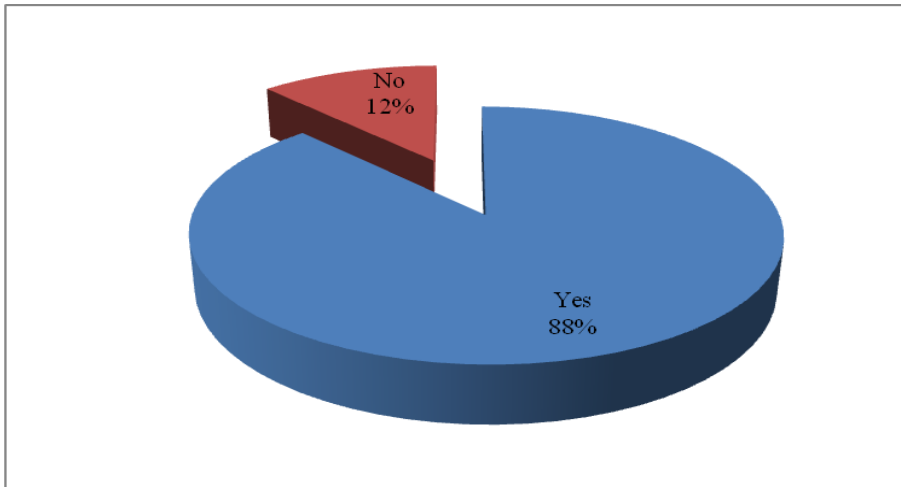
Figure 4.4 Subject areas influencing ICT

The findings show that most of teachers indicated that subject area taught in secondary school by huge margin influence ICT adoption in the school.

4.7.2 Subject area that is likely to influence adoption of ICT in teaching

The study further sought from both teachers and students about which subject area encourages adoption of ICT More. The influence of subject area was determined by the number of times teachers use ICT in the process of teaching and learning in that particular subject. The subjects were grouped into five groups and analyzed by the frequency or percentage of use of ICT as shown in Table 4.15

Table 4.15

 Subject areas utilizing ICT more as expressed by teachers

Variable	Frequency	Percentage	Mean
Sciences	8	36.0	.85
Technical	6	24.0	.69
Humanities	4	18.0	.45
Languages	3	15.0	.40
Mathematics	2	7.0	.14
Total	23	100.0	.50

From the findings most of teachers indicated sciences as the subject area which utilized ICT more than other subject area with a mean of .85 and as accounted by 36.0% of the teachers. In terms of comparison subjects in the technical area with a mean of .69 accounted by 24.0% of respondents, Humanities with a mean of .45 came in third, languages with a mean of .3958 was fourth and lastly mathematics with a mean of .14 and accounted by 18.0% and 7.0% of the teachers in their responses. ICT has been is mostly utilized in science subjects as opposed to other disciplines like languages and humanities (Kozma, 2005; Leech, 2008). In many developed countries 75.0% of learning and teaching processes are done using ICT, through provision of pedagogical training for teachers, rather than simply training them to use ICT tools is an important aspect in the adoption of ICT as a tool to support teaching and learning in schools

Table 4.16

 Subject areas utilizing ICT more as expressed by students

Variable	Frequency	Percentage	Mean
Sciences	31	30.0	.70
Technical	21	20.0	.60
Humanities	15	25.0	.32
Languages	13	15.0	.20
Mathematics	6	10.0	.10
Total	**86**	**100.0**	**.42**

From the findings most of teachers indicated sciences as the subject area which utilized ICT more than other subject area (M= 0.7) and as accounted by 30.0% of the teachers. In terms of comparison subjects in the technical area with (M= 0.6) accounted by 20.0% of respondents, Humanities (M= 0.32) came in third, languages with a mean of 25% was fourth and lastly mathematics (M= 0.2) and accounted by 10.0% and 7.0% of the teachers in their responses. ICT has been is mostly utilized in science subjects as opposed to other disciplines like languages and humanities (Kozma, 2005; Leech, 2008). In many developed countries 75.0% of learning and teaching processes are done using ICT, through provision of pedagogical training for teachers, rather than simply training them to use ICT tools was an important aspect in the adoption of ICT as a tool to support teaching and learning in schools (Kozma, 2005; Leech, 2008). The analysis showed a positive correlation between ICT adoption and subject area (r = .68, p < .01).

