

**USE OF INFORMATION, COMMUNICATION AND  
TECHNOLOGY IN PROMOTING LEARNING FOR HEARING  
IMPAIRED LEARNERS IN SPECIAL SCHOOLS IN MOMBASA  
COUNTY, KENYA**

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**E55/CE/21912/2012**

**A RESEARCH THESIS SUBMITTED FOR THE AWARD  
OF THE DEGREE OF MASTER OF EDUCATION  
(SPECIAL NEEDS EDUCATION) IN THE  
SCHOOL OF EDUCATION  
KENYATTA UNIVERSITY**

**OCTOBER, 2020**

## **DECLARATION**

I declare that this thesis is my original work and has not been presented in any other university/institution for consideration. This research thesis has been complemented by referenced sources duly acknowledged. Where text, data (including spoken words), graphics, pictures or tables have been borrowed from other sources, including the internet, these are specifically accredited, and references cited by anti-plagiarism regulations.

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## **DEDICATION**

This thesis is dedicated to my loving husband Thomas, whose encouragement, inspiration and financial support motivated me to reach this far; our children, Demis, Damaris, Mildred and Gilbert for their prayers, patience and support during this studies.

## **ACKNOWLEDGEMENTS**

I wish to express my sincere appreciation to all individuals whose contributions made the completion of this thesis possible. First and foremost, to my Supervisors, Prof. Geoffrey Karugu and Dr. Bunyasi Beatrice Awori whose intelligent ideas, guidance, and assistance showed me the direction to success. To all lecturers in the department of Early Childhood and Special Needs Education, who showed great interest in my progress and dedicatedly guided me in my work.

Thanks to my husband Thomas, our children Demis, Damaris, Mildred and Gilbert for their patience and understanding during the period of my study. To my father Mwatsaka and my mother Mbeyu who planted the spirit that has made me what I am today, through your prayers and support offered throughout my early education cycle; I am deeply indebted to you. May almighty God bless you all.

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## **ABBREVIATIONS AND ACRONYMS**

<b>AT</b>	Assistive Technology
<b>EFA</b>	Education for All
<b>HI</b>	Hearing Impairment
<b>ICT</b>	Information and Communication Technology
<b>KICD</b>	Kenya Institute of Curriculum Development
<b>M.O.E.S.T</b>	Ministry of Education Science and Technology
<b>MDG</b>	Millennium Development Goals
<b>PTR</b>	Pupil-Teacher Ratio
<b>SNE</b>	Special Needs Education
<b>UN</b>	United Nations
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>WHO</b>	World Health Organization

## ABSTRACT

Information and Communication Technology plays an important role in teaching of learners with hearing impairment. Despite the significant role of ICT in promoting learning among learners with hearing impairment, its usage in promoting learning among learners with HI across the country however has been on a small-scale especially in remote areas with limited infrastructure that supports ICT. The purpose of this study was to determine the use of information communication and technology and its impact on promoting learning for the hearing impaired in special primary schools and units in Mombasa County. The specific objectives of the study were to; examine the extent of use of ICT in special schools and units in Mombasa County, determine the importance of Information Communication and Technology (ICT) in promoting learning for learners with hearing impairments, establish the impact of ICT in promoting learning in schools for learners with hearing impairments and to find out the challenges faced in the application of ICT in schools for learners with hearing impairment. The study was anchored on the theory of Diffusion of Innovation and Capability Theory. The study adopted descriptive survey design. The study was conducted in special schools and units for learners with hearing impairment within Mombasa County. The target population comprised of all learners with HI and their teachers in 3 public and one private primary schools in Mombasa County. There was a total of 223 learners with H.I and 30 teachers. Simple random sampling was applied to select the target population and get the study sample size. That was 77 respondents comprising of 66 Hearing Impaired Learners, 6 Teachers and 2 Head teachers/Deputy Head teachers. The study collected primary data using questionnaires and interview guides. The study revealed that laptops and desktops were inadequate, ICT enabled locally relevant teaching materials, in local languages, to be created and disseminated quickly and affordably, whether learners using voice communication aids were able to gain confidence and social credibility at school and in their community and schools had limited infrastructure. The study concludes that desk computers and laptops were inadequate. ICT enabled education to be tailored to individual learning needs and abilities. Learners using voice communication aids were able to gain confidence and social credibility at school and in their community. Computers were used to control hyperactive children. There was lack of education/school administrators of ICT support. The study recommends that all schools promoting education for learners with hearing impairments should implement and invest in ICT in order to ensure that learners get sufficient ICT facilities required for their education to ensure there is uninterrupted learning in schools. The Ministry of Education needs to strengthen policy and regulatory framework with regard to implementation of ICT in schools with specific references to special schools and units. All special schools should implement voice communication aids to help learners gain confidence and social credibility at school and in their community. All schools should have adequate Information and Communication Technology (ICT).

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.0 Introduction**

This chapter outlines the following elements; background of the study, statement of the problem, purpose of the study, study objectives and research questions, significance of the study, limitations and delimitations, theoretical and conceptual frameworks and operational definition of terms used in the study.

### **1.1. Background to the Study**

The right to education is universal for all learners including those with hearing impairment (UNESCO, 2009). Hearing provides a basis for almost all kinds of learning. From the time a child is born, they are at least, after some weeks expected to respond to sound stimuli (Gordon, Henkin and Kral, 2015). This becomes possible if the auditory systems are perfectly developed. Right from a tender age, learners with good auditory perception can respond to the voices of parents as well as identifying them using auditory discrimination. According to (Agomoh & Kanu, 2011), the ability to communicate and interact with one's environment largely depends on the hearing state. Loss of the ability to hear can create difficulties in a person's communication, adjustment, and learning. According to (World Health Organization, 2006), about 10% of the world population is made up of persons with hearing impairment.

Information and Communication Technology (ICT) refers to a set of computer-aided devices that help in the imparting of knowledge Masson, (2000). ICT can introduce new teaching and learning practices as it acts as a catalyst in transformation of an education

system Trucano, (2005). ICT helps in transfer of information and this can result in creation of new knowledge Duus, (2009). An international conference in Geneva on ICT utilization indicated that many learners with hearing impairments require the knowledge and utilization of Information and Communication Technology (ICT) to participate in and benefit from educational programs UNESCO, (2009). Learners with hearing impairment who have access to appropriate information and communication technology solutions are more likely to be successful in their educational programs Masson, (2000).

Many developed countries pounced on ICT usage in teaching learners with disabilities when the information age came into being. In Europe, for instance, there is a specialized training course for ICT in education for people with special needs using ICT applications for special needs educational learning and the use of assistive technologies in teaching children who are disabled (Tuomi, 2013). According to United States of America Department of Education (2013), it is important that all learning institutions recognize technology especially in teaching learners with hearing impairment.

The use of ICT has enhanced the cause of inclusive learning in the developed countries especially for learners with hearing impairment Tanner, Dixon & Verenikina, (2010). Research has shown the success stories in North America and Western Europe in the steps and the significant progress they have made in inclusive education by incorporating ICT in teaching. However, in some cases like Eastern Europe, Asia and Africa, there are still many difficulties in implementation of inclusive education and especially to learners with disabilities Ribeiro & Moreira, (2010). In a study among European countries, 90%

of the teachers noted that ICT played a significant role as far as learners with hearing impairment was concerned Elmailfi, (2014).

In Ireland, the Technology Integration Initiative, the Teaching Skills Initiative and the Schools Support Initiative all have been put in place to support use of ICT in teaching learners with HI. The Technology Integration Initiative aims at helping schools of learners with HI to develop their ICT infrastructures through issuing grants to purchase hardware and increasing internet connectivity. The Teaching Skills Initiative ensures that teachers of learners with HI are well equipped with adequate skills to effectively teach their learners through ICT Harris, (2006).

The role of ICT in promoting learning among learners of HI cannot be underestimated. This is because ICT is seen as an agent of transforming learning institutions of learners with hearing impairment. This fact is supported by a study carried out by Greenfield (2008) where 1000 experts in Australia were asked how much change; on a Likert scale of 10 would the internet bring to institutions. The results placed learning of learners with HI at 8.46 followed by publishing and new organizations with a score of 7.98. Hence, use of ICT is expected to make significant improvement in performance of learners with hearing impairment.

In Africa, Omoniyi & Oluniyi, (2012) examined the impact of captioned video instruction on Nigerian hearing-impaired learners' performance in English language and established that captioned video utilization improved learning. Chesitit, (2015) assessed how integration of ICT affected performance of mathematics among secondary schools in West Pokot. From the findings, there is a statistical difference in mathematics

performance between learners in classes taught by traditional methods and the ICT integrated in public secondary schools in West Pokot County.

According to Gakuu, (2010), ICT integration in Kenya is commonly embedded in private unlike public schools of hearing impairments with an aim of attracting learners in these schools for improved performance. A study on training in ICT tools to teach learners with HI by Wakhaya, (2010) noted that only 32.1% of teachers of learners with HI were trained to use computers whereas 67.9% were not. In another study by Salim, Mutanyi, Wesonga & Mutuku, (2014) on technology for early childhood education, it was noted that learners at the age of 5 (pre-unit) who use computers on a daily basis out performed 7-year old (class 1) from the control group which did not have access to computers.

In Mombasa County, learners with hearing impairment largely use analogy kind of technology in their daily educational activities with little exposure to modern technology Mugo, (2013). This study sought to determine whether use of ICT can promote learning among learners with HI in special schools and units.

## **1.2 Statement of the Problem**

Information and Communication Technology plays an important role in teaching of learners with HI. Salim, Mutanyi, Wesonga & Mutuku, (2014) finds that learners at the age of 5 (pre-unit) who use computers on a daily basis outperform 7-year old (class 1) learners that do not have access to computers. Despite this fact, the usage of ICT in learning across the country however has been on a small-scale especially in remote areas with limited ICT infrastructure.

In Mombasa County, teachers of learners with HI are ill-equipped with skills to use ICT. Teaching strategies and approaches employed by teachers in teaching learners with HI are essentially of passive type and traditional composes; they are approaches which are regularly utilized in schools to pass on guidance for learners having no hearing impairment. Hence, learners with HI become frustrated, discouraged and disengaged from the academic experience, with the resultant effect of poor performance.

A number of studies have been done on use of ICT in teaching of learners with disabilities. Globally, Dadzie-Bonney & Hayford, (2017) investigated factors preventing learners' ICT knowledge acquisition and utilization among learners with impairment in Ghana. Lidström and Hemmingsson, (2014) assessed role of ICT in learning by learners with hearing, visual, speech and motor impairment. In Ibadan, Egaga & Aderibigbe, (2015) examined how ICT enhanced learning outcomes of learners with HI. It is clear that Most of these studies were done in developed countries and this creates a gap that the current study sought to fill. Therefore, this study assessed the use of information communication technology and its impact on promoting learning for the hearing impaired in special primary schools and units in Mombasa County, Kenya.

### **1.3 Purpose of the study**

The main purpose of this study was to assess the use of information communication and technology and its impact on promoting learning for the hearing impaired in special primary schools and units in Mombasa County.

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

The objectives of this study were: -

1. To evaluate the teacher's extent of use of ICT in special schools and units in Mombasa County
2. To analyse the importance of Information Communication and Technology (ICT) in promoting learning for learners with hearing impairments in special schools and units in Mombasa County
3. To evaluate the effect of ICT in promoting learning in schools for learners with hearing impairment in Mombasa county
4. To find out the challenges faced in the application of ICT in schools for learners with hearing impairment.

#### **1.5 Research Questions**

1. What is the extent of teacher's use of ICT in special schools and units in Mombasa County?
2. What is the importance of Information Communication and Technology (ICT) in promoting learning for learners with hearing impairments?
3. What is the impact of ICT in promoting learning in schools for learners with hearing impairment?
4. What are the challenges faced in the application of ICT in schools for learners with hearing impairment?

## **1.6 Limitation and Delimitations of the Study**

### **1.6.1 Limitations of the Study**

Some of target respondents were very busy during data collection period. To overcome this, a drop and pick later method was adopted in distribution of questionnaires at an agreed time frame of two weeks. At the point of dropping questionnaires, contact information of respondents was established and a follow up was done to answer any question and difficulty encountered by the respondents as they filled in the questionnaires. Some respondents were also hessitant in giving adequate information because of the belief that information given would be used to intimidate and victimize them. To overcome this limitation, the researcher assured all respondents that information collected was only for academic purposes . Besdies this, the researcher had an introduction letter from the university that stated the purpose of the study.

### **1.6.2 Delimitations of the Study**

The study evaluated the use of information communication and technology and its impact on promoting learning for the hearing impaired in special schools and units in Mombasa County. Mombasa county was selected because the academic performance of learners with hearing impairments is constantly poor (Mugo, 2013). The poor academic performance of learners with hearing impairments is partly due to inability to adopt ICT in their teaching programs. The study relied on primary data that was collected using questionnaires. Primary data was used because it is the first hand source of information that is free from bias.

## **1.7 Significance of the study**

It is hoped that the findings and recommendations of this study would contribute significantly to learners, parents, teachers, government, and policymakers for hearing impairment.

For the Government of Kenya, it was hoped that through the findings of this study, policymakers would avail information to inform solid policies for better learning among learners with hearing impairment.

For learners with hearing impairment, the findings of this study would help outline the various challenges they go through in their quest to learn thus develop strategies on how their learning can be improved.

For the teachers of learners with HI, the findings of this study would be significant in informing them of the various ways they can improve their interactions with learners with special needs for optimal outcomes.

Parents of learners with hearing impairment may also benefit from this study in that the study will provide some important insights on the reason why their learners have been performing poorly.

