USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TRAINING PRE-SERVICE STUDENT TEACHERS' WITH VISUAL IMPAIRMENT IN BISHOP WILLIS TEACHERS' TRAINING INSTITUTE, UGANDA

BY

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DECLARATION

I, Elipu Stephen, do solemnly declare to the graduate board of Kyambogo University that this research dissertation is my original initiative and deliberate effort and no part of it has been submitted for another degree in this university or any other institution of higher learning for the same award.

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APPROVAL

The writing and presentation of this research dissertation was done following the guidelines on supervision of research projects laid down by Kyambogo University and it is hereby submitted to the graduate board for examination with our approval as supervisors.

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DEDICATION

I dedicate this dissertation to my daughter, Jemimah Akiteng and my wife Amuge Beatrice.

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LIST OF ACRONYMS AND ABBREVIATIONS

ATS   : - Assistive Technology System

CCTV   : - Closed-circuit television

HAAT   : - Human Activity Assistive Technology

ICT   : - Information and communication technology

MoES   : - Ministry of Education and Sports

MoICT   : - Ministry of Information and communication technology

PTC(s)   : - Primary Teachers' College(s)

TTI   : -Teacher Training Institution

PWDs   : - People with disabilities

SwVI   : - Students with visual impairment

UACE   : - Uganda Advanced Certificate of Education

UBOS   : - Uganda Bereau of Statistics

UCC   : - Uganda Communications Commission

UCE   : - Uganda Certificate of Education

UNESCO : - United Nations Educational, Scientific and Cultural Organization

UNICEF : - United Nations International Childrens Emergency Fund

VI   : - Visual Impairment

WHO   : - World Health Organization

ABSTRACT

Information and communication technology (ICT) in education has swiftly advanced across the world. This is caused by the reforms that are taking shape in education including teacher education, special needs education and legislative provisions. To cope up with these (ICT) reforms and developments that are taking place in different sectors including education, initiatives are being set up as informed by research. In this study, the researcher explored how ICT is used in the Training of pre-service students with visual impairment (SwVI) in Teachers Training Institutes to use it as a pedagogical tool. This study was carried out in Bishop Willis Teachers' Training Institute in Eastern Uganda. The researcher used Human Activity Assistive Technology model (HAAT) to explore how humans make use of the assistive technology (ICT) to perform an activity. The researcher used qualitative research approach with a case study design. Through this approach and design, the researcher collected data using semi structured interviews and non-formal observation. Ten (10) participants took part in the study. They included three (3) tutors and seven (7) SwVI. Data was analyzed thematically. The presentation, interpretation, analysis, and discussion of findings were backed by the Human Activity Assistive Technology (HAAT) model and the literature reviewed in chapter two. The researcher chose the relevance of HAAT in picking information that would be used in understanding how both human and nonhuman resources are useful in training SwVI to use ICTs as pedagogical tools. During and after presenting, interpreting, analyzing, and discussing the findings four major issues were exposed. The first issue that emerged from the findings was that tutors had inadequate training in the use of adapted ICT for training SwVI to use it as a pedagogical tool. Findings further showed that, although tutors are engaged in teaching/integrating ICT in their subject lessons for teaching pre-service teachers with visual impairment, there is a need to retool them (tutors) on the use of adapted ICT for persons with visual impairment. Secondly, findings revealed that the available computers did not have accessible soft wares for SwVI to make use of ICT as a pedagogical tool. The findings further indicate that those SwVI who had their personal smart phones made use of them for academic purposes. The third issue that emerged from the findings show power shortages as a barrier affecting the planned use of ICT by tutors while training SwVI. Lastly the findings show negative attitude from some SwVI in using ICT as a pedagogical tool.

Recommendations made include; ministry of education and sports with other partners to invest highly in ICT for SwVI in Teachers Training Institutes, regular training of tutors on adapted ICT for persons with visual impairment and sensitizing SwVI the values of adopting ICT in education as a sector.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This study aimed at examining the use of Information and Communication Technology (ICT) in teacher training institute to train pre-service teachers with visual impairments to use it as a pedagogical tool. The background to the study, the statement of the problem, the purpose, the objectives, the research questions, the study scope, and the significance of the study are among the major components of the introduction that are included in this chapter. Within and outside of the classroom, ICT use was the main focus.