4.8 Inferential statistics on factors influencing ICT adoption in teaching

The main purpose of this study was to determine school based factors that influence teacher's adoption and use of ICT in teaching and learning in secondary schools in Westlands Sub-County, Kenya. The dependent variable was ICT adoption by secondary school teachers in teaching and learning while the independent variables include school based factors which are in-service support offered to teachers, teacher's attitudes and subject area taught by teachers. That was done through use of Chi-square value at a significance level of 0.05.

4.8.1 ICT teachers and ICT application in teaching

To establish the relationship between dependent and independent variable of the study a cross-tabulation between ICT teachers and ICT adoption in teaching and learning in sampled secondary schools was established with aim of establishing whether there was a significant relationship between the two variables using a Chi square statistics.

Table 4.17

A cross-tabulation between ICT teachers and ICT application in learning in secondary schools

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Chi-Square Tests					
Pearson Chi-Square	11.000[a]	1	.003		
Continuity Correction[b]	5.144	1	.042		
Likelihood Ratio	10.535	1	.002		
Fisher's Exact Test				.018	.018
N of Valid Cases	23				

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .44.

b. Computed only for a 2x2 table

Table 4.17 shows a Chi-square value of $\chi^2 = 11.000$ at a significance level of 0.003. The calculated statistic $\chi^2 = 11.000$ was found to be greater than the tabled critical value of $\chi^2 = 6.100$. It can be interpreted that, statistically, there was a significant relationship between in-service support offered to teachers, teachers' attitudes and subject area and extent to which ICT is used in teaching and learning by teachers in public secondary schools. The findings strong agree with other scholars where by there is a general consensus that ICT adoption in teaching and learning is strongly influenced by the school factors such as school support in adoption of ICT, teachers attitude, subject area covered and other cultural, societal and institutional factors (Kozma, 2005; Leech, 2008). This factors influence flexibility and the demand for ICT adoption in the teaching and learning process thus influencing its use in the learning institution. Therefore greater collaboration is needed for successful adoption and implementation of ICT; however initial teacher preparation is a critical step towards use and adoption of the ICT in Secondary schools whether public or private.

4.8.2 Perceived usefulness of ICT in teaching and learning

Having established that ICT adoption and use by teachers influence teaching and learning process in secondary schools in Westland Sub-County the researcher sought from students to give their opinion on usefulness of ICT they may have noted in the course of learning and teaching in their respective schools. Table 4.18 contains the full list which is summarized in the subsequent section.

Table 4.18 Perceived usefulness of ICT in teaching and learning

	Perceived usefulness of ICT	F	%
1	Understand concepts faster	1	3.3
2	Reativities& Innovations	1	3.3
3	Increase Interactivity	1	3.3
4	Motivations	1	3.3
5	Demonstrations	1	3.3
6	Generators interest	1	
7	Life Applications	1	3.3
8	Motivation & interacting	1	3.3
9	Life application	1	3.3
10	Understanding concepts, motivation	1	
11	Demonstrations	1	3.3
12	Increasing creativity	1	3.3
13	Innovations Motivation	1	3.3
14	Interactivity. Life applications	1	3.3
15	Generates interest, creativity	1	
16	Creativity; demonstrations	2	6.
17	Generates interests, innovations	2	6.7
18	Demonstrations	1	
19	Interacting	6	20.0
20	Understanding concepts	3	10.0
21	Creativity & innovations	3	10.0
22	Motivation, Creativity	1	3.3
23	Demonstrations	1	3.3
		35	100

The perceived usefulness of ICT in teaching and learning could be summarized as; it helps in understanding of concepts, leads to creativity and innovations, it makes learning

interactive, it was a source of motivation and self confidence. It was also observed that it was easier to demonstrate using ICT. Yusuf (2005) notes that the field of education has been affected by ICT, which have undoubtedly affected teaching, learning, and research. A great deal of research has proven the benefits to the quality of education (Al-Ansari, 2006). ICT has the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students and to help relate school experience to work practices.