## **1.8 Assumptions**

1. That the schools for learners with hearing impairment and units would collaborate with one another, would be accessible and leveraged to create accessible community ICT centres.

2. That information sought from respondents would be a true representation of the status quo.

## **1.9 Theoretical and Conceptual Framework**

### **1.9.1 Diffusion of innovation theory**

The study was anchored on the theory of Diffusion of Innovation by Rogers (1962). Diffusion of innovation according to Rogers is the process where an innovation is communicated by use of certain channels over a given period of time. Diffusion of innovation is a special form of communication as the messages are concerned with new ideas Rogers, (1995). The theory presents five features of innovation that affect its diffusion and these include relative advantage, compatibility, complexity, trial ability and observability Rogers, (2003). The theory further divides technology adopters into five categories depending on their speed of uptake: innovators, early adopters, early majority, late majority, and laggards.

Rogers, (1995) proposed that the appropriation of advancements is affected by the five qualities, and that they can clarify the rate of innovation selection. This theory explains how ICT can be adopted in learning institutions to teach learners with hearing impairments.

While there are schools that adopted ICT early, the researcher applied the theory in evaluating how the academic performance of learners in such schools compared with those who adopted it late as well as those who are yet to adopt. The theory was also applied in explaining how the success of such schools can be emulated to benefit learners with HI through adoption of ICT

### **1.9.2 Capability Theory (CT)**

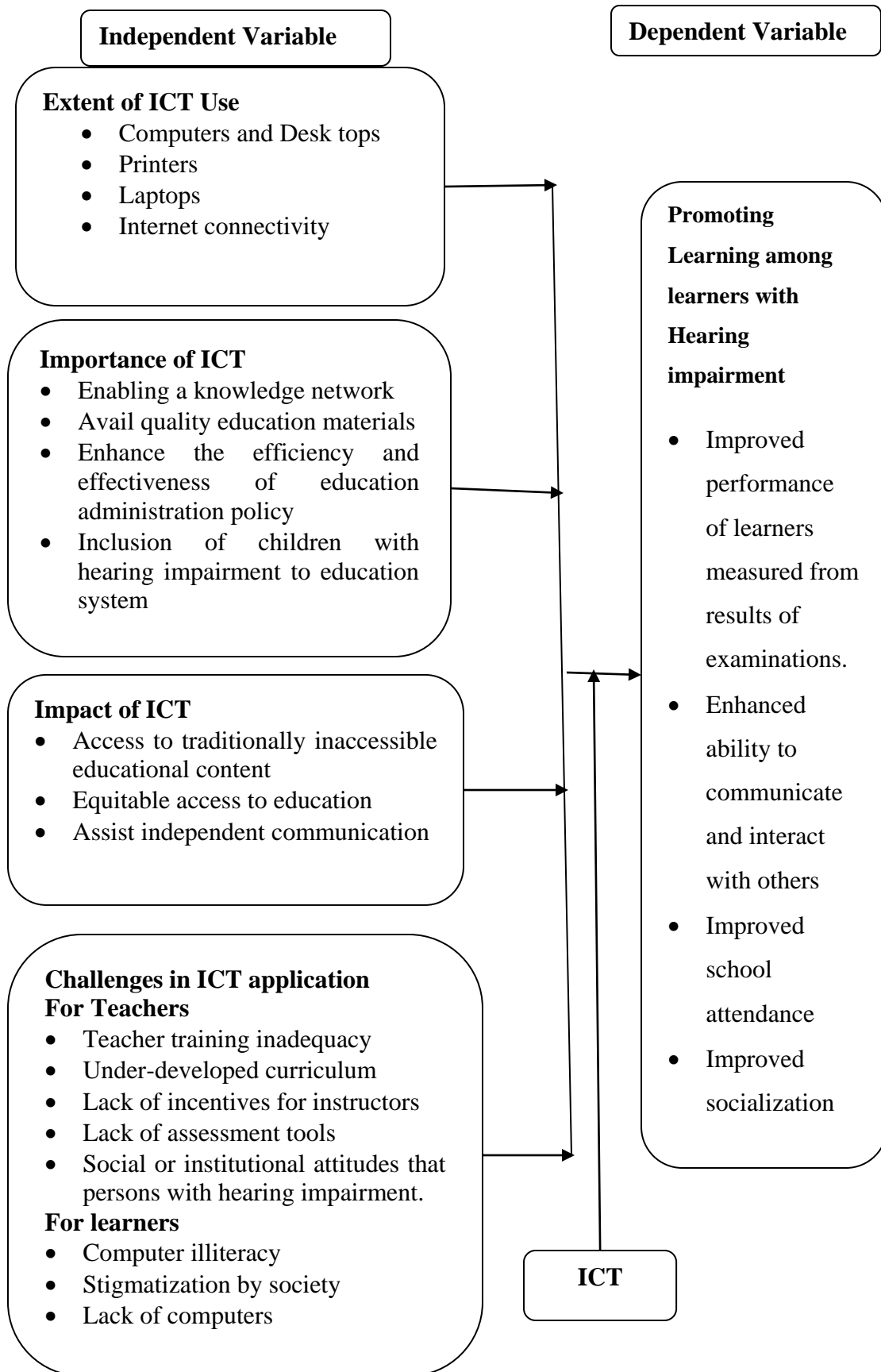
The theory was first coined by Amarta Sen in the 1980s and remains closely linked to him. The focus of the theory is on the impact of the impact of personal characteristics like handicaps on a person's capabilities (Sen, 2002). The approach has been adopted by Tobobso (2011) who presented an evaluation of disability in Sen's presentations on the abilities as well as functioning techniques based on information and communication technologies. Toboso (2011) postulates that the essence of diversity in the functioning and ability require inclusion in the assessment of people with disabilities where technology plays a crucial role. Therefore, when contemplating to utilize ICT to improve engagement and involvement, it is crucial that element like accessibility, inclusivity, and user engagement is taken into consideration to achieve the desired outcomes in fostering similar rights and equal opportunities for people with disability.

In the current study, the theory of capability was relevant due to its provision of accessing the need for ICT among learners with hearing disability. With the theory's argument that capability comes from accessibility, it was utilized in this study to determine how utilization of ICT provides an opportunity for learners with hearing impairment to reach their educational potential.

### **1.9.2 Conceptual Framework**

A conceptual framework is a diagram that shows relationship between the study variables. A conceptual framework shows the independent and dependent variables of the study and how these variables are measured. In this study, the conceptual framework shows how ICT affects promotion of learning for learners with hearing impairment. The dependent variable in the study was the promotion of learning among learners with

hearing impairment that Improved performance of learners measured from results of examination, enhanced ability to communicate and interact with others Improved school attendance and improved socialization. The independent variables in the current study included the extent of ICT use which focused on computers and desktops, printers, laptops ad internet connectivity. The other independent variable was the importance of ICT, the challenges facing ICT including stigmatization, lack of computers, and computer illiteracy for the learners while the challenges faced by the teachers include; teacher training inadequacy, under-developed curriculum, lack of incentives for instructors and lack of assessment tools. The other indepdent variable that infleunce the depdent variable is the impacts of ICT use which covered the; access to traditionally inaccessible educational content, Equitable access to education and Assistinng independent communication. The variables presented in the conceptual framework helped the study to determine the impact of ICT use in teaching and learning using ICT schools for learners with hearing impairment.



## **Figure 1.1: Conceptual Framework**

### **1.10 Operational Definition of terms**

**Access** –Opportunity or right to use something or to see something.

**Hearing impairment** – A generic term that is preferred when one has a hearing loss that may be mild, moderate, severe or profound. It is usually used in an educational setting.

**Hearing Impairment** – Someone whose hearing disability is so severe that it precludes successful processing of linguistic through audition, with or without a hearing aid.

**Learning environment** - Physical conditions that include resources, facilities, and class size that to some extent influence the teaching-learning process

**Sign- language**– A non-oral method of communication. It is pure, gesture language which has been developed and is used by people who are hearing impaired.

**Signed English**- A mode of communication in the English language where signs are superimposed on words in English sentences, but affixes, such as “s” and “ing” are indicated by fingerspelling.

**Special Schools** – Schools that individually planned and systematically monitored arrangements of physical settings, special equipment and materials, teaching procedures and other Interventions designed to help exceptional children achieve the greatest possible self-sufficiency and academic success.

**Special Unit**- It’s a learning centre where learners with specific challenges in Hearing Impairment are found

**Total communication** –A philosophy of communication that incorporates more than one mode of communication

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

In this chapter, the researcher examines the literature related to usage of ICT in promoting learning in special schools and units for the hearing impaired. The review covers the extent of use of ICT in special schools and units in Mombasa County, the importance of Information Communication and Technology (ICT) in promoting learning to learners with hearing impairments, the impact of ICT in promoting learning in schools for learners with hearing impairments and challenges faced in the application of ICT in schools for learners with hearing impairment.

#### **2.1 The Concept of Hearing Impairment**

Hearing weakness is a general, sound intelligent term which envelops all degrees of hearing misfortune independent of the etiology and area (Paul & Quigley, 1994). Hearing impairment is an inability related to hearing, and it extends in seriousness from mellow to significant. Hearing weakness alludes to all variations from the norm, issue, deviations in the component by and large alluded to as the ear. It alludes to all levels of hearing misfortune and irregularities in the consultation framework. It is ordered into Deaf and Hard of hearing. A man who is Hard of Hearing is one who with the utilization of intensification/listening devices has leftover hearing adequate to empower effective handling of phonetic data through tryout. A Deaf individual, is one whose consultation misfortune is so extraordinary to the degree that one/they cannot profit by everyday handling of phonetic data through tryout, with or without intensification Abang, (2005).

According to the American School for the Deaf,(2008), hearing impairment covers all forms of hearing problems that impede communication. It could be mild or severe. So, persons with hearing impairment are individuals who have mild or severe hearing problems to the extent that communication is affected. According to Baker,( 2006), hearing loss has a continual impact on daily learning experience. For many children, some form of special education services is required for the child who is hearing impaired to receive an appropriate education.

Ojile, (2006) explains that hearing impairment can likewise be characterized utilizing the period of beginning of the hearing misfortune. This incorporates postlingual and prelingual deafness. The Disabilities Education Improvement Act (2004), characterizes Hearing impairment in the instructive speech as a condition/inability which affects/influences the scholarly execution of the person with hearing misfortune regardless of the level of misfortune.

Different terms that are important to clarify the sorts of hearing impairments understudy may have extended from pre-lingual to post-lingual deafness. Prelingual deafness suggests hearing misfortune happening before dialect creates. In another word, prelingual hard of hearing youngsters do not create discourse and dialect. Fitting instructional techniques and utilization of assistive innovation gadgets go far in easing the instructive issues of this classification of understudies Beard, Carpenter & Johnson, (2011); Heward, (2009); Heller, Alberto, Forney & Schwartzman, (1996).

Post lingual deafness suggests a conference weakness happening when discourse and dialect have been created. Henceforth singular adapting needs of the people vary from

the individuals who have never created discourse and dialect. As indicated by Heward, (2009), the instructive program for Hearing disabled understudies who have prelingual deafness must underscore dialect and relational abilities, while those with postlingual deafness must spotlight on upkeep of the current discourse and dialect design. In addition, Hearing hindered understudies which show either a pre-lingual or postlingual hearing misfortune will in all probability get advantage from the utilization of assistive innovation gadgets.

Hearing impedance is additionally estimated on a continuum from ordinary hearing to serious and significant hearing misfortune. A Hearing-weakened understudy may have a one-sided hearing misfortune (including just a single ear) or two-sided hearing misfortune (the two ears are included). Hearing disability is either caused by a conductive hearing misfortune, sensor neural hearing misfortune or blended hearing misfortune. Gargiulo, (2009) called attention to that one strategy for ordering hearing misfortune is by the level of misfortune. Hearing misfortune can run from gentle to significant dependent on the level of power required as estimated in decibels (dB) at different frequencies portrayed in Hertz (HZ) to set up the meeting limit.

The meeting misfortune is estimated in decibels (dB), or, in other words used to gauge the relative power of sound. Hearing misfortune is ordered into mellow misfortune 27-40 dB; moderate misfortune 56-70 dB; extreme misfortune 71-90 dB and significant loss of in excess of 90 dB. The correspondence framework the understudies with hearing disability are presented to is specifically identified with the person's capacity to hear and grasp sound. Factors, for example, these and in addition in the case of hearing misfortune is pre-lingual or post lingual plainly have instructive ramifications.

For example, people with mellow hearing misfortune may experience trouble hearing an uproarious classroom setting or have the capacity to recognize far off sounds. Be that as it may, the discourse separation capacities are regularly inside as far as possible. Suitable housing for such understudies may incorporate favored seating game plan; conceivable utilization of portable amplifier and/or individual FM framework; more noteworthy reliance on the instructional models that will require expanded coordinated effort with the guardians to encourage learning. The person with a moderate hearing misfortune, contingent upon the sort, degree and period of beginning, may encounter huge deferrals in discourse and dialect advancement. Enunciation shortfalls, lessened vocabulary, troubles acing different linguistic and grammatical ideas and poor voice quality are basic issues. Thus, portable hearing assistant with individual FM framework is fundamental for such understudies, notwithstanding rehabilitative systems.

A serious or significant hearing misfortune individual once more, contingent upon the degree and age beginning, may endure extremely hinder discourse and dialect improvement. People with extreme to significant hearing misfortune often times have poor sound-related segregation which may restrain the viability of regular enhancement gadgets.