1.1 Background to the study

Apparently 1.1 billion people with visual impairment worldwide were estimated in 2020 and it is hoped that by 2050, that number was predicted to rise to 1.8 billion Blind people, (Global Burden on Disability [G. B. D.], 2021). 90% percent of individuals affected reside in developing countries. According to Burton, et al. (2021), visual impairment and other eye disorders have a considerable impact on individuals, families, healthcare systems, societal development, and the economy. They further say that the issue of visual impairment (VI) affects a large and expanding population of people worldwide.

Sub-Saharan region of Africa which consists of 46 nations and has a population of more than a billion people, (World Bank, 2021b) inclusive of Uganda with about 2.5 million people with disabilities, including those with VI (Uganda Bureau of Statistics 2016; UNICEF 2014). Out of a global total of 1,025,260, it is predicted that 350,674 children between the ages of 0 and 18 in the region are blind (Burton et al., 2021).

According to Asferaw et al. (2017), corneal scarring brought on by vitamin A deficiency, measles, ophthalmia neonatorum, and the usage of indigenous plants is the primary cause of visual impairment in underdeveloped nations. According to Asferaw et al. (2017), this has significantly decreased in many industrialized nations due to economic growth, expanded measles vaccination campaigns, and improved management of vitamin A insufficiency. Although other causes of blindness, such as measles, traditional practices, such as the use of herbs, and vitamin A deficiency, have significantly declined in those industrialized countries (Asferaw et al., 2017), cataract is now frequently the most prevalent preventable cause of blindness in these settings.

According to the International Council of Ophthalmology (2002), visual impairment ranges from modest to profound and include near-blindness, blindness, and loss of color vision. Low vision and blindness are included in these types of visual impairments (Kinengyere et al., 2017; Arunga et al., 2016). Low vision is described by Arunga et al. as having a visual acuity of less than 6/18 but equal to or better than 3/60, or a comparable visual field loss of less than 20 degrees in the better eye with the greatest available correction. According to Arunga et al. (2016), blindness is defined as having a visual acuity of less than 3/60 or an equivalent vision field loss of less than 10 degrees in the better eye with the greatest available correction.

The visual impairment is a risk factor not only for altered vision-sensory development but also for education and general socioeconomic position throughout one's life (Ngwoke et al., 2020). Vision plays a crucial part in a child's learning and development. According to Ngwoke et al., those with visual impairments should be prioritized as a group of people with disabilities who need quality education.

According to Mambela (2018), students with visual impairment (SwVI) are individuals who have vision issues. These issues make it difficult for individuals to perform daily tasks, such as

learning (Wahyuni, 2017). Students who are visually challenged have difficulties learning from visual materials. Additionally, SwVI find it difficult to learn abstract symbols without the aid of pictures (de Oliveira, do Nascimento, & Bianconi, 2017).

ICT is a broad word that refers to technologies that are used to gather, store, alter, and transmit information in a variety of forms. Computers, the internet, broadcasting technologies, social networks, and telephones are some of these technologies (Odeke, 2021). One of the four pillars of modern civilization, information and communication technology, has given every one of us a virtual passport to the rest of the world. Nevertheless, the rising usage of technology has also had an impact on the field of education.

An understanding of ICT from both developed and developing countries have shown that these technologies have an enormous potential for knowledge dissemination, knowledge acquisition, effective learning and the development of more efficient education services. Teachers, students, administrators and everybody related to professional or educational world broadly use ICT.

ICT in Education Policy is therefore seen as an epitome version of the ultimate goal of transforming the educational system by the Ministries and their sector stakeholders (UNESCO 2006). The Marrakesh Treaty of (2013) also puts emphasis on accessibility to information by persons with visual impairment where ICT play a central role. ICT can be powerful and essential tools for learning, understanding, interpreting and communicating about the real world or they can be black holes into which we pour our money, intelligence and time, getting very little in return. For developing countries such as Ghana, investing in ICT presents the dilemma of spending scarce/valuable equipment on ICT or consequently suffering from widening technological gap (Swarts, 2006).