The adoption and use of ICT in teaching and learning had a favorable opinion on teaching, learning according to the data. ICT can affect the delivery of education and enable wider access to the same. In addition, it will increase flexibility so that learners can access the education regardless of time and geographical barriers. It can influence the way students are taught and how they learn. It would provide the rich environment and motivation for teaching learning process which seems to have a profound impact on the process of learning in education by offering new possibilities for learners and teachers. These possibilities can have an impact on student performance and achievement. Similarly wider availability of best practices and best course material in education, which can be shared by means of ICT, can foster better teaching and improved academic achievement of students.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter focuses on the summary of the findings on school factors influencing adoption of information communication technology in teaching and learning in secondary schools in Westlands, Kenya and give recommendations and the way forward.

5.2 Summary of the study

The purpose of the study was to determine and document school based factors that influence adoption of ICT in teaching and learning. This was done via a series of objectives that were in themselves a key means towards achieving this end. These objectives included; determining how ICT influences teaching and learning, the influence of in-service support offered to teachers who had adopted ICT in teaching and learning, identify the influence of teachers' attitude towards adoption of ICT in teaching and learning and finally was to examine if subject area influences the adoption as a tool in teaching and learning.

The study employed descriptive survey design as this design enabled the researcher to assess the situation within the study area at the time of the study. The sample size included 23 teachers and 86 students. The main research instrument employed by researcher in data collection was questionnaires for the students and teachers.

The findings of this study revealed positive correlation between ICT adoption and subject area ($r = .68$, $p < .01$). This result is consistent with Sorgo, Verckovnik and Kocijancic

(2010) who found high correlation between frequency of use of ICT, perceived value and teachers' competence in use of ICT among science teachers.

The analysis also revealed that teachers' attitudes influence on the adoption of ICT were positive and low but not statistically significant. This finding is in confirmation with Eugene (2006) who explored the effect of teachers' beliefs and attitudes towards the use of ICT in classrooms. There was a clear inconsistency between teachers' beliefs and their actual adoption of ICT in classroom. Teachers' beliefs and teaching practices were found not to match. The inconsistency between teachers' actual adoption of ICT and perception can be attributed to inadequate supply of ICT resources, lack of access to the right kinds of technology, inadequate ICT pedagogical training and insufficient administrative support.

There exist an inverse correlation between ICT adoption in teaching and age. This finding supports van Braak et al. (2004), Bebell, Russell, & O'Dwyer (2004), and Inan and Lowther (2010) assertions that ICT use falls with age and that younger teachers integrated ICT into their teaching more than veteran teachers. This may be contributed by low competencies, unpreparedness and low confidence among the old teachers.

The main infrastructural support offered by schools was by availing the computer's hardware and software. These results of the study are clear evidence that many schools were equipped with computers. Other support involved enrolling in professional development courses in ICT. Another group got support through sponsorship programmes organized by the school (Mean= 3.8). Respondents with (Mean= 4.3) being

the largest got support by being given Hardware and software's by the school and lastly another group of respondents got support from professionals on a one basis.

This is a clear indicator that there was support offered by schools though different from school to school. Most of the institutions used different methods in efforts to provide in service support for teachers. The study also found out that some teachers were allowed flexible time tables in order to focus on professional development courses in ICT. Other institutions sponsor their teachers and funding their enrolment to ICT based training. The schools also have been keen on providing different forms of hardware and software to simplify the transition from traditional learning techniques.

Another kind of support offered was through provision of infrastructure. Institutions established infrastructure at different levels. These include provision of ICT equipment and computer labs.

Teachers who may be unfamiliar with new ICT tools, or different software versions, provision of technical and instructional support was a key factor for successful adoption of ICT in teaching and learning. While teachers may have good personal productivity skills, their knowledge of how to use ICT for instruction was often limited thus technical support offered was significant in influencing adoption of ICT in teaching.

5.3 Recommendations from the study

Adoption of ICT will able to provide strong support for teaching and learning in secondary schools and there are many outstanding examples of world class settings for competency and performance-based curricula that make sound use of the affordances of these technologies (Oliver, 2000). The adoption of information and communication

technologies can help revitalize teachers and students. Thus this study recommends the following:

5.3.1 Recommendations for the policymakers

1. From the results of the study, it is recommended that teachers be given sufficient training on how to use ICT into teaching and learning processes to acquire the requisite knowledge and skills in integrating the technology in classrooms.