Good to deal with remediation ought to be utilized which includes significant connection with the audiologist and different experts to guarantee the precision of analytic data and in addition the propriety of intensification. Understudies with this level of hearing misfortune will require critical settlement in the instructive situations to be fruitful, including extraordinary visual dialect support for guidance in language structure and grammar Ajuwon, (2012), Gargiulo, (2009).

In actuality, whatever phrasing is utilized, it is critical for one to see to the individual needs of the understudy with hearing impedance can be distinguished so they get proper training in light of the fact that the depiction of a man's hearing misfortune is frequently founded on the level of hearing at various frequencies as estimated by the audiologist.

## **2.2 Information Communication Technology and Learning for Individuals with Hearing Impairment**

There is a relatively all inclusive acknowledgment that data and correspondence advances (ICT) are appropriate for improvement of Livingstone,( 2012). For instance in the region of training, the World Bank calls attention that "teachers and policymakers concur that ICTs are absolutely critical to the eventual fate of instruction" and that "ICT in instruction activities are probably going to contribute effectively to meeting Millennium Development Goals."

These advancements, most especially those that are web associated and fit for giving on the web data in genuine – time" increment access to separate learning, empower an information arrange for understudies, prepared educators, expand the accessibility of value instructive materials and improve the productivity and viability of training organization strategy. As indicated by Livingstone, (2012), this position is shared by guardians and educators on the ground, with the end goal that the simple accessibility of ICT in schools has come to be quite often likened to great advancement in ICT technology Livingstone, (2012).

Information and Communication Technology has been the basis for human existence from time immemorial (El-Kadiri, Grabot, Thoben, Hribernik, Emmanouilidis, Von

Cieminski & Kiritsis, (2016), also, this has driven a man to look for persistently approaches to enhance the preparing of data and conveying such data to each other regardless of separation and consistently Ndukwe, (2002). Making due in the data age relies upon access to national and worldwide data in a quickly changing worldwide condition Federal Republic of Nigeria, (2001) .

ICT plays an important role in so far as the learners with hearing impairments are concerned. According to Wastiau, Blamire, Kearney, Quittre, Van de Gaer & Monseur, (2013), ICT increases learning outcomes of learners with hearing impairment through enhanced visual and retention capabilities. Learners with hearing impairment require ICT in order to boost and to benefit from education programs. According to Salaudeen, (2015), ICT increases the learning potential of learners with hearing impairment besides increasing their proficiency through provision of ability to access knowledge using appropriate digital devices. ICT helps learners with hearing impairment to effectively communicate with their peers and through this, a collaborative and social learning environment is fostered Lasa, (2010).

ICT has been advocated as one of the most effective ways to progress learners with hearing impairment in learning. Many of the developed countries are using different ICT programs among HI learners to advance learning in their educational programs. The developing and less-developed countries are following suit in adopting the use of ICT in teaching of the HI learners due to its inherent advantages. Some of the benefits accrued from the use of ICT in education for HI learners include greater efficiency in running school programs as educational programs are automated and improved communication channels between learners with HI and their teachers. These learners benefit from the use

of ICT as learning is tailored to suit the needs (strengths and weaknesses) of the learners with HI hence better performance. The use of ICT also increases the motivational level of both teachers and learners with HI.

With ICT, learners with HI can continue using computers to learn outside the school hours. Another great advantage of ICT is that it allows for flexibility of learning as it can be self-paced and allows for self-regulation for different learners' with HI needs. ICT is beneficial as it reduces the level of stigma of failure as the online environment provides enough privacy and space since learners with HI do not feel miserable about minor failures. They are more motivated, and it encourages independence and self-responsibility for learning and active learning. If these are some of the benefits accrued in learning, then ICT would equally be beneficial to learners with hearing impairment Gichana, (2011).

According to Salaudeen (2015), ICT assists learners with hearing impairments, by providing them with aids to learning capacities and also increasing their learning potential. ICT makes the children with hearing impairment proficient by providing them with the capacity to get to learning with the assistance of appropriate computerized media. It also plays a crucial role in helping the children with hearing impairment communicate with peers, thereby promoting them with a collaborative and social learning environment. ICT also helps learners with HI in reading and writing through visual processes Lasa, (2010).

Assistive innovation is a conventional term that incorporates adaptive, assistive, and rehabilitative gadgets for people with incapacities and incorporates 'basically anything that may be utilized to make up for absence of specific capacities' Reed and Bowser,

(2005). They include hearing aids and calpers. These can be used in teaching and learning through internet usage which help teachers to get a variety of the latest information in special education Asmal, (2004). Internet facilities are educational resources in which teachers can use to facilitate learning. Internet usage enhances learning by helping in curriculum adaptation to meet the unique needs of learners with hearing impairment Jegbefume, (2013). It gives a variety of great instruments that help with changing the by and by separated educator focused and message bound classroom practices into rich student-focused and interactive learning environments. To effectively meet these expected results in schools, teachers must, therefore, embrace the new technology learning tools Handel & Harold, (2006). There are different sets of ICT devices used for learners with hearing impairment. An example of these devices includes loop systems, personal hearing aids and sound field systems.

In South Africa, just like other in African countries, 30% of deaf are ICT illiterate Asmal, (2004). According to Asmal (ibid), the vast majority of deaf children never attended school or attend at a very late age due to ignorance of ICT usage in teaching learners with hearing impairment. There are very few ICT teachers who are equipped to teach learners with hearing impairment. The few that are there are in major urban cities teaching the schools of elites.

South Africa has a peculiar blend of developed and developing world conditions. The hearing impaired elite learner experiences a cutting-edge technology like their first world counterparts while most of the hearing-impaired learners in less privileged schools for the deaf experience a less advantaged side of the digital ICT divide. The hearing-impaired learners in elite schools in South Africa like in the USA use cutting edge technology

devices. The use of ICT is incorporated in Hearing Aids devices which are either behind-the-ear, body worn, eyeglass or in the ear by school children (hearing impaired). They also use Frequency-modulated (FM) Amplification systems (auditory trainer) which create a direct link between the learner and teacher, who wears a hearing aid. Others are infrared systems, Audio loops, cochlear implants, Captioned Television, Live speech captioning and Telecommunication Devices for the deaf (TDDS), Asmal, (2004).

Looijesteijn, (2009) while exploring the outline of a hard of deaf-to-hearing communication aid for South Africans noted that the deaf people living in South Africa have communication problems alongside illiteracy hence asking the need for special solutions to them. An answer for Deaf-to-hearing correspondence was outlined. It was discovered that in spite of the fact that there is a requirement for a simple to utilize use sign language-based telecommunication based media transmission arrangement, the Deaf right now encounter the correspondence issues, with hearing individuals among the most squeezing.

A web benefit called Sign Support was intended to encourage Deaf and hearing to converse with one another when a human gesture based communication mediator isn't accessible. Sign Support is intended to be open on a cell phone and can be utilized by illiterate Deaf. Sign language based communication video is utilized to direct Deaf clients through an arrangement of inquiries that are made to help them in certain predefined circumstances (i.e., purchasing a prepare ticket, announcing a wrongdoing or getting a specialist's doctors).

The Deaf clients answer the inquiries by connecting with graphic symbols. Sign Support turns their answers into text for the hearing person they are planning to visit. Looijesteijn, (2009) further noted that if Sign Support would be made accessible on the web, it could satisfy an incredible want for better comprehension between Deaf and hearing people Looijesteijn, (2009).

In Kenya, the importance of ICT in special schools is well outlined in the Basic Education Act of 2013. The Basic Education Act (2013) provides that special public schools be created and maintained. This shows governments' interest and desire in accessibility of ICT to all learners with disabilities. Several government projects have been commenced to promote ICT usage in schools and even in special schools.

The Kenyan government has commenced the rural electrification project where connection fee charged is currently at Ksh15000 with an optional payment mode of Ksh2500 per month for a specified period. This adjustment in electricity connection is one of the projects by the government in aid of the usage of ICT devices that are powered by electricity for both the special and the normal school units. The Kenyan government has equally given computers that are solar-powered to class one children that would equally promote education for both children in regular and special schools.

Promotion of science and technology is one of the eight National Goals of Education in Kenya. Innovation is a basic type of riches to any country. Therefore, advancement, investigate, improvement, data, and communication technology (ICT). With advancement in technology, then children with hearing impairment stand to benefit from new

inventions and innovations. This is how important ICT is to the nation and in particular to the inclusion of persons or children with hearing impairment.

In connection to advancement in technology, much has been done. For example, a meta-study research into the use of ICTs among secondary school teachers in Kenya was done by Kiptalam and Rodrigues in 2011. The study showed that learners with hearing impairment could accomplish tasks working at their pace, and independent access to education can be improved (Kiptalam & Rodrigues). The study further established that learners with hearing impairment using voice communication aids. The study revealed that an increase in ICT confidence amongst learners with HI motivates them to use the internet at home for school work and leisure interest. It is for this reason that this study sought to find out if ICT was being used in the hearing impaired special schools and units to support teaching and learning. This is because little has been done on the use of ICT by the hearing impaired.

### **2.3 Importance of ICT in Promoting Education for Learners with Hearing Impairment**

Aside from drastically changing the methods of educational information delivery, ICTs can perform basic jobs in information development by making conceivable administration, the creation and sharing of learning Hallahan, Kauffman and Pullen, (2011). ICTs, are intense social change frameworks injected with the mission of creating and improving attractive qualities and practices among people in general and particularly among the adolescent.

ICT supports cognitive development and play of learners with hearing impairment Besio, (2004). At the tender age (under 2 years), ICT is useful to help learners with HI to utilize objects as tools to attain desired results. Later, (2-6 years), the design and use of ICT is such that children with HI can deal with objects more symbolically. Older learners of HI (7-11 years) use ICT more variably as they are in a position to apply logical operations to specific sets of problems. Finally, the design of ICT for adolescent learners with HI (over 11 years) can be based on decision making and problem solving

Definitely due to their job in information generation, teachers and policymakers who grasp ICTs to promote instructive objectives must perceive their conceivable negative results and be proactive in tending to them. ICT proficiency training gives a fitting scene to this. In addition, given that there is ceaseless improvement of ICTs and the general population who utilize them, so ought to there too be a continuous adoption of ICT in teaching learners with hearing impairment Palak & Walls, (2009).

Hasselbring & Glaser, (2000) looked at the use of technology to assist learners with special needs in United States of America. The study noted that governments should come up with strategies for using ICT in promoting education for learners with physically challenged (special educational needs). There should be a national ICT strategy in education and training for both the teachers and learners with hearing impairment among others. Such strategies include conducting ICT training courses for the teachers who will teach H.I learners, having a national strategic plan to be adopted by all special schools and units in the educational plan; providing the necessary resources and materials for the schools, teachers, and learners with hearing impairment. These strategies are put in place

to improve access, quality and equity in the delivery of education services to those with hearing impairment in different special schools and units Hasselbring & Glaser, (2000).

In the Kenyan instruction framework (education system), the general goal of the ICT vital arrangement is to guarantee that the deliberate endeavors are made towards strengthening, selection and utilization of ICT in training area with appropriate consideration given to instruction improvement needs as sketched out in the Big-Four Agenda GoK, (2018).

Financing ICT in the ordinary schools and the special schools is one of the key initiatives by both the national and county governments. Financing as a strategy comes regarding funding the acquisition of the ICT programs, gadgets, and systems to promote the use of ICT in training the teachers and in teaching the learners both in the regular and special school setting.

The Education strategic plan of the MOEST (2013-2018) considers and proposes that ICT can contribute substantially towards the realization of the National ICT Strategy objectives.

Likewise, ICT can possibly bolster execution of Free Primary Training (FPE) and to address rising difficulties, for example, high Pupil-Teacher Ratios (PTRs) especially in unique schools, packed classrooms, and semi-arid-dry regions, units, the deficiency of instructors taking care of learners with hearing debilitation and moderately high expense of learning and educating materials. This system traces zones for coordination of ICT in showing learners with hearing and impedance in Kenya to address the difficulties made

mentioned above and to secure the situation of the country as concerns the quickly growing training requirements for learners with hearing impairment.

Starctic & Niskala (2010) examined how internet can be utilized to teaching learners with hearing impairment in Finland, Lithuania and Hungary. The study noted that there are four key pillars critical to effective implementation of ICT initiatives to meet ICT integration in the education sector. These are; teacher capacity development, relevant digital content, deployment of ICT infrastructure and robust policy and strategy Kenya Education Management Institute – KEMI, (2014). The study further established that implementation of ICT in special schools makes information-exchange faster, easier and more cost-effective among learners with hearing impairment.

ICT makes education more accessible especially to the hearing-impaired school going children who are hampered regarding communication. ICT equally improves the quality of education among learners with hearing impairment as knowledge is easily amassed and shared electronically among them. Koech, (2000) posits that the Kenyan school educational modules is wrong in that there is absence of clear strategy rules and lawful status on learners with HI arrangements, deficient instructing offices, equipment and services for learners with hearing impairment and inadequate teachers who use rigid teaching approaches which may only benefit the average learners among others. According to the Policy on Special needs, a document launched by the Ministry of Education in 2009, the curriculum materials for children with hearing impairment are inadequate at all levels of education.

The curriculum also lacks flexibility in terms of time, learning resources, methodology, and modes of access, presentation and content for learners with hearing impairment. There is lack of sufficient trained personnel for curriculum development to handle learners with HI. In addition, there are no clear staffing norms and recommendation on pupil-teacher ratios in institutions and programs for learners with HI.