In Africa, there has been a rising interest and commitment to ICT, especially by the disability movement for use during the teaching and learning process and improving the quality of life for SwVI (Belay, 2005). From South Africa, the use of ICT for pedagogical practices of SwVI is more pronounced in higher learning institutions. The students have access to digital enlargeable (zoom text) and voice synthesizable library books, computer monitors with adaptations in font size and colour contrasts as well as the internet are among the ways they access information for purposes of participation in learning (Mokiwa & Phasha, 2012).

Similarly in Kenya, there have been initiatives in promoting the integration of ICT in Secondary Schools. For instance, the provision of school broadcasting programme for curriculum content using World Space Technology for 3000 secondary schools, digitization of course content for schools by Kenya Institute of Education and purchasing of computers for 142 schools by 2006 (Hennessy et al., 2010). All these efforts done do not leave behind the teaching and learning of students with visual impairment in inclusive secondary schools.

Uganda's first ICT policy guidelines of (2003) reviewed in (2014) recognizes and embraces the goal for lifelong education for "all" with specific strategies including integration of ICT into mainstream curricula as well as other literacy programmes to provide equitable access for all students regardless of their level of education; developing and managing ICT centres of excellence to provide basic and advanced ICT training in secondary schools and other tertiary institutions of learning, (Farell, 2007). Section 6 of Uganda Persons with Disabilities Act (2020) under sub section 4 requires an institution of learning owned by government and registers students with disabilities including those with visual impairment to provide adapted learning instructional materials and up to date ICT devices suitable for the learners for full inclusion in school activities like others.

ICT, when effectively used may amongst other things; provide multiple avenues for professional development of both pre-service and in-service teachers, especially through distance education; Facilitate improved teaching and learning processes; Improve teacher knowledge, skills and attitudes and even inquiry; Improve educational management processes; Improve the consistency and quality of instruction both for formal and non-formal education; Increase opportunities for more student centred pedagogical approaches; Promote inclusive education by addressing inequalities in gender, language and disability; Widen the traditional sources of information and knowledge; Foster collaboration, creativity and higher order thinking skills; Provide for flexibility of delivery; and reach student populations outside traditional education systems (Hennessy et al., 2010). He further stated that effective integration ICTs into educational planning and delivery can be a complicated process, leading to further disparities and challenges in the system. These may include lack of focus on educational objectives where ICTs are seen as an end itself, rather than a means (tools) to an end (Hennessy et al., 2010).

Preschool, primary, and secondary education levels are the three settings in which teachers in Uganda are trained. People who want to teach pre-primary school (kindergarten or nursery school) enroll in programs that educate them for the position. Primary teachers' Institutes require anyone who want to work in primary schools to complete a two-year training program. After two years of successful completion, they receive their Grade III teaching certifications, whilst secondary school teachers enroll in National Teachers Institutes or universities and complete two and three years to receive either diplomas or bachelor's degrees respectively. When finished, they teach in secondary schools (Gov. of Uganda, MOES 2008).

In Uganda, there are 51 Teacher Training Institutes that provide primary school teachers with pre-service teacher Training . Forty-five are owned and funded by the government, with most students being sponsored by the government and six are private and funded by religious institutions or individuals (Kagoda & Ezati, 2013; O'Sullivan, 2010). Of the 45 government-aided Teacher Training Institutes, 23 are core institutions that run both pre- and in-service programs and 22 are non-core institutions, hence they run pre-service teacher education programs only.

Initially, Uganda's teacher training before the National Teacher Policy (2019) which is on its implementation, one would meet the requirements to join a Primary Teachers' College (PTC) if she/he had completed at least four years of lower secondary education and possesses a Uganda Certificate of Education (UCE) or its equivalent. An additional two years of advanced secondary education, with possession of the Uganda Advanced Certificate of Education (UACE) is an added advantage (Kagoda & Ezati, 2013; Norton & Tembe, 2006; Okwaput, 2013). On completion and passing all the prescribed subjects, the trainees including those with visual impairment are awarded a Grade III teachers' certificate, which is the minimum qualification for primary school teachers. This allows the holder to teach primary school children all subjects in a primary school curriculum (Kagoda & Ezati, 2013). Hence, teacher Training has an impact on primary teachers' performance, and today's teachers who undergo pre-service teacher education are introduced to ICT as a pedagogical tool regardless of any disability.

Uganda's National Teacher Policy (2019) which is now being implemented sets a minimum of senior six as the entry point to a teachers' training institute.