2. From the findings, it seems that teachers are not properly trained to enable them use ICT well in teaching. Professional development programs should be provided by the government and schools, and continuously for teachers to update and equip them with ICT knowledge and skills. The government should also design courses such as computer supported learning, ICTs and design of teaching materials should be introduced in initial teachers' training to increase teacher trainee confidence and perception of the use of ICT in their teaching.

3. Teachers should be provided with adequate technological resources, technical support and administrative support to encourage them to successfully use ICT in classrooms. Yee (2000) believes that a leader who implements technology plans and also shares a common vision with teachers, this stimulates them to adopt ICT in teaching and learning.

4. Effective adoption of ICT in teaching and learning largely depends on teachers and principals who require in-depth professional development due to limited knowledge and skills in ICT. Keen attention needs to be directed to in-service teacher training for both practicing teachers and principals and pre-service

training for newly appointed teachers before joining the regular classes to acquaint them with the important role of technology in schools settings and to train them on how to prepare and use ICT competently. Afshari et al, (2009) states that professional development is necessary for teachers to enable them to effectively adopt ICT in teaching and learning.

5.3.2 Recommendations for practice

1. The institutions environment should be designed to accommodate ICT. Infrastructure such as laboratories should be equipped well than the current status to be able to accommodate more number of students. The number of desktops and laptops should be increased in order for students to have more exposure and easy to navigate.

2. Software companies should be encouraged to work together with the teachers to produce software programs suitable for the local education context. Mumtaz (2000) states that software designers and teachers should work together and observe critically how a range of teachers teach in the classroom and how appropriate forms of software supporting different skills and ways of teaching and learning can be better developed for teachers to use in subject teaching.

5.3 Conclusions of the study

From the study, we can conclude that realizations of the issues for adoption of ICT in general, require the implementation of various school based factors at school level and individual level that have complex and mutual relation between them. Here there is place to adopt policies or stimulus that go directly to the individual level and school level, which naturally will result in the adoption of ICT in teaching and learning.

From the findings, the study also revealed that adoption of ICT influences teaching and learning positively. Teachers are also supported in adopting ICT as a tool in teaching and learning. Teachers' attitude influences their adoption of ICT whereby their attitude is determined by their education levels. The use of ICT as a tool in subject's areas was determined by the subject's content and the study concluded sciences followed by Humanities were compatible with ICT.

The study further concludes that adoption of ICT faces challenges and some of the challenges that the institutions face in their adoption of ICT. There are high costs accompanied with running and maintaining the technologies. Some institutions lack the capacity in terms of manpower with the know how to adopt ICT.

5.5 Suggestions for further studies

1. The study was limited to secondary schools; similar quantitative research can be carried out in teacher training institutions and tertiary institutions. Further research can also be carried out to examine the correlation between ICT use and administrative support.

2. Further studies, should be conducted to shed light on the processes that schools go through in adopting ICT in teaching.

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APPENDICES

APPENDIX ONE: LETTER TO THE PRINCIPAL

P.O Box 42171

 Nairobi- Kenya

 Tel: +254 720 367 352

  Email: ahmed.ibrahim146@gmail.com

Dear Sir/Madam,

RE: DATA COLLECTION

I am a Master of Education (Curriculum Studies) student of University of Nairobi doing a research study on "School factors influencing adoption of ICT in teaching and learning in secondary school." You school has been chosen as one of those to participate in this research. I therefore request your consent to interview selected teachers and students in your school in order to obtain relevant and viable information regarding the area of study. The information will be treated with a lot of confidentiality and you are also free to withdraw from the research without having to explain yourself.

I will be grateful for your positive response.

Yours sincerely,

…………………………..

Ahmed Ibrahim

Registration No: E55/66043/2011

APPENDIX TWO: QUESTIONNAIRE FOR TEACHERS

The questionnaire is designed to gather information on School factors influencing adoption of ICT in teaching and in secondary schools in Westlands, Kenya. The

researcher would like to gather information about yourself and school. You are kindly requested to respond to all questions. Any information you give will be treated with utmost confidence and the data collected will be used for purpose of this research only.

Do not write your name or that of your school anywhere on this questionnaire.