Information and Communication Technology integration is one of the concerns of sessional paper. No 14 of 2012 sector-wide framework-Kenya to realign education and training sector to Vision 2030 and the constitution of 2010. It strengthens the integration of ICT into the teaching and learning in schools (ECD to secondary) by training of trainers and building computer labs.

On the provision of computers and laptops, the sessional paper. No 14 of 2012 lays as well as the development of digital literacy in support of knowledge economy. Though elaborate with precision, most of the ICT strategies are silent on learners with special needs especially those with hearing impairment. Using ICT can make education among learners with HI increasingly free of the constraint of distance, makes education easier and cheaper to access for learners with HI. The use of ICT can also change the ways learners with HI are taught and this result into better learning outcomes.

#### **2.4 The Impact of ICT in Schools for Learners with Hearing Impairments**

According to WHO, (2004) the World Health Organization defines hearing impairment as partial loss or a complete of the ability to hear from one or both ears. Study indicates that 250 million people in the entire world are having a disabling hearing impairment.

The barriers encountered by children with a hearing impairment in inclusive schools relate to communication.

UNESCO, (2004) contends that persons with hearing impairment remain excluded in society. Education is an important part of enabling learners with hearing impairment to reach their full potential, Accessible ICTs hold the potential to facilitate access to education, job training, and employment for learners with HI.

Learners with hearing impairment may have difficulties in hearing audio information in different levels. They need different types of assistive technologies (ATs) Egaga & Aderibigbe, (2015). According to Anido-Rifon, (2008), the most commonly used Assistive Technologies software for the hearing impaired is the I-Communicator. I-Communicator is an assistive tool for the people with hearing impairments. It assists independent communication for persons who are deaf or hard-of-hearing. It translates contents in real-time, like Speech to Text, Speech/Text to video sign-language and Speech/Text to Computer Generated Voice.

Content once translated can be used by the user for obtaining definitions, synonyms, and antonyms, with the help of an inbuilt dictionary in the system. This is the ideal assistive technology software that should be available and used in special schools and units for the hearing impaired to promote teaching and learning. Precisely because of the importance of ICT in teaching and learning in hearing-impaired institutions, there is a need for investigating if they are used in schools, the main knowledge gap in this study.

Sylvia, (2009) commenting on the general use of ICT in schools for learners with hearing impairments stated that ICT could have a positive reaction on studying for deaf children,

Use of ICT teaching and learning process goes past the utilization of computers by instructors since not just a computers and the web are utilized, yet in addition computerized cameras, cell phone and different innovations that can change the process of teaching learners with HI. Nevertheless, ICT has not revolutionized teaching methods so far as leaners with HI are concerned.

The use of ICT as noted by Sylvia, (2009) is mostly focused on supporting the subject content of learners with disability. ICT-based exercises by hearing-debilitated learners are significantly more to do with devouring than delivering. They work independently more regularly than together. In any case, the effect of coordinating ICT in training hard of hearing youngsters can be estimated in student's commitment separation and innovativeness and by the way that less time is squandered however the effect of ICT is extremely subject to how it is utilized.

The benefits of using ICT by hearing-impaired learners are many and varied. According to World Bank report, (2009), deaf learners gain as there are improved literacy levels through the use of ICT and specialized software. The World Bank report further notes that ICT could serve as a teaching, communication and learning tool; a helpful guide; a learning environment; a demonstrative guide and a device for the authoritative assignment in SEN arena (p.163). Different investigations have demonstrated that ICT can reduce the impact of incapacity among learners with HI, which would somehow or another make a boundary to learning and active cooperation in the learning procedure for learners with HI Florian, (2004).

ICT can enable learners with hearing impairment to partake in the learning society Starcic, (2010) and help them in building up their correspondence and social aptitudes Thorpe, (1998); Xin, (1999). ICT is a useful instrument for understudies with HI, who might have generally confronted trouble in getting to data Myhill, (2002). Understudies with HI are generally subject to other people; and ICT is viewed as an essential instrument in making them moderately free (Grimaldi & Goette, (1999); Watkins, (2004). In specific terms, there is increased independence, confidence, motivation and social contact between learners with HI and others who may be “normal” with no hearing challenges. The use of ICT offers excellent forms of communication, email, fax, and video conferencing for learners with HI.

Alongside comprehensive training, another change motivation in instruction is driven by Information and Communications Technology (ICT). Kids with HI live in a computerized age where the trading of such data happens through ICT Brodin, (2010). Innovation has profoundly affected learning outcomes of learners with hearing impairment across the world Lily (2001). According to UNESCO, (2000): “ICT may have a role to play in disseminating and sharing special forms of education especially among learners with hearing impairment” (p.8). Florian, (2004) recommended that "innovation is an extraordinary equalizer which fills in as an intellectual prosthesis to remunerate the distinctions among learners with hearing impedance and the typical ones."

Proof from the created nations recommends that the utilization of ICT in supporting understudies with hearing hindrance has developed fundamentally over the most recent couple of years. Research has noticed that ICT could be a powerful apparatus for learning among understudies with hearing weakness Buckingham, (2007); Hegarty, (2004). In

European nations, it has been noticed that ICT can be utilized to satisfy a scope of capacities with regards to understudies with hearing hindrance. In his report ICT in SEN venture by European Agency in 17 nations of Europe, Watkins, (2004) made reference to that every student with hearing debilitation has unmistakable necessities and the product utilized should supplement these requirements.

Turin, (2000) while giving the impact of ICT in advancement of learning among understudies with hearing weakness said that learners with HI experience issues in the improvement of a correspondence framework. The capacity to impart among understudies with HI is basic to their passionate, social, and subjective advancement. Teaming up on an ICT action can energize a gathering of learners with HI to expand their utilization of dialect and their comprehension of ideas as they plan and do their work.

## **2.5 Challenges Faced in the Application of ICT by Learners with Hearing Impairment**

Usually, a successful inclusion occurs when an individual is given all supports needed, whether it's physical (assistive technology like hearing-aids) or human (a trained assistant); and when the level of the disability matches appropriately with the environment into which the disabled is integrated in, as defined in Educational fully inclusive model Morrison, (2004).

When handling special needs inclusion in the mainstream society, a study by Ruijs and Peetsma, (2009) on the impacts of consideration on understudies with and without unique instructive necessities checked on recommended that youngsters with uncommon requirements ought to be involved in the whole design process. The design process starts

with the level of the child's involvement, followed by the additional influence of nature and the strictness of the child's disability, and lastly with the child's availability and intensity of support Ruijs & Peetsma, (2009).

The same goes for the hearing-impaired individuals needing special attention; when technology is specifically developed for these individuals, need to involve and assess them with design process models, also known as, 'The Inclusionary Model.' For example, a communication device for the hearing-impaired individuals, an individual could be a full design partner that opens-up too many involvement levels, if given a one-on-one special education supporter, although the deafness will defeat the individual to participate fully unless provided with a sign language interpreter.

The Kenyan government recognizes two broad areas of challenges of ICT application in schools in the education integration. In the National ICT policy paper of 2006, the two broad challenges are infrastructure related challenges and capacity building related challenges.

A country's educational innovation framework sits over the national broadcast communications and data foundation. On infrastructure related challenges; Fichten, Ferraro, Asuncion, Chwojka, Barile, Nguyen, & Wolforth, (2009) in the study on disabilities and e-Learning problems and solutions; the paper noted that before any ICT-based program is launched, policy makers and planners must carefully consider the availability of appropriate rooms or buildings to house the technology, electricity, and telephony.

Williams, Jamali & Nicholas, (2006) in the present educators need to figure out how to instruct with advanced innovations while a considerable lot of them have not been educated mentions on capacity building related challenges which include lack of skilled teachers, education administrators, technical support specialists and content developers. This poses a challenge in the adoption and implementation of the usage of ICT to special needs children. Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given school.

Content development is a critical area that is too often overlooked. There is a need to develop original education content for example radio programmes, interactive multimedia learning materials on CD – ROM or DVD, (Web-based courses), adapt existing content, and convert print-based content to digital media Williams, Jamali & Nicholas,(2006).

UNESCO'S Institution for Information Technology in Education (IITE) views policy development for the use of accessible ICTs in schools as a “complex proposition based on the principle that technology is not only a tool,” it also requires “a shift in the focus from technology provider to the design of learning environments “policy development has, therefore, moved from an exclusive focus on the provision of hardware and software to the effective use of ICTs in different educational contexts.

UNESCO suggests four stages of the successful integration of accessible ICTs in learners with disabilities educational environments. These include the design and development of the accessible ICTs, their implementation, and improvement, and the assessment of their benefits. Lack of web-portals developed for the hearing-impaired individuals. Besides

teaching the ICT courses online, again the need analysis conducted surveys the teachers' views on existing portals in Malaysia on the hearing-impaired education. Most teachers stated that there is still not one satisfactory portal that has a combination of various aspects regarding these individuals.

Hashim, Tasir, & Mohamad, (2013) in an educational technology journal on e-learning environment for hearing impaired learners. Nothing that these aspects given by respondents include issues on having attractive visual graphics with animation and 3D; information on the deaf, Malay Language Hand Code (KodTangan Bahamas Melayu), videos showing Sign Language alongside with captions and subtitles, job opportunities for the hearing-impaired, blogging, education institution to further studies, download/upload files, chatting system, and a membership profile to sign-up for the learners, teachers and parents. Most teachers highly demanded a portal that has all these aspects, which would be beneficial to them, crucially to the hearing-impaired individuals as well.

### **2.5.1 Challenges Faced by Teachers of Learners with Hearing Impairment**

The Kenya Institute of Education, (2011), today is known as the Kenya Institute of Curriculum Development (KICD) guide reports on ICT training for teachers highlights areas of challenges that teachers face in implementing ICT programs in schools at the level of secondary and primary schools.

They include teacher training inadequacy, underdeveloped curriculum, equipment identification problems, lack of training tools, lack of incentives for instructors, lack of assessment tools, the high cost of training and implementation, lack of resources and

social or institutional attitudes that persons with hearing impairment cannot or should not be educated.

Catelli, (2006) observes that one of the problems in teachers training is inadequacy since the present instructors need to figure out how to educate with advanced innovations while a considerable lot of them have not been instructed on how to do so, making them widely incompetent in emerging issues such as computer-generated learning.

Fischer, (2006) commenting on the inadequacy of training for the teachers of deaf children, observed that the deaf learners are often left behind in the use of ICT technology in this rapidly changing world. This means that most teachers in deaf schools still prefer the traditional sign language teaching strategies which are devoid of anything ICT related Catell, (2006).

Undeveloped curriculum for ICT is another challenge to the teachers. Teaching practices on ICT and Curriculum development have not much attention on ICTs and ATs used in classrooms. The KICD is yet to roll out a comprehensive curriculum inculcated in the syllabus for deaf schools.

This makes it very difficult for teachers to identify ICT equipment (software and hardware) relevant to teaching and learning for the hearing impaired, teachers need an appropriate curricular that permits the use of ICT tools for enhancing education in teaching and learning. Lack of these tools, especially the assessment tools is a big problem of teaching and learning using ICT.

Mundi, (2011) socio-cultural impression of instructors and guardians on comprehensive training in four chose extraordinary and coordinated schools in Kenya; Mundi, (2011) noted that while it is not necessary for teachers to have in-depth knowledge of assistive technologies and devices, it is important that they receive support in developing educational materials and resources that are acceptable for all learners.

Lack of this support de-motivates teachers who eventually develop a negative attitude towards the use of ICT in teaching the deaf learners. Poor funding for developing school ICT capability and negative political and financial commitment (at both government and schools levels) challenges the teachers in deaf schools to have to contend with (Mundi, 2011).

### **2.5.2 Challenges Faced by Learners with Hearing Impairment**

Many deaf learners endure long, painful experiences of being taught by untrained teachers who have not mastered the strategies and use of ICT in teaching and learning. Most learners from poor or rather humble backgrounds are computer illiterate. This is due to inadequate exposure to information communication technologies (ICTs). This may also lead to poor academic performance.

Another challenge is the inability for the hearing impaired learners to work by themselves. For lack of computers, HI learner's access to education cannot be improved, and therefore they will not be able to accomplish educational tasks working at their own pace. They may not be able to gain confidence and social credibility at school and in their communities. This may lead to stigmatization and inability to deal with wider issues of exclusion from their peers, society, environment, and culture.

A World Bank, (2009) report gives an account of ICTs in schools bringing up that "Society (consistently) requires new abilities: ICT progressively pervades each part of life (health, learning, work, relaxation,). ICT is the dominating apparatuses for information handling, new ages need to end up able in their utilization, ought to get the important skills, and in this way should approach PCs and network systems during their school life" (World Bank, 2009).

Adoyo, (2008) while investigating on educating deaf children in an inclusive setting in Kenya: challenges and considerations. Other challenges include communication problem; frustration, isolation depending on the dictates of the environment and learners experienced feelings of anger. Adoyo, (2008).

## **2.6 Summary of Literature Review**

The findings presented in this chapter indicates that ICT plays a very significant role in the promotion of learning among learners with hearing difficulties. Unlike in the previous years where individuals with hearing difficulties used to struggle so as to communicate or even access learning r, things have transformed over the years, and the integration of technology has enabled them to achieve milestones in life. Masson, (2000) affirms that learners with H.I who can access appropriate ICT facilities have very high chances of succeeding.