To this effect, teachers will take four years and graduate with degrees as opposed to certificates. The last lot of grade III completed their course in 2022 thus the country is on transition in line with the National Teacher Policy (2019).

Much as policies concerning integration of ICT in inclusive education at different levels both at international and national levels are documented as seen above, there seems to be a gap in the training of pre-service students with visual impairment to use ICT as a pedagogical tool in Teacher Training Institutes in Uganda. ICT is expected to be taught in Teacher Training Institutes not as a subject but as a tool that enhances teaching skills of teacher trainees with visual impairment in Institutes and the trainees are expected to apply the ICT skills in teaching learners in primary schools after completion of the training. Teachers of the 21st Century need more knowledge and skills on ICT and teacher trainees with visual impairment should be at the fore front of this campaign.

1.2 Statement of the problem

In Ugandan Teacher Training Institutes, ICT is taught not as a subject but as a tool that enhances teaching and learning in Institutes and later on in primary schools after completion. An attempt to provide ICT laboratories to Institutes has been made by government. Not much information is however known regarding how Bishop Willis Teacher Training Institute is training pre-service students with visual impairment to use ICT as a pedagogical tool. It's against this background that the researcher is examining how ICT is used to train pre-service students with visual impairment in Teacher Training Institutes as a pedagogical tool in Uganda.

1.3 Purpose of the study

The purpose of this study was to examine how Teacher Training Institutes are training pre-service students with visual impairment to use ICT as a pedagogical tool in Bishop Willis Teacher Training Institute, Uganda.

1.4 Research objectives

This research was guided by the following specific objectives;

   i.   To establish the nature of ICT resources available in Teachers' Training Institute for training pre-service students with visual impairment in Bishop Willis Teachers' Training Institute.

  ii.   To explore how ICT resources in Bishop Willis Teachers' Training Institute are used to train pre-service students with visual impairment to use it as a pedagogical tool.

 iii.   To examine the perceptions of tutors in Teachers' Training Institute towards teaching the use of ICT as a pedagogical tool in Bishop Willis Teachers' Training Institute.

1.5 Research questions

To obtain the data, the following questions were used:

   i.   What ICT resources are available in Teachers Training Institutes for training pre-service students with visual impairment to use as a pedagogical tool?

  ii.   How do tutors in Teachers Training Institute use ICT when training pre-service students with visual impairment to use it as a pedagogical tool?

 iii.   What are the perceptions of tutors towards teaching the use of ICT to train pre-service students with visual impairment to use it as a pedagogical tool?

1.6 Scope of the study

The study was restricted to exploring how tutors use ICT in Teachers Training Institutes to train pre-service students with visual impairment to use it as a pedagogical tool. This was achieved by checking the nature of ICTs in the Institute, how tutors train pre-service students with visual impairment to use ICT as a teaching tool and how ICT is perceived by tutors as a pedagogical tool. The study was carried out in Bishop Willis Teachers' Training Institute located in Iganga district, Eastern Uganda. This Institute was chosen because it enrolled students with Visual impairment (SwVI) who are expected to be beneficiaries of ICT resources. This study took place between June 2022-March, 2023.

1.7 Significance of the study

The research findings may;

i. Act as an eye-opener to various stakeholders to support the development of ICT for the benefit of students with visual impairment.

ii. Help to enlighten the educators/tutors on how ICT as innovation can be used to facilitate the teaching of pre-service students with visual impairment in Teachers Training Institutes and any other level of education.

iii. Help to identify challenges and possible solutions faced by tutors when using ICT to train pre-service students with visual impairment in Teacher Training Institutes to use ICT as a pedagogical tool.

1.8 Definition of terms

Information and Communication Technology (ICT): refers to all technologies used for collecting, storing, editing and passing information in various forms. These technologies

include computers, the internet, broadcasting technologies, social networks and telephony (Odeke, 2021).

Pre-service students with visual impairment are those admitted/enrolled to be trained as teachers in the Teacher Training Institutes and have a limitation in their vision/sight.