Section A: Background information

1. What is your gender?   Male (   )   Female (   )

2. What is your age bracket? Below 25 years (   )   26- 34 years (   )

35-44 years ( )   45- 54 years   (   ) Above 50 years (   )

3. What is the type of your school?   Public (   )   Private (   )

4. What is your education status? Diploma (   ) Degree (   ) Postgraduate (   )

Part B: Information on ICT

5. Do you have ICT infrastructure in your institution?   Yes (   )   No (   )

If yes, briefly explain…………………………………………………………….......

……………………………………………………………………………………….

6. How many computers do you have?

7. How often do teachers use ICT in their teaching?

Rarely (   )   Often (   )   More often (   )

8. Do you consider ICT necessary in the teaching and learning process? Yes ( ) No ( )

Why…………………………………………………………………………………….

9. How does use of ICT in teaching and learning impact positively on the students' achievements?..

....

....

10. How are the teachers well prepared to adopt ICT in teaching?

……………………………………………………………………………………………

……………………………………………………………………………………………

………………………………………………………………………………………….

11. What kind of support is given to teachers who adopt ICT in the teaching process?

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12. How is the school leadership supporting the use of ICT in the school?

……………………………………………………………………………………………

……………………………………………………………………………………………

………………………………………………………………………………………….

13. What are the challenges of ICT adoption in teaching and learning in your school?

……………………………………………………………………………………………

……………………………………………………………………………………………

…………………………………………………………………………………………..

14. In your own opinion, do you think subject are influences adoption of ICT?

   Yes ( )   No ( )

15. Which subject area encourages adoption of ICT more?

Mathematics ( ) Languages ( ) Humanities ( )   Sciences ( )   Technical ( )

16. How do you think ICT adoption as a tool in teaching and learning can be improved?

…………………………………………………………………………………………………

………………………………………………………………………………………………

17. Does one's education level influence the adoption and use of ICT in teaching?

    Yes (   )   No (   )

18. How are students supported in the use of ICT in the learning process?

…………………………………………………………………………………………………

………………………………………………………………………………………………..

19. Are there any software designed to support teaching and learning in your school?

If yes, which ones?...

THANK YOU

APPENDIX THREE: QUESTIONNAIRE FOR STUDENTS

The questionnaire is designed to gather information on School factors influencing adoption of ICT in teaching and in secondary schools in Westlands, Kenya. The

researcher would like to gather information about yourself and school. You are kindly requested to respond to all questions. Any information you give will be treated with utmost confidence and the data collected will be used for purpose of this research only.

Do not write your name or that of your school anywhere on this questionnaire.

Section A: Background Information

1. What is your gender? Male ( )   Female ( )

2. What is your age? Below 14 years ( )   14-17 years ( )   18-20 years ( )

3. What is your level/class?

4. Which system of education are you pursuing?

8:4:4 ( )   IGCSE ( )   Others (   ) Specify…………..

Section B: Information on ICT

5. What ICT infrastructure do you have in your institution?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………..

6. How often do teachers use ICT in their teaching?

        Rarely (   ) Sometimes (   ) Regularly ( )

8. Do you consider ICT necessary in the teaching and learning process? Yes ( )   No ( )

Explain briefly……………………………………………………………………………

…………………………………………………………………………………………

9. To what extent do you agree that ICT in teaching influences learning outcome?

i) Strongly agree

ii) Agree

iii) Disagree

iv) Strongly disagree

10. In which subject areas do teachers use ICT more?

Mathematics ( )   Humanities ( )   Languages ( )   Sciences ( ) Technical ( )

11. What kind of support is provided by the institution in the adoption of ICT?

……………………………………………………………………………………………

……………………………………………………………………………………………..

12. What challenges does adoption of ICT in your institution face?

……………………………………………………………………………………………

………………………………………………………………………………………….

13. In your own opinion, do you think that teachers attitude influence adoption of ICT

    Yes ( )   No (   )

Explain briefly……………………………………………………………………………

………………………………………………………………………………………….

14. How do you think ICT adoption in teaching and learning can be improved?

………………………………………………………………………………………….

15. How can you describe adoption of ICT by:

Very good   Good   Fair   Poor

    i) Head teacher

    ii) Teachers

iii) Students

16. Are there any software designed to support teaching and learning in your school?

Yes ( )   No (   )

If yes, which ones? ....

THANK YOU

Appendix four: Permit for the research