Programs such as computer-based assessment systems and the circumaural ear cups which have worked credibly well in supporting learners with H.I condition. Nevertheless, with those achievements in records there still exists many problems faced by learners with H.I difficulties that need to be attended to. For example, the majority of teachers are

not trained or lack knowledge on how to deal with their learners who are suffering from H.I. In addition to that, the cost of accessing to the ICT equipment's and facilities are very expensive and unachievable hence most of them cannot afford to purchase them. These studies reviewed show that there exists major research gap in this area. For instance, the study by Looijesteijn (2009) noted that the deaf people living in South Africa have communication problems including being illiterate hence asking the need for special solutions to them. This study was done in South Africa which is more developed technologically than Kenya hence its findings may not be applicable in the Kenyan context. Furthermore, Fichten, Ferraro, Asuncion, Chwojka, Barile, Nguyen, & Wolforth, (2009) study looks at the general e-learning problems as opposed to learning for the hearing-impaired learners. Mundi, (2011) socio-cultural view of instructors and guardians on comprehensive training ; noted it is important that teachers receive support in developing educational materials and resources that are acceptable for all learners. Poor funding for developing school ICT capability and negative political and financial commitment challenges the teachers in schools of to have to contend with. This study looks at challenges covering only one of this study's objectives thus creating a gap where other objectives have to be discussed. Adoyo, (2008) while investigating on educating deaf children in an inclusive setting in Kenya investigates inclusion in educating deaf children and fails to touch on using ICT to promote education for the deaf learners. The study steps in to cover the research gap by investigating the usage of information and communication technology and its impact in promoting learning for the deaf learners in special schools units, Mombasa County, Kenya.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

The chapter describes the methodology used for the study. It includes; research design, variables, the location of the study, target population, sampling techniques and sample size, data collection techniques, data analysis, and logistical and ethical considerations.

#### **3.1 Research Design**

This study adopted a descriptive survey design. According to Orodho, (2005), “descriptive survey design is used in preliminary and exploratory studies to allow researchers to gather information, summarize, present and interpret for clarification.” The researcher collected information on the usage of ICT in promoting learning in special schools and units for the hearing impairment without manipulating any other variable.

#### **3.2 Variables**

The independent variables were the extent use of ICT , the importance of Information Communication and Technology (ICT) in promoting learning to learners with hearing impairments, the impact of ICT in promoting learning in schools for learners with hearing impairments and challenges faced in the application of ICT in schools for learners with hearing impairment in Mombasa County. The dependent variable was the use of ICT in learning by learners with hearing impairments in Mombasa County.

### **3.3 Location of the Study**

The study was conducted in special schools and units for learners with hearing impairment within Mombasa County (Ziwani School for the Deaf, Tudor Special Unit and Ronald Ngala Special Unit). The county was selected for the survey because of its continued decline in performance by learners with hearing impairment. The study sought to determine whether this poor performance is related to adoption of technology in the learning process. Accessible ICTs have the potential to provide learners with hearing impairment unprecedented skills training, opportunity to participate in the economic, levels to access to education, employment, cultural and social life of their community. Therefore, there was need to establish the level of usage of ICT in promoting learning in these institutions.

### **3.4 Target Population**

In this study, the target population comprised of all learners with H.I and their teachers in 3 public and one private primary schools in Mombasa County. However, only 3 schools (Ziwani School for the Deaf, Tudor Special Unit and Ronald Ngala Special Unit) were targeted since one of them (Kibarani School for the Deaf) was used for piloting (Ziwani School for the Deaf, Tudor Special Unit and Ronald Ngala Special Unit). There was a total of 223 learners with H.I and 30 teachers. Teachers were chosen for this study because they were in direct contact with learners and it was their responsibility to cover the curriculum content effectively, and usage and adoption of ICT was in their hands. The teachers were also tasked with selecting the most suitable modes of communication as they would take into account the needs of every student. Headteachers were important in

this study as they supervised the work of teachers and provided needed resources and materials thus had valuable information for this study.

**Table 3.1: Target Population**

<b>Category</b>	<b>Schools</b>	<b>Population</b>
Hearing Impaired Learners	Ziwani School for the Deaf	159
	Tudor Special Unit Unit	32
	RG Ngala Special	34
Teachers	Ziwani School for the Deaf	14
	Tudor Special Unit Unit	9
	RG Ngala Special	7
Headteachers/Deputy Headteachers		6
<b>Total</b>		<b>259</b>

**Source:** *Mombasa County Government website (2016)*

### **3.5 Sampling Techniques and Sample Size**

This section describes the sampling techniques and the size of the sample that were used in this study.

#### **3.5.1 Sampling Techniques**

Simple random sampling was applied to select the target population and get the study sample size. The target population was put into 3 strata (Hearing Impaired Learners; teachers and Headteachers/Deputy Headteachers) and using simple random sampling allowed each stratum to be included in the study. According to (Mugenda and Mugenda, 2003), 20% to 30% of the population is adequate, however, the larger, the better. For this reason, 30% of the pupils were considered while all the teachers were sampled since the number was small and manageable. In every school, either the head teacher or the deputy was chosen. The researcher therefore, had 99 respondents as distributed in Table 3.2.

**Table 3.2: Sample Size**

<b>Category</b>	<b>Schools</b>	<b>Population</b>	<b>%</b>	<b>Sample</b>
Hearing Impaired Learners	Ziwani School for the Deaf	159	30%	47
	Tudor Special Unit	32	30%	9
	RG Ngala Special	34	30%	10
Teachers	Ziwani School for the Deaf	14	100%	14
	Tudor Special Unit	9	100%	9
	RG Ngala Special	7	100%	7
Headteachers/Deputy Headteachers		6	50%	3
<b>Total</b>		<b>259</b>		<b>99</b>

### 3.6 Data Collection Instruments

The study used questionnaires and interview schedules in collecting data. The questionnaires were utilized for collecting data from the learners with hearing impairment and their teachers. The questionnaire was developed in such a manner as to collect demographic information for the respondents and the other section covered the study variables. The questionnaire was structured and closed-ended applying the 2-point and 3 point Likert Scale. The interview guide was semi-structured and used for collecting primary data from the head teachers; this enabled the researcher to make inquiries and afterward testing all the more profoundly utilizing the open form questions to get extra information that is imperative in the examination. The questionnaires and interview schedules had relevant questions that tested the objectives of the survey.

### **3.6.1 Questionnaire**

Kothari, (2004) highlights that a questionnaire gives the respondents ‘adequate time to give well thought out answers. The questionnaires enabled the researcher to obtain demographic data from teachers and other information concerning the Usage of ICT in promoting education for learners with Hearing Impairment. The questions in the questionnaire were a mixture of open-ended and close-ended questions.

A questionnaire was administered to all sampled teachers in the participating institutions and a sample of pupils from the same institutions. The closed-ended questions provided an easy way of coding and were used in gathering quantitative data while the open-ended ones enabled the researcher to gather wide and free opinions from the teachers and were used in gathering qualitative data. The teacher’s questionnaires covered the extent of use of ICT, the importance of ICT in Education, strategies used to promote UCT, and the impact of ICT in schools for learners with HI.

### **3.6.2 Interview Schedule for head teachers**

An interview is a verbal technique for obtaining data. According to Cohen, Manion, & Morrison, (2013) interviewing is a proper instrument in any examination since it causes the questioner to cover all measurements of the examination through testing of the respondents. Pickard, (2012) also notes that more people are willing to communicate orally than in writing and therefore, provide data more readily in an interview. The interview was used in gathering information from the head teachers about the impact of ICT on promoting learning for the learners with a hearing impairment from head teachers.

### **3.7 Pilot Study**

To pre-test the research instruments, the researcher conducted a pilot study before the actual data collection. This was to verify that the questionnaires provided valid and reliable data for decision making. The reason for pre-testing the instrument was to guarantee that things in the instrument are expressed plainly, have a similar importance to all respondents and reveal deficiencies in the design of the proposed study or procedure so that they could be addressed before the actual study. The pilot study was done at Kibarani School for the Deaf, involving five teachers and five learners. Kibarani School for the deaf was selected because it was not part of the schools sampled for the current study, but had similar characteristics to the current sample due to the presence of learners with hearing impairment. Piloting was done to test the validity and reliability of the tools used in data collection.

#### **3.7.1 Validity**

Validity refers to the degree to which results obtained from the analysis of the data represent the phenomenon under study. It is the extent to which test measures what is supposed to measure. According to Orodho, (2005), the validity of an instrument is improved through expert judgment. As such, the researcher sought the assistance of research experts, experienced supervisors and results of the pilot study to contribute to improving content validity of questionnaires. They were asked to validate the content of the research instruments by giving opinions on whether the specific questions were addressing the research objectives. Their comments, notes and suggestions were taken into consideration by the researcher.

### 3.7.2 Reliability

Reliability is a proportion of how much a research instrument yields steady outcomes or information after rehashed preliminaries. The researcher utilized the test-retest strategy to set up the unwavering quality of the polls. A test-retest includes controlling similar instruments twice to a similar gathering of subjects, however with a period pass in the middle. For this situation, a two weeks distinction was favored. The researcher made a correlation between reactions or results acquired in the test-retest questionnaires. A Cronbach coefficient was used. According to Mugenda and Mugenda, (2003), a coefficient of 0.70 or more simply showed that there is the high reliability of data. It therefore means the reliability of the tools was adequate and would address the research objectives. Reliability results were shown in Table 3.3.

**Table 3.3: Reliability Test**

<b>Variable</b>	<b>No of items</b>	<b>Cronbach Alpha</b>
Importance of ICT	9	0.723
Strategies used	9	0.731
Impact of ICT	21	0.802
Challenges Faced	15	0.719

From the findings, the importance of ICT had Cronbach alpha of 0.723, strategies used had 0.731, the impact of ICT had 0.802 and challenges faced had 0.719. As all the values of Cronbach alpha were more than 0.7, this indicates that the scale used was reliable.

### 3.8 Data Collection Techniques

The researcher used questionnaire and interview guides to collect data from the respondents. Questionnaires were delivered to the respondents through face to face meeting by the researcher in person. This method of delivery was specifically chosen to

allow clarification on issues, explanation of purpose and significance of the study, creating a good rapport and ensuring confidence to the respondents.

The head teachers were interviewed after school. Care was taken not to interfere with the normal teaching schedules. Each rating teacher was required to fill the information in the questionnaires during the long break and later collected after completion. This was done twice, before and after two weeks to comply with the study reliability test-retest plan.

### **3.9 Data Analysis**

After collection of data, it was cross-examined to ascertain accuracy, completeness, identify those items that were wrongly responded to, uniformity, spelling mistakes, and blank spaces. The study used both qualitative and quantitative approach where data extracted from the questionnaires were coded and entered into the computer for analysis using the statistical package for social sciences (SPSS version 22). Content analysis was used to analyze qualitative data. The researcher categorized the main topics of the verbatim responses from the respondents according to the study's objectives. The responses were presented in quotes or reported verbatim.

Frequencies (f) and percentages (%) obtained from the SPSS output were used to discuss the findings through descriptive statistics. Tables were used to present the data where conclusions were made. The data were presented using tables and charts. On the other hand, qualitative data was analysed using thematic discussion and direct verbatim.

### **3.10 Logistical and Ethical Considerations**

#### **3.10.1 Logistical Considerations**

The researcher obtained authorization to carry out the study from Kenyatta University Graduate School and the National Commission for Science, Technology, and Innovation (NACOSTI). The researcher also obtained permission from Mombasa District Education Office under which all the sampled schools fall. The researcher visited schools that were sampled for the research for introduction and familiarization and set the dates for the study through the help and guidance of the head teacher.

#### **3.10.2 Ethical Considerations**

Before data collection, the actual nature, and purpose of the research study were explained to the research subjects and request for their guardians' consent. During the study, a good rapport was first established which created a comfortable environment for respondents to openly and freely participate in the study.

Confidentiality and Respect of the interviewees were maintained by avoiding reporting of their personal data. The study findings will also be shared with the respondents, education stakeholders, policy makers, curriculum developers, schools, teachers, and parents. A copy of the final thesis will be presented to NACOSTI.

## CHAPTER FOUR

### RESEARCH FINDINGS AND DISCUSSION

#### 4.1 Introduction

This chapter presents an analysis of the data collected on the usage of information communication and technology and its impact on promoting learning for the hearing impairment in special schools and units, Mombasa County, Kenya. Information was assembled solely from questionnaires. The questionnaires were composed in accordance with the exploration targets.

- i. To evaluate the extent use of ICT in special schools and units in Mombasa County
- ii. To analyse the importance of Information Communication and Technology (ICT) in promoting learning to learners with hearing impairments
- iii. To establish the impact of ICT in promoting learning in schools for learners with hearing impairments
- iv. To find out the challenges faced in the application of ICT in schools for learners with hearing impairment.