1.9 Theoretical Framework

This study was guided by a rehabilitation model known as; The Human Activity Assistive Technology (HAAT) model, which was proposed by Albert Cook and Hussey in 1995. HAAT was an improvement of Bailey's Human Performance model of 1989 which was later reviewed by Albert M. Cook and Miller Janice Polgar in 2008 (Giesbrecht, 2013). HAAT model was established to guide the selection, assessment and decision making on the design, and the prescription as well as evaluation of the result of an Assistive Technology System (ATS) while conducting teaching and learning activities.

HAAT model components

The people, the activity, the assistive technology, and the setting in which these three interrelated things occur are the four elements that make up the HAAT model. The human component of assistive technology includes intrinsic and extrinsic enablers, while the activity component covers self-care, productivity, and leisure. The context component encompasses physical, social, cultural, and institutional contexts. In the overall system, each component has a certain role to play. For the design, selection, implementation, and assessment of suitable assistive technology as well as for research into various facets of assistive technology development and use, it is imperative to consider each of these factors and how they interact. The characterization of the model with the elements of human, activity, and assistive technology forming a collective cycle that is nested within a physical, social, cultural, and

environmental context is intended to show the dynamic interaction between the initial three components and the general influence on them, both individually and collectively of the various contexts.

Critiques of HAAT model framework

Although HAAT model has highly continued to be more relevant especially in clinical practice, (Bernd, Van der Pijil & De Witte, 2009) cited that there is limited evidence for relationships between concepts or how they impact outcomes as the model lacks substantive testing. Hersh and Johnson (2008) further perceived several limitations of HAAT model such as lack of a user-friendly coding scheme, insufficient description of concepts and lack of focus on end user goals. Similarly, in education field the model does not specify which AT can be used by SwVI and tutors for a particular activity that may require training human capital in all areas of ICT for an effective outcome.

The relevance of the HAAT model to this study

This model recounts well with this study in a way that the 'Human', who in this case is the tutor and the pre-service teacher trainee with visual impairment, has to interface or interact with the ICT resources available in the college setting to enhance his/her participation and engagement in learning activities at college as the context in which he/she operates from.

Although not all ICT resources are AT, in this study adapted electronic ICT resources represent the AT referred to in the HAAT model which may include electronic high-tech and low-tech ICT resources. These ICT resources are meant to act as external enablers in aiding SwVI to access curricula activities during their Training. The SwVI and the tutor has to be knowledgeable and skilled (physical, cognitive and emotional) in the use of ICT resource/facility to facilitate the teaching and learning process.

Application of the HAAT model to the study

The expertise of the tutors herein, was significant in influencing the adaptation and use of ICT in their teaching including the presentation of information by SwVI to enhance their learning (Cook & Polgar 2008). For example, the Training /knowledge of tutors and SwVI in using available ICT equipment is quite important as it culminates into SwVI utilizing ICT to facilitate their learning. Furthermore, the type of college activity that engages SwVI had an implication on the kind of ICT resources to be used. Activities such as reading, writing, independent mobility and orientation, leisure activities including games and sports required different adaptations in ICT resources to enhance the teaching of SwVI in an Institute setting.

HAAT model is unconditional on the nature of ICT available to choose from and in this particular study, the nature and availability of ICT resources/facilities in Institutes have an influence on the teaching and learning of SwVI and consequently determines the learning outcomes. If tutors and SwVI have access to adequate and appropriate (adapted) ICT facilities, which in this case act as pedagogical tool, the teaching and subsequent participation in learning activities are likely to be enhanced.

Akyurek et al., (2017) used the HAAT model in describing how the context/setting in terms of the physical environment like the home, school, workplace; governing policies; socio-cultural context (family, peers and strangers) determines the design, development and guidance in AT and services for persons with disabilities. They further observe that while using HAAT in education, it is important to understand and consider the educational activities in which the user is likely to engage before designing assistive technology as these factors can either facilitate or inhibit its use by the person.

Kouroupetroglou (2015) used HAAT model in a study on Text Signals and Accessibility to Educational Documents to explain the accessibility to text-content of a document as well as the text signals. This was mainly done to enable an electronic document, either in form of a common file format (such as .pdf .doc, .ppt) or a Web document, to be used effectively, efficiently and satisfactorily accessed by more users in more situations or context including accessing and applying during the teaching process.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed related literature to the study on how ICT was used in Training pre-service students with visual impairment in Teacher Training Institutes to use it as a tool. It was centered on three objectives as; to establish the nature of ICT available in Teachers' Training Institute for training pre-service students with visual impairment in Bishop Willis Teachers' Training Institute; to explore how ICT is used to train pre-service students with visual impairment to use it as a pedagogical tool and to examine the perceptions of tutors towards the use of ICT as a pedagogical tool in Bishop Willis Teachers' Training Institute.