#### 4.1.1 Response Rate

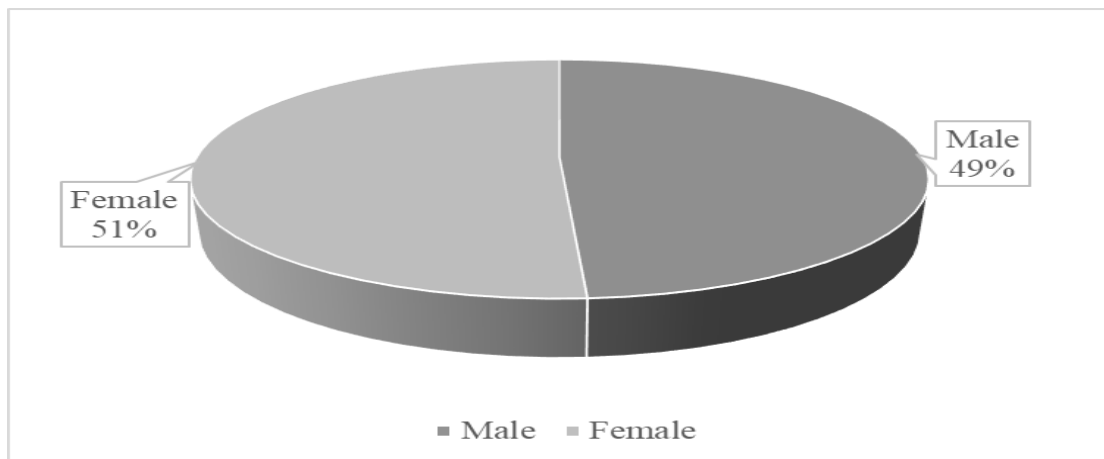
A total of 96 questionnaires were distributed to teachers and pupils while 3 interviews were conducted to headteachers. While teachers and head teachers had 100% return rate, 60 pupils out of 66 successfully participated, representing a return rate of 90.1%. According to Mugenda & Mugenda, (2003), a response rate of 50 % is adequate for analysis and reporting, a rate of 60% is good, and a response rate of 70% and over is excellent. Based on this scale the response rate was sufficient for the study.

## 4.2 Background Information

The study sought to establish the general information about the respondents. The findings are indicated in subsequent sections.

### 4.2.1 Gender of the Respondents

Gender has become increasingly significant in the education of pre-school learner and in this case of children with hearing impairment it is not an exception. The gender of the teachers is indicated in Figure 4.1.



**Figure 4.1: Gender of the teachers**

From the findings in Figure 4.1, above indicates that 51% of the respondents were female and 49% were male. This implies that there is a great disparity in form of gender representation of teachers. This may be because the teaching of learners with HI is presumed to be a feminine career as it entails motherly care and training in daily living skills. Rice & Goessling, (2005).

### 4.2.2 Highest Qualification

The study sought to establish the level of education of the teachers. The findings are indicated in Table 4.2.

**Table 4.1: Highest Qualification**

<b>Highest qualification</b>	<b>Frequency</b>	<b>Percent</b>
Certificate	4	13.3
Diploma	8	26.7
Graduates	10	33.3
Masters	4	13.3
Others	4	13.3
<b>Total</b>	<b>30</b>	<b>100</b>

From the findings in Table 4.1, majority of the teachers 33.3% were graduates, 26.7% had diplomas with a tie for those who had certificates, masters and other education qualifications at 13.3% respectively. This indicated that teachers in the study were literate and therefore they were able to handle learners with HI. Training in any profession is necessary for an individual to perform. The results on the professional qualification of teachers concur with Kamunge, (1988) that quality of teaching depends on training and academic, professional qualifications.

#### **4.2.3 Teaching Experience**

The study sought to determine the teaching experience of the teachers in the schools. The findings are indicated in Table 4.2.

**Table 4.2: Teaching Experience**

<b>Years</b>	<b>Frequency</b>	<b>Percent</b>
Less than 1year	3	10
2-5 years	9	30
5-10 years	12	40
Above 10 years	6	20
<b>Total</b>	<b>30</b>	<b>100</b>

From the results, 10% of the teachers had a teaching experience of less than one year, 30% had a teaching experience of 2-5 years, 40% had a teaching experience of 5-10 years

and 20% had a teaching experience of above ten years in the schools. This indicates that the study covered all teachers working in the schools.

This finding supports a report by the Centre for Public Education (2005) which stated that teachers of learners with HI with more than five years teaching experience are found to be the most effective while inexperience is shown to have a strong negative effect on performance of learners with HI.

#### 4.2.4 Trained Special Needs

The study sought to determine whether the teachers in the schools had been trained for special needs learners. The findings are indicated in Table 4.3 show that:

**Table 4.3: Trained Special Needs**

	<b>Frequency</b>	<b>Percentage</b>
Yes	24	80
No	6	20
<b>Total</b>	<b>30</b>	<b>100</b>

80% of teachers had been trained in special needs learners while 20% had not. This indicates that majority of teachers had been trained for special needs and they were presumed to be knowledgeable and qualified to handle special needs learners.

#### 4.2.5 Trained on ICT Integration

The study sought to identify if the teachers in the schools were trained on ICT integration. The results are indicated in Table 4.4.

**Table 4.4: Training on ICT Integration of Teachers**

	<b>Frequency</b>	<b>Percentage</b>
Yes	21	70
No	9	30
<b>Total</b>	<b>30</b>	<b>100</b>

From the findings, 70% of the teachers had been trained on ICT integrations while 30% had not been trained on ICT integrations. This means that majority of the teachers in the schools had been trained in ICT integration and along these lines they were in a situation to offer profitable information looked for by the investigation.

This is a clear indication that the educators had been particularly prepared and were creating themselves towards outfitting themselves with abilities to deal with hearing impaired learners. In-servicing of teachers is a necessary tool to keep them abreast with new and modern development in their field.

The results concur with Kamunge, (1988) who observes that schools can only accomplish to manage societal change through in-servicing of their teachers. According to Koech, (1999), resources include hearing aids that offer services for teachers to enrich their teaching. Teaching /learning resources such as ICT are used widely in Hearing Impaired schools and teachers cannot run away from them.

#### **4.3 Extent of Use of ICT in Special Schools and Units**

Several statements on extent of use of ICT in special schools and units were carefully identified by the researcher. Teachers were requested to indicate the extent of their agreement with each of these statements using a Likert scale of 1-5 where 1= Not Available, 2= Very Inadequate, 3= Inadequate 4= Adequate and 5= Very adequate. The findings are indicated in Table 4.5.

**Table 4.5: Extent of Use of ICT in Special Schools and Units**

ICT Resource Items	Adequacy of ICT resources									
	VA		A		I		VI		NA	
	F	%	F	%	F	%	F	%	F	%
Desk computers	1	3.3	3	10	17	56.7	4	13.3	5	16.7
Laptop	2	6.7	3	10	16	53.3	5	16.7	4	13.3
Ups	1	3.3	16	53.3	2	6.7	7	23.3	4	13.3
Printer	1	3.3	3	10	15	50	6	20	5	16.7
LCD Projector	1	3.3	2	6.7	17	56.7	5	16.7	5	16.5
Installed Local Area Network	1	3.3	15	50	13	10	4	13.3	7	23.3
Internet connectivity	2	6.7	3	10	14	46.7	4	13.3	7	23.3
ICT trained teachers	1	3.3	13	43.3	4	13.3	5	16.7	7	23.3
KICD digital content devices	14	46.7	3	10	6	20	3	10	4	13.3

Key: VA- Very adequate, A-adequate, I- inadequate, VI- very inadequate, NA- not applicable)

From the findings, desk computers (56.7%) were inadequate. Laptops (53.3%) were inadequate. Ups (53.3%) were adequate. According to Asmal, (2004), other schools had adequate Telecommunication Devices for the deaf (TDDS), infrared systems, Audio loops, cochlear implants, live speech captioning and Captioned Television. Printers (50%) were very inadequate. LCD projectors (56.7%) were inadequate. Installed Local Area Network (50%) were adequate. Internet connectivity (46.7%) were inadequate. ICT trained teachers (43.3%) were adequate. KICD digital content devices (46.7%) were very inadequate.

The findings of this study are in line with Starcic & Niskala, (2010) in their study of vocational learners with difficulties when learning on the digital technology; noted that there are four key pillars critical to effective implementation of ICT initiatives to meet ICT integration in the education sector relevant digital content, deployment of ICT infrastructure and robust policy and strategy are vital.

### 4.3.1 Learners Response on Strategies Used in Promoting ICT

Learners were asked to rate the adequacy of ICT resources in their schools using the scale Enough-E, Not enough-NE and Not available-NA. Their responses are indicated in Table 4.6.

**Table 4. 6: Learners Responses on Strategies Used in Promoting ICT**

Resource Items	E		NE		NA	
	F	%	F	%	F	%
Desk computers	10	16.7	35	58.3	15	25
Laptops	18	30	38	63.3	4	6.7
Printers	10	16.7	34	56.7	16	26.7
Projectors	4	6.7	18	30	38	63.3
Internet Connectivity	17	28.3	37	61.7	6	10

From the findings 58.3% of the learners indicated that desktops were not enough in their schools, 63.3% indicated that Laptops were not enough in their schools, 56.7% of the learners also indicated that Printers were also not enough. However, 63.3% of the learners indicated that there were no Projectors in their schools while 61.7% indicated that there was no enough Internet connectivity in their schools.

### 4.4 Importance of ICT in Education

Several statements on Importance of ICT in education by learners with hearing impairments were carefully identified by the researcher. Teachers were requested to indicate the extent of their agreement with each of these statements using a Likert scale of 1-2 where 1=Agree, 2=Disagree.

**Table 4.7: Importance of ICT in Education**

	Agree		Disagree	
	F	%	F	%
Expand educational opportunities by making education available anywhere, anytime to anyone	21	70	9	30
Improve learning outcomes by making learning more interactive and getting learners more involved in the subject matter	28	93.3	2	6.7
Improve motivation to learn by improving relevant of content and making learning more fun	20	66.7	10	33.3
Enable education to be tailored to individual learning needs and abilities	29	96.7	1	3.3
Enable locally relevant teaching materials, in local languages, to be created and disseminated quickly and affordable	19	63.3	11	36.7
Facilitate technology-skill formation and team-work abilities	22	73.3	8	26.7
Bring about pedagogical improvements and learner-centred teaching	17	56.7	13	43.3
Provide conditions that permit and promote lifelong learning for learners with HI condition.	18	60	12	40
Increase the effectiveness and efficiency of education planning and delivery	27	90	3	10

(Key: 1-Agree, 2- disagree)

From the findings, 70% of the teachers indicated that ICT expand educational opportunities by making education available anywhere, anytime to anyone. This finding concurred with Looijesteijn, (2009) who stated that if sign support would be made available online, it could fulfil a great desire for better comprehension between deaf and hearing people. The study established that ICT improved learning outcomes by making

learning more interactive and getting learners more involved in the subject matter (93.3%). Teachers (66.7%), noted that ICT improved motivation to learn by improving relevant of content and making learning more fun.

Teachers (96.7%), felt that ICT enabled education to be tailored to individual learning needs and abilities. Teachers (63.3%), noted that ICT enabled locally relevant teaching materials, in local languages, to be created and disseminated quickly and affordably while 73.3% said that ICT facilitated technology-skill formation and teamwork abilities. The study established that ICT brought about pedagogical improvements and learner-centred teaching (56.7%). Teachers (60%) said that ICT provided conditions that permit and promote lifelong learning. Most of the Teachers (90%) said that ICT increased the effectiveness and efficiency of education planning, and delivery.

#### **4.4.1 Learners Response on the Importance of ICT in Education**

Learners were asked to indicate the extent of their Agreement or Disagreement on the statements about the importance of ICT in Education using the Likert scale of 1 to 2 where 1=Agree, 2=Disagree. Their response is indicated in Table 4.8.

**Table 4.8: Learners response on ICT in Education**

		<b>Agree</b>		<b>Disagree</b>	
		<b>F</b>	<b>%</b>	<b>F</b>	<b>%</b>
1	ICT expands educational (learning) opportunities by making education (learning) available anywhere, anytime to anyone	35	58.3	25	41.7
2	ICT improves learning results by making learning more interactive and making learners more involved in whatever subject they are focused on	37	61.7	23	38.3
3	ICT improves motivation and make learning more fun	36	60	24	40
4	ICT enables education (learning) to be individualized according to needs and abilities of the learner	38	63.3	22	36.7
5	ICT enables the use of locally available materials and local languages to be spread in other areas or centres with fewer costs.	28	46.7	32	53.3
6	ICT helps in acquiring skills in technology and ability to work as a team	27	45	33	55
7	ICT helps teachers to use good teaching methods that are focused on each individual learner	26	43.3	34	56.7
8	ICT provides conditions that allow promoting lifelong learning	25	41.7	35	58.3

(Key: 1-Agree, 2- disagree)

From the findings, 58.3% of the learners agreed to that ICT expands educational (learning) opportunities by making education (learning) available anywhere, anytime to anyone, 67.7% of the learners agreed to that ICT improves learning results by making learning more interactive and making learners more involved in whatever subject they are focused on, 60% of the learners agreed to that ICT improves motivation and make learning more fun, 63.3% also agreed to that ICT enables education(learning) to be individualized according to needs and abilities of the learners.

However, 53.3% of the learners disagreed to that ICT enables the use of locally available materials and local languages to be spread in other areas or centers with less cost, 55% disagreed that ICT helps in acquiring skills in technology and ability to work as a team, 56.7% of the learners disagreed to that ICT helps teachers to use good teaching methods that are focused on each individual learner while 58.3% of the learners also disagreed to that ICT provides conditions that allow and promote lifelong learning.

#### **4.5 Impact of ICT in Schools for Hearing Impaired**

Several statements on the impact of ICT in Schools for Learners with hearing impairments were carefully identified by the researcher. Teachers were requested to indicate the extent of their agreement with each of these statements using a Likert scale of 1-3 where 1= Not at all, 2=to a small extent and 3= to a large extent. The findings are indicated in Table 4.9.

**Table 4.9: Impact of ICT in Schools for Hearing Impaired**

	1		2		3	
	F	%	F	%	F	%
Increased ICT confidence amongst learners motivates them to use the internet at home for school work and leisure interest	1	3.3	17	56.7	12	40
Learners using voice communication aids are able to gain confidence and social credibility at school and in their community	2	6.7	6	20	22	73.3
Hearing impaired learners using the internet can access information alongside their hearing peers	2	6.7	11	36.7	17	56.7
Learners with hearing impairment are able to accomplish tasks working at their own pace	2	6.7	12	40	16	53.3
Computers can improve learners independent access to education	1	3.3	15	50	14	46.7
Computers are used to control hyperactive children	2	6.7	9	30	19	63.3
Learners enjoy computer lessons and are ready to learn	1	3.3	17	56.7	12	40

(Key: 1= Not at all, 2=to a small extent and 3= to a large extent.)