2.1 Nature of ICT resources in Teachers Training Institutes used for Training Pre-Service students with Visual Impairment

The nature and availability of ICT resources in Teachers' Training Institute determine their accessibility by tutors and SwVI for use in their education at different levels. With the advancement of technology adapted ICT devices, software or programmes have been invented to promote the teaching and learning of SwVI in Schools/Institutes. Therefore, this subsection presents the literature search from empirical studies about the nature of ICT resources available for SwVI.

Douglas et al., (2011) conducted a study on Access to print literacy for children and young people with visual impairment. The study findings cited ICT resources like computer magnification software, Closed Circuit Television (CCTV), screen-reading software as very appropriate in enabling low vision print readers to start optimal print size or alternative means

to access print text materials provided in soft copy during teaching. These ICT resources mentioned above provide access to information in appropriate formats particularly by enlarging font sizes of text materials and given an audio output of word documents displayed on computer screens.

In a study by Wong and Cohen (2016) on access and challenges of AT application: experiences of teachers of SwVI in Singapore the findings identified relevant ICT resources for SwVI in form of high-tech resources including computers with inbuilt enlargement/magnification software, zoom text, Job Access with Speech (JAWS), CCTV and low-tech devices including table lamps, and photocopiers for enlarging materials.

In a study by Mathevula and Uwizeyimana (2014) the outcome indicates that schools had scarce ICT resources for integration during teaching, with only television sets, photocopiers and computers available. It was further indicated that projectors were rarely used by teachers.

ICT resources necessary for supporting SwVI are Optical Character Recognition software (OCR) used in conjunction with a computer and a scanner to make texts from books, magazines or any other reading material transformed into speech accessible to SwVI who have severe low vision (Serero, 2011). Mulloy et al., (2014) identified interactive boards like Promethean boards for the display of computer image making it accessible to users directly, voice recorders for recording lessons and assignments as well as adapted calculators with large keys, high contrast screens, lamps for increased illumination as potential ICT resources. They argue that teachers and SwVI need to make use of these ICT resources during the teaching process.

Hussin et al., (2013) add that CCTVs, talking books through computers, moving pictures experts group Audio Layer 3 (MP3) players for playing digital books and the internet are more acceptable, effective and accessible ICT resources for teaching SwVI. They also indicate that

the internet is used by SwVI to browse and find all sorts of information including additional notes and supplementary materials in subjects learnt in the school.

Eguavoen (2016) carried out a study and observes that majority of the Students (78.6%) apply smart mobile phones while a few made use of personal computers as well as e-learning platforms including internet implying that ICT resources which are most likely to facilitate teaching them are either not available for them to use or not accessible.

2.2 How tutors in Bishop Willis Teachers Training Institute use ICT resources to train pre-service students with visual impairment to use it as a pedagogical tool

The quality of education and training of SwVI mainly depends on the quality of tutors; that is an academic qualification, professional training, commitment and dedication (Mugambi, 2011).

Uganda is currently embracing ICT as an integral tool in all service delivery and teachers are vital to any successful implementation of such an educational innovation/change. Tutors' ability in training SwVI as well as ICT utilization as a pedagogical tool in teaching is a litmus paper in determining the quality of learning by SwVI in this recent generation. Some empirical research studies have been reviewed in line with the aforesaid as follows:

ICT resources or equipment facilitate SwVI to access a vast amount of information while studying in class as well as leisure activities.

Similarly, ICT resources such as CCTV, zoom-text for enlargement, phones especially smartphones, e-books, videos on YouTube, perform a very crucial role in compensating the impairment students have. SwVI can therefore manipulate such equipment according to their

needs to increase their reading and writing skills including typing of notes for purposes of enhancing communication during the teaching process (Edgar et al., 2017).