Increased ICT confidence among learners motivated them to use the internet at home for school work and leisure interests (40%). The finding is in line with (Sylvia, 2009) who commended that ICT generally can have a positive impact on learning for deaf children, but the expectations that ICT could in some ways revolutionize teaching processes at school have not yet been realized in many schools.

As to whether learners using voice communication aids were able to gain confidence and social credibility at school and in their community (73.3%) of the teachers agreed to a large extent with the statement. On whether hearing impaired learners using the internet

can access information alongside their hearing peers (56.7%) of the teachers agreed to a small extent with the statement.

On whether learners with hearing impairment were able to accomplish tasks working at their own pace, (53.3%) of the teachers agreed to a small extent with the statement. As to whether computers can improve pupil's independent access to education (46.7%) of the teachers agreed to a large extent with the statement. In regard to whether computers were used to control hyperactive children (63.3%) of the teachers agreed to a large extent with the statement and finally on whether learners enjoyed computer lessons and were ready to learn, (40%) of the teachers agreed to a large extent with the statement.

#### **4.5.1 Learners Response on Impact of ICT in Schools for the Learners with Hearing Impairments**

The learners were asked to indicate the extent to which they thought accessible ICT connected school for the hearing impaired using computers and other equipment for teaching and learning benefits the, (as learners) and their teachers. Using the key indicators; to a large extent, to a small extent and not at all. Their responses are indicated in Table 4.10.

**Table 4. 10: Learners Response on Impact of ICT in Schools for the Learners with Hearing Impairments**

	1		2		3	
	F	%	F	%	F	%
Increased confidence amongst learners motivates them to use the internet at home for school work and leisure interests	12	20	38	63.3	10	16.7
Learners using voice communication aids are able to gain confidence and social credibility at school and in their community	39	65	19	31.7	2	3.3
Hearing impaired learners using the internet can access information alongside their hearing peers	28	46.7	30	50	2	3.3
Learners with hearing impairment are able to accomplish tasks working at their own place	20	33.3	38	63.3	2	3.3
Computers can improve learners independent access to education	15	25	35	58.3	10	16.7
Computers are used to control children who do not keep quiet or keep still for short periods (bad behaviour)	10	16.7	34	56.7	16	26.6
Learners enjoy computer lessons and are ready to learn	38	63.3	12	20	10	16.7
Using a computer makes printing and picture reading easy	39	65	13	21.7	8	13.3

(Key: 1= Not at all, 2=to a small extent and 3= to a large extent)

From the finding 63.3% of the learners indicated that increased confidence amongst learners motivates them to use the internet at home for school work and leisure interests to small extent while 65% indicated that learners using voice communication aids are able to gain confidence and social credibility at school and in their community to a large extent. Most of the learners 50% indicated that hearing impaired learners using the internet can access information alongside their hearing peers to a small extent while

63.3% of the learners indicated that learners with hearing are able to accomplish tasks working at their own pace to a small extent.

On whether computers could improve learners' independent access to education, 58.3% of the learners indicated a small extent while 63.3% indicated that learners enjoy computer lessons and are ready to learn to a large extent and 65% also indicated that using a computer makes printing and picture reading to a large extent.

#### **4.6 Challenges Faced in Application of ICT in schools for learners with hearing impaired**

Several statements on challenges faced in the application of ICT for learners with hearing impairments were carefully identified by the researcher. Teachers were requested to indicate the extent of their agreement with each of these statements using a Likert scale of 1-3 where 1=to no extent, 2=to a small extent and 3= to a large extent. The findings are indicated in Table 4.11.

**Table 4.11: Challenges Faced in the Application of ICT**

Statement	1		2		3	
	F	%	F	%	F	%
Inadequate classrooms or building to house technology.	21	70	3	10	6	20
Availability of electricity and telephony	16	53.3	5	16.7	9	30
Policymakers inability in looking at the ubiquity of different types of ICT in the country	23	76.7	4	13.3	3	10
Inadequate or no Information and Communication Technology (ICT)	18	60	4	13.3	8	26.7
Limited infrastructure	25	83.33	1	3.3	4	13.3
Inadequate teaching and learning materials and equipment	19	63.3	3	10	8	26.7
Financial constraints	15	50	4	13.3	11	36.7
Limited number of ICT trained teachers	22	73.3	3	10	5	16.7
Lack of In-service trained teachers	21	70	4	13.3	5	16.7
Minimal parental involvement in children's affairs.	16	53.3	6	20	8	26.7
Teachers unable to master (scientific) sign language	17	56.7	13	10	10	33.3
Lack of education/school administrators of ICT support.	24	80	2	6.70	4	13.3
Lack of ICT technical support specialists	20	66.7	2	6.7	8	26.7
Lack of ICT developers and developed Content	19	6.3	2	6.70	9	30
Poor / lack of ICT monitoring and evaluation techniques.	15	50	5	16.7	10	33.3

(Key: 1= Not at all, 2=to a small extent and 3= to a large extent)

From the results, the schools had inadequate classrooms or building to house technology (70%) and therefore teachers agreed to a large extent with the statement. Teachers agreed to a small (53.3%) extent that the statement schools had available electricity and telephony. Teachers agreed to a large extent with the statement (76.7%) that policymaker's inability in looking at the ubiquity of different types of ICT in the country. Livingstone, (2012) argues that in the area of education, the World Bank points out that "educators and policy makers agree that ICTs are of the utmost importance to the future of education" and that "ICT in education initiatives are likely to contribute successfully to meeting Millennium Development Goals.

On the schools having inadequate or no Information and Communication Technology (ICT) (60%) of teachers agreed to a small extent with the statement. On whether the schools had limited infrastructure (83.3%) of the teachers agreed to a large extent with the statement. On whether there were inadequate teaching and learning materials and equipment (63.3%) of the teachers agreed. As to whether the school had financial constraints (36.7%) of the teachers agreed to a small extent with the statement. As to whether there were limited number of ICT trained teachers (73.3%) of the teachers agreed. Regarding whether there was lack of in-service trained teachers (70%) of the teachers agreed

On whether there was minimal parental involvement in children's affairs (53.3%) of teachers agreed. According to Livingstone (2012), the position is shared by parents and teachers on the ground, such that the mere availability of ICT in schools has come to be almost always equated to good progress in ICT technology. As to whether teachers were unable to master (scientific) sign language (56.7%) of the teachers agreed. In respect to

whether there was lack of education/school administrators of ICT support (80%) of the teachers agreed. The statement on whether the schools lacked ICT technical support specialists (66.7%) of the teachers agreed. On whether the schools lacked ICT developers and developed content (30%) of the teachers agreed. In regards to whether the schools had poor / lack ICT monitoring and evaluation techniques (33.3%) of the teachers agreed.

The findings are in line with Barret, (2007) perceived teaching and learning facilities as those things which enable a skilful teacher to achieve a level of instructional effectiveness that far exceeds what is possible when they are not adequately provided and used. Inadequacy of facilities has the potential to hamper effective teaching and learning to both teachers and learners in schools as what Ainscow, (2005) posited out that when teaching and learning facilities are grossly inadequate or are in bad conditions it reduces the weight of instructions as little or nothing can be done when facilities to work with are not available. That being the case, one of the reasons of poor academic performance of learners with hearing impairment in the state of inadequate teaching and learning facilities was an inevitable consequence

The findings concur with Wilmshurst & Brue, (2005). The school administration will expect their schools to perform equally with other regular schools hence a lot of pressure is put on the teachers to perform. The authors also assert that it is not possible for a teacher to use two or more teaching methods effectively in the same class.

#### 4.6.1 Learners Response on Challenges Faced in Application of ICT

Learners were asked to indicate the extent to which they thought infrastructure, rooms, electricity, ICT itself and capacity building, for example, ICT trained teachers related challenges confront or inhibit schools in their bid to deliver quality education using the latitude: to a large extent, to a small extent and not at all their responses are shown in Table 4.12.

**Table 4.12: Learners Response on Challenges Faced in Application of ICT**

	Large extent		Small		Not at all	
	F	%	F	%	F	%
Inadequate classrooms or building to house technology	38	63.3	20	33.3	2	3.4
Availability of electricity	35	58.3	15	25	10	16.7
Limited number of ICT trained teachers	37	61.7	19	31.7	4	6.7

From the finding, 63.3% of the learners indicated that inadequate classrooms or buildings to house technology challenged the application of ICT to a large extent, 58.3% of the learners indicated that availability of electricity challenged the application of ICT to a large extent, 61.7% of the learners indicated that limited number of ICT trained teachers challenged the application of ICT to a large extent. The results concur with sentiments expressed by Pfeiffer, (1998) who affirms that children with special needs require adaptation to access the general curriculum.

Adaptation of such children may take a lot of time for the teacher who may need to keep the integrated class at the same pace. He also said that the learners require some specialized machines which may waste a lot of time for the other learners during set up. Smith, Polloway, Patton, & Dowdy, (1999) also concur that integration sometimes

creates more problems such as rejection of the learners with visual impairment by their normal peers. Arditit & Rosenthal, (1998) also say that the mainstream school cannot support the policy of integration.

#### **4.7 Qualitative Analysis**

Head teachers were asked whether they had computers in their schools. From the findings, the majority of the head teachers 53% agreed that computers were in place in their schools. The study established that these computers are safely stored in the computer labs that are well protected. The study sought to establish whether computers were used in administration. From the findings, about 57% of head teachers said that computers played a significant role in the administration of the school.

Head teachers said that computers help in structuring and planning of lessons for teaching and promoting learning for the hearing impairment in special schools and units. When asked whether teachers used computers in teaching, close to 51% of the head teachers agreed on this. Head teachers however, raised a need to enhance training of these teachers who use computers in teaching so as to sharpen their skills and keep updated with current changes in technology.

The study sought to establish whether the schools were financed by the government/school proprietors in order to establish and use ICT in promoting learning and teaching. From the findings, it was established that the government played a significant role in the promotion of ICT promotion in most of the schools. Most of the schools received funding from the government that helped in the acquisition of computers.

The study revealed that the rural electrification programme by the government significantly promoted the use of ICT in schools as accessibility to electricity was ensured. The study sought to examine whether the schools were connected to electricity. From the findings, close to 53% of the head teachers agreed, and therefore electricity was not an issue in most of the primary schools. This enhanced the use of ICT. Some of the head teachers who disagreed with no electricity connection said plans were underway to install solar panels or solar-powered computing devices.

Head teachers of the study were asked whether there was training in the management of ICT integration. From the findings, more than half of the head teachers agreed that indeed they were trained on how to manage the ICT integration programme at the school level. The study further sought to investigate whether there was any teacher presently on the teaching staff who has necessary skills to teach deaf learners using ICT programs and systems.

Over half of the head teachers said that their schools had a teacher(s) ICT specialist of the deaf with the necessary ICT skills to set up a lab, troubleshoot problems and repair them, and teach appropriate ICT skills to the hearing impaired. When asked about the challenges of implementing and using ICT in most school, the majority of the head teachers suggested inadequate finances, lack of support and cooperation from all the stakeholders, fear for change by standing for the status quo, lack of qualified ICT personnel, frequent blackouts and computer failures by an attack of viruses.

Close to 54% of the head teachers agreed that there were lessons that were taught using ICT programs. The study established that the use of ICT in teaching these lessons actualizes the learning process due to an ability to see and watch the contents of the

visual display units of the computers. The study also established that use of computers in teaching breaks monotony in teaching and therefore reduces boredom because most of these lessons are practically demonstrated.

According to the Global Education Monitoring Report (2016), the adoption of ICT in teaching learners with HI has been affected by a number of challenges for instance limited rural electrification and low internet connectivity in remote areas. According to World Bank, (2010), the ministries of education have little or no influence over internet connectivity of schools with learners of hearing impairment since it largely depends on accessibility to reliable supply of power and the development in national telecommunication infrastructures. The Global Education Monitoring Report (2016) notes that internet connectivity is a challenge in Latin and Caribbean countries where it is only available in less than 25% of the schools teaching learners with hearing impairment. For instance, in 2010, internet was available in 24% of schools of learners with HI in El Salvador, 22% in Ecuador and 9% in Paraguay. In a country like Australia, the take of ICT in promoting learning among learners with HI relies on provision infrastructures like networking and computer systems besides professional training and development of teachers handling learners with HI MCEETYA,( 2004).

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter presents the discussion of key data findings, the conclusion drawn from the findings and recommendation made. The conclusions and recommendations drawn were focused on addressing the purpose of the study which were to assess the use of information communication and technology and its impact on promoting learning for the hearing impaired in special schools and units, Mombasa County.

#### **5.2 Summary of Findings**

The study sought to assess the use of information communication and technology and its impact on promoting learning for the hearing impairment in special primary schools and units, Mombasa County. The specific objectives of the study were; to examine the extent of use of ICT in special schools and units in Mombasa County. To determine the importance of Information Communication and Technology (ICT) in promoting learning to learners with hearing impairments. To establish the impact of ICT in promoting learning in schools for learners with hearing impairments. To find out the challenges faced in the application of ICT in schools for learners with hearing impairment. A summary of the key results on each of these specific objectives is presented in this subsection.