Teachers use ICT resources especially the computers for typing their notes for teaching or make SwVI type and print their notes while table lamps are used for illumination of appropriate light to enable SwVI to read their work (Wong et al., 2016). Similarly, Eligi and Mwantimwa (2017) report that SwVI make use of different ICT resources in varied ways. For example, computers are used for multiple functions such as writing notes during teaching sessions, reading audiobooks and notes, listening to and other contents accessible in portable document format (pdf) and hypertext mathematics language (HTML). Others use options to visual displays such as screen readers like JAWS and NVDA and window's eye programmes to access audio information; note-takers and tape recorders for recording and listening to notes while the internet is considered by SwVI as a vital resource due to its multifunction platform to access to online learning resources/materials in alternative formats that support their instruction. Likewise, Mathevula and Uwizeyimana (2014) recognize that ICT has benefits in teaching including enabling students to share learning resources, promoting collaborative learning as well as autonomous search for information by SwVI for learning purposes even though many schools rarely use ICT as a pedagogical tool but mostly for administrative purposes.

On the other hand, Kavcic et al., (2017) observe that all students with visual impairment are excited to play games using computers with a designed perceive-conceive platform, which includes motivating and accessible elements of game-based learning. Similarly, Söderström & Ytterhus (2010) say that youths with visual impairment used ICT mostly for entertainment and leisure activities. They further explain that SwVI and visually impaired largely used ICT and enjoyed opportunities with which the internet connected to the computer provides them including games that are taken as their hobbies. Whereas the study above is relevant to this

study, it focused on issues related to SwVI transitioning to higher education and did not focus on the Teachers' Training Institute of which this study is focused, the ICT as innovation must be embraced by tutors in an attempt to bridge the gap that is created by visual impairment condition.

2.3 Perceptions of tutors in Bishop Willis Teacher Training Institute on the use of ICT for training pre-service students with visual impairment

The study carried out by Bingimals (2009) on hurdles to the successful integration of ICT in the teaching and learning environment shows that teachers have a strong desire to integrate ICT into the teaching of SwVI but are encountered by barriers including lack of confidence and skills. Bingimals further adds that accessing ICT resources in the school might be available but teachers cannot use them in the classroom to support teaching SwVI because it is difficult for them to operate ICT resources as well as enable SwVI to use them. The study thus recommends provision of effective pedagogical training to teachers rather than training them to use ICT tools as an important parameter in enabling its integration in teaching SwVI.

The role and skills of teachers are very critical because they are at the front line of designing and delivering learning experiences (Eady & Lockyer, 2013). They further contend that just making ICT available in schools does not mean that teachers will make use of it nor can it be necessarily be used efficiently. This argument is true because the teachers must possess some sort of knowledge and skills in adapting ICT resources so that they can use them during the teaching and learning process. The availability of ICT resources in a school ought to match the teacher's abilities in using them in their pedagogical engagement.

In a study carried out by Msila (2015), findings point out that many participants (teachers) felt inadequate in applying ICT and without proper training, any attempt to utilize ICT in teaching

can embarrass and uncover their inadequacies in the classroom before students. Msila further elaborates that ICT competence is highly related to its training including continuous professional development and attitudes, as pertinent ingredients towards the success of its instruction, application and thus concludes that any innovation in education including ICT needs skilled teachers.

Similarly, various factors influence teachers' use of ICT. Teachers' knowledge and attitudes influence their use of ICT in teaching (Andoh, 2012). The findings illustrate that teachers' attitudes towards technology influenced their acceptance of the usefulness of technology and its integration into teaching. If teachers' attitudes are positive towards the use of technology, then they can easily provide useful insight into the adoption and integration of ICT into teaching processes.

The above argument is to a large extent true because there is no way SwVI can be able to utilize available ICT resources in Schools/Institutes if they are not supported by teachers through training. Nevertheless, this training can only be done if the tutors are as well proficient in using the same ICT resources at their disposal.

Zhou et al., (2011) in their study indicated that a majority of the teachers (74%) reported having a significantly lower level of knowledge and skills than they ought to have in ICT, indicating dismal knowledge and skills to use ICT as AT for pedagogical purposes. They further observe that the teachers were also less confident to use ICT in teaching SwVI in their classes. This had an impact on their teaching and therefore needed the training to fulfill the requirement of teaching SwVI. Equally, Shikden (2015) study shows that only 0.07% of the teachers were experts in using ICT resources (devices) while a higher number of teachers either had no experience or were at the level of a beginner or novice in using ICT as an AT to teach SwVI. This indicates that most of the tutors were not proficient in teaching SwVI using ICT resources.