##### **5.2.1 Extent of Use of ICT in Special Schools and Units**

From the findings, teachers reported that desk computers, laptops, ups were and printers were inadequate. Similarly, LCD projector were, KICD digital content devices and Internet connectivity were also found to be inadequate. In fact, only Installed Local Area

Network and ICT trained teachers were found to be relatively adequate. Basically, most of the teachers and learners indicated that most of the ICT materials were inadequate, hence their use was also very limited.

### **5.2.2 Importance of ICT in Education for learners with Hearing Impairment**

Majority of the teachers felt that ICT enabled education to be tailored to individual learning needs and abilities. The study established that ICT improved learning outcomes by getting learners more involved in the subject matter and making learning more interactive. Moreover, most of the teachers said that ICT increased the effectiveness and efficiency of education planning, and delivery. The study established that majority of teachers felt ICT facilitated technology-skill formation and teamwork abilities. From the findings, teachers indicated that ICT expands educational opportunities by making education available anywhere, anytime to anyone. This positive opinion in regard to importance of ICT was also replicated by learners where majority agreed that ICT improves learning results by making learning more interactive and making learners more involved in whatever subject they are focused on. In fact, majority of them agreed that ICT enables education(learning) to be individualized according to needs and abilities of the learners. It can therefore be explained that the importance of ICT in education of learners with hearing impairment was acknowledged by both teachers and the learners.

### **5.2.3 Impact of ICT in Schools for learners with hearing impairment**

Most of the teachers indicated that learners using voice communication aids were able to gain confidence and social credibility at school and in their community. Hearing impaired learners using the internet can access information alongside their hearing peers. On whether learners with hearing impairment were able to accomplish tasks working at

their own pace, most of the teachers agreed in agreement. In regard to whether computers were used to control hyperactive children, majority of the teachers were of this opinion. Similar findings were obtained from learners and head teachers. For instance, majority of the learners felt that use of ICT increased their confidence since they feel motivated and encouraged despite their disability.

#### **5.2.4 Challenges Faced in Application of ICT for Learners with Hearing Impairment**

Most of the respondents who participated in this study admitted that their existed pertinent challenges facing application of ICT for learners with hearing impairment. For instance, teachers, learners and the headteachers were unison that their schools lacked adequate ICT infrastructure. Similarly, majority indicated that there were limited education/school administrators of ICT. Respondents further complained of policy makers inability in looking at the ubiquity of different types of ICT in the country. Basically, there was major indications showing that schools for learners with hearing impairment in Mombasa County were facing many challenges that making application of ICT in education difficult.

### **5.3 Conclusion**

#### **5.3.1 Extent of use of ICT in schools of learners with hearing impairment**

On extent of use of ICT in special schools, teachers reported that desk computers were inadequate. Laptops were inadequate. Ups were adequate. LCD projector were inadequate. Printers were very inadequate. Installed Local Area Network were adequate. In view of learners, desktops were not enough in their schools. Laptops were not enough

in their schools. Printers were also not enough. There were no projectors in their schools with no enough internet connectivity.

### **5.3.2 Importance of ICT for learners with hearing impairment**

In view of the importance of ICT, teachers reported that ICT enabled education to be tailored to individual learning needs and abilities. ICT enhanced learning results by making adapting more intelligent and getting learners more associated with the topic. ICT increased the effectiveness and efficiency of education planning, and delivery. ICT facilitated technology-skill formation and teamwork abilities. ICT expand educational opportunities by making education available anywhere, anytime to anyone. Learners on the other hand felt that ICT improved learning results by making learning more interactive and making learners more involved in whatever subject they are focused on. ICT enables education(learning) to be individualized according to needs and abilities of the learners. ICT improves motivation and make learning more fun.

### **5.3.3 Impact of ICT in Education of learners with Hearing Impairment**

In regard to the impact of ICT in schools, teachers noted that learners using voice communication aids were able to gain confidence and social credibility at school and in their community. Computers were used to control hyperactive children. Hearing impaired learners using the internet can access information alongside their hearing peers. Learners indicated that using a computer makes printing and picture reading. Use of voice communication aids helps learners with HI to gain confidence and social credibility at school and in their community. Learners enjoy computer lessons and are ready to learn. Expanded certainty among learners propels them to utilize the web at home for school work and recreation interests to a small extent

### **5.3.4 Challenges in ICT Application for Teachers of Learners with Hearing Impairment**

With regard to challenges faced in application of ICT, teachers indicated the schools had limited infrastructure. There was lack of education/school administrators of ICT support. Policy makers inability in looking at the ubiquity of different types of ICT in the country. There were limited number of ICT trained teachers. There was lack of in-service trained teachers. There were inadequate classrooms or building to house technology. According to learners, inadequate classrooms or buildings to house technology challenged the application of ICT to a large extent. Limited number of ICT trained teachers challenged the application of ICT to a large extent.

## **5.4 Recommendations of the Study**

### **5.4.1 Good practice**

The study recommends that all schools promoting education for learners with hearing impairments should implement and invest in ICT in order to ensure that learners get sufficient ICT facilities required for their education to ensure there is uninterrupted learning in schools. The management of all special schools and units in Kenya should invest in desk computers, laptops, LCD projector and printers to promote learning especially of learners who are (hearing impairment).

The study recommends that all special schools should actualize voice correspondence which helps to enable learners to pick up certainty and social believability at school and in their community. All learning institutions should use computers to control hyperactive children.

The study recommends that all schools should have adequate Information and Communication Technology (ICT) and also In-service trained teachers should be available in all schools promoting education for learners with hearing impairments.

#### **5.4.2 Policy Recommendations**

The Ministry of Education in Kenya need to strengthen policy and regulatory framework in regard to implementation of ICT in schools with specific references to special schools and units. All schools (primary and secondary) in Kenya should increase the adoption of ICT in order to improve learning outcomes and tailor education to specific needs of learners.

#### **5.5 Suggestions for Further Studies**

Several studies should be carried out on some issues or factors that seem to have a positive effect but not significantly affect the level of success for learners with hearing impairments. The study also concentrated on the public and private schools in Kenya. Therefore, further research should be carried out to include all the schools not only in Kenya but across the world.

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## APPENDICES

### APPENDIX A: QUESTIONNAIRE FOR TEACHERS

The researcher is interested in investigating the usage of ICT in promoting learning in special schools and units for the hearing impaired of Mombasa County. You are kindly requested to provide answers to these questions as honestly and precisely as possible. Responses to these questionnaires will be treated as confidential. Do not write your name or anything that will identify you. Please, tick (v) where appropriate or fill in the required information on the spaces provided.

#### SECTION A: Demographic data

1. What is your gender?

Male

Female

2. Do you watch television at home?

Yes

No

(a) If yes, who interprets for you?

(b) Do you use a computer in learning in your school?

Yes

No

#### SECTION B. Importance of ICT in education

1. a). Read each of the statements provided in the table below on why Information and Communication Technology (ICT) is used in education. Tick on the appropriate columns using the key below:

A – Agree

D – Disagree

<b>Statement</b>	<b>A</b>	<b>D</b>
ICT expands educational (learning) opportunities by making education (learning) available anywhere, anytime to anyone.		
Improve learning outcomes by making learning more interactive and getting learners more involved in the subject matter.		
ICT improves learning results by making learning more interactive and making learners more involved in whatever subject they are focused on.		
ICT improves motivation and make learning more fun		
ICT enables education (learning) to be individualized according to needs and abilities of the learners		
ICT enables the use of locally available materials and local languages to be spread in other areas or centres with less cost		
ICT helps in acquiring skills in technology and ability to work as a team		
ICT helps teachers to use good teaching methods that are focused on each individual learner.		
ICT provides conditions that allow and promote lifelong learning		

**Section C: Strategies used in promoting Information and Communication Technology (ICT)**

1. Rate the adequacy of the following ICT resources in your school using the scale below:

Enough – E

Not enough – NE

Not available – NA

<b>ICT resource items</b>	<b>E</b>	<b>NE</b>	<b>NA</b>
Desk computers			
Laptops			
Printers			
Projectors			
Internet Connectivity			

**Section D: Impact of ICT in schools for learners with Hearing Impairments.**

1. To what extent do you think accessible ICT connected school for the hearing impaired using computers and other equipment for teaching and learning benefits both you as a pupil and teachers? Indicate your understanding or knowledge and benefits using the indications: Too large extent, to a small extent, not at all using a tick (√)

<b>Understanding and benefits</b>	<b>To a large extent</b>	<b>To a small extent</b>	<b>Not at all</b>
Increased confidence amongst learners motivates them to use the internet at home for school work and leisure interests			
A few learners have access to computers borrowed from home or neighbours to complete assignments			
Learners using voice communication aids are able to gain confidence and social credibility at school and in their community.			
Maintenance of ICT will require the services of computer specialists at a high cost			
Hearing impaired learners using the internet can access information alongside their hearing peers			
Learners with hearing impairment are able to accomplish tasks working at their own pace.			
Computers can improve learners independent access to education			
The few hearing aids available are often faulty			
Computers are used to control children who do not keep quiet or keep still for short periods (bad behaviour)			
Learners enjoy computer lessons and are ready to learn			
Using a computer make printing and picture reading easy			

### **Section E: Challenges faced in the application of ICT**

1. To what extent do you think infrastructure, e.g., rooms, electricity, ICT itself and capacity building, e.g., ICT trained teachers related challenges confront or inhibit

schools in their bid to deliver quality education and determine their preparedness to embrace ICT?

<b>Infrastructure and capacity building challenges</b>	<b>To a large extent</b>	<b>to a small extent</b>	<b>Not at all</b>
Inadequate classrooms or house to house technology			
Availability of electricity			
Limited number of ICT trained teachers			
Attitude of teachers and learners towards the use of ICT in teaching and learning of the hearing impaired learners			

2. Suggest ways in which usage of ICT can be improved to promote learning of the hearing impaired in your school or unit.

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## APPENDIX B: PUPILS' QUESTIONNAIRE

### Section A: Extent of Use of ICT in Special Schools and Units

Kindly rate the adequacy of ICT resources in your schools using the scale Enough-E, Not enough-NE and Not available-NA

Resource Items	E	NE	NA
Desk computers Laptops Printers Projectors Internet Connectivity			

### Section B: Importance of ICT in Education

Indicate the extent of your Agreement or Disagreement on the statements about the importance of ICT in Education using the Likert scale of 1 to 2 where 1=Agree, 2=Disagree.

		Agree	Disagree
1	ICT expands educational (learning) opportunities by making education (learning) available anywhere, anytime to anyone		
2	ICT improves learning results by making learning more interactive and making learners more involved in whatever subject they are focused on		
3	ICT improves motivation and make learning more fun		
4	ICT enables education (learning) to be individualized according to needs and abilities of the learner		
5	ICT enables the use of locally available materials and local languages to be spread in other areas or centres with fewer costs.		
6	ICT helps in acquiring skills in technology and ability to work as a team		
7	ICT helps teachers to use good teaching methods that are focused on each individual learner		
8	ICT provides conditions that allow promoting lifelong learning		

### Section C: Impact of ICT in Schools

Indicate the extent to which you think accessible ICT connected school for the hearing impaired using computers and other equipment for teaching and learning benefits the, (as learners) and their teachers. Using the key indicators; to a large extent, to a small extent and not at all.

	Large extent	Small extent	Not at all
Increased confidence amongst pupils motivates them to use the internet at home for school work and leisure interests			
Pupils using voice communication aids are able to gain confidence and social credibility at school and in their community			
Hearing impaired learners using the internet can access information alongside their hearing peers			
Pupils with hearing impairment are able to accomplish tasks working at their own place			
Computers can improve pupils independent access to education			
Computers are used to control children who do not keep quiet or keep still for short periods (bad behaviour)			
Pupils enjoy computer lessons and are ready to learn			
Using a computer makes printing and picture reading easy			

### Section D: Challenges Faced in Application of ICT


Indicate the extent to which you think infrastructure, rooms, electricity, ICT itself and capacity building, for example, ICT trained teachers related challenges confront or inhibit schools in their bid to deliver quality education using the latitude: to a large extent, to a small extent and not at all


	Large extent	Small	Not at all
Inadequate classrooms or building to house technology			
Availability of electricity			
Limited number of ICT trained teachers			

## APPENDIX C: INTERVIEW SCHEDULE FOR HEADTEACHERS

1. Comment on adequacy of computers in your school
2. a) comment on use computers in administration  
b) comment on your teachers use computers is teaching
3. What can you say about financing of your school by by the government/school proprietors in order to establish and use ICT in promoting learning and teaching?
4. a) Is your school connected to the electricity power gridline?  
Yes  No   
b) If your school is not connected to the electricity power gridline, have you installed solar panels or solar-powered computing devices?
5. The principals and headteachers were trained on how to manage the ICT integration programme at the school level (The National ICT strategy in Education and Training, 2006). Were you one of the beneficiaries of this government ICT capacity building? What do you think about this training?
6. Is there any teacher presently on the teaching staff who has the necessary skills to teach deaf learners using ICT programs and systems? How has this affected
7. Are there teacher(s) ICT specialists of the deaf with the necessary ICT skills to set up a lab, troubleshoot problems and repair them, and teach appropriate ICT skills to the hearing impaired?
8. What are the challenges of implementing and using ICT in your school?
9. Are there lessons that are taught using ICT programs?  
Yes  No   
a) If yes, how has usage of ICT impact on learners' performance?  
b) If yes, how has usage of ICT impacted on teachers' performance?


**APPENDIX D: RESEARCH PERMIT**

  
REPUBLIC OF KENYA

  
NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY & INNOVATION

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