Shikden further points out that the lack of training; ICT resources and/or competence in using ICT are the main factors responsible for this trend. In response to the above, Hussin et al. (2013) recommend more in-house (school-based) ICT training for teachers so that teachers can use more advanced ICT technologies to facilitate the teaching of SwVI.

Following the discussion from the literature, there is no argument that ICT is now an integral part of the teaching process in the current trend and ICT resources can positively influence and or contribute to the teaching of pre-service students with visual impairment in Teachers' Training Institute.

Thus, ICT integration in the teaching of teacher trainees with visual impairment is something that should be embraced by all educators in an attempt to make accessible the general curriculum to pre-service teacher trainee with visual impairment. The review has however, identified gaps in the preceding discussions/review presented above such as; some studies reviewed did not focus on using ICT to teach SwVI in Secondary Schools but also included other levels of education including primary and tertiary institutions.

However, all through the literature review, it was discovered that there were little or almost no studies carried out relating to how ICT resources were utilized as a pedagogical tool for teacher trainees with visual impairment let alone being taught as pedagogical tool to all generally, in Uganda Teachers' Training Institute and this has created a significant gap in the delivery of education services to this group of students. This study addressed specifically how best ICT influences the Training of pre-service teacher trainees with visual impairment in Teachers' Training Institute in Uganda.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This study aimed at examining how tutors in the Teachers Training Institute use ICT to train pre-service students with visual impairment to use it as a pedagogical tool. This research was directed by the following specific objectives; To establish the nature of ICT resources available in Teachers' Training Institute for training pre-service students with visual impairment in Bishop Willis Teachers' Training Institute; to explore how ICT resources in Bishop Willis Teachers' Training Institute are used to train pre-service students with visual impairment to use it as a pedagogical tool and to examine the perceptions of tutors in Teachers' Training Institute towards teaching the use of ICT as a pedagogical tool in Bishop Willis Teachers' Training Institute.

This chapter presented the methodology which guided the study on how tutors in Teachers' Training Institute used ICT to train pre-service students with visual impairment to use it as a pedagogical tool in Bishop Willis Teachers' Training Institute, Uganda. It described the research approach and design, area of the study, population and targeted population, sample and sampling procedure, research methods and instruments, data collection, data analysis, and ethical procedures which were put into consideration while conducting the study.

3.1 Research approach

There are three approaches in carrying out research and these include qualitative, quantitative and mixed research methods (Bryman, 2016). This study used a qualitative research approach

in an attempt to examine the use of ICT in Teachers Training Institutes for training pre-service teacher trainees with visual impairment.

Qualitative research approach is defined as an inquiry that seeks to know a given social phenomenon or research problem from the perspective of the local population (Farr, 2008). Qualitative research approach was thought to be the best for this study because it enabled the researcher to get specific information, study and build a holistic picture, and detailed views from the participants in a natural setting. The natural setting for this case was the institute where pre-service students with visual impairment are training from. This approach also used smaller sample sizes and thus saved time and costs of carrying out the study.

3.2 Research Design

This study used a case study design to analyze the use of ICT in training pre-service teacher trainees with visual impairment in Teachers Training Institutes. A case study is a qualitative approach where the researcher explores real-life, contemporary bounded system or multiple bounded systems over time through detailed and in-depth data collection (Creswell, 2013). Creswell adds that a "case" could also be a concrete entity like an institute, Organization, and a private or less concrete one like a community. A case study design was preferred for this study because it enabled the researcher to get information from real-life context/setting about the research problem under investigation. Besides, a case study helped to answer questions of "what", "how" and "why", which aims at providing a vacuum for participants to offer more extensive data concerning a problem of interest and based on knowledge and experience of participants (Yazan, 2015).

3.3 Area of study

The study was conducted in Bishop Willis Teachers' Training Institute found in Iganga district, Eastern region of Uganda. This institution was chosen because it is among the 23 core government-aided Teacher Training Institutions in Uganda which enrolled students with visual impairment (a unit) whose essence in this study was very supreme. It also implemented government education policies in the training of teachers in Uganda.

Eastern region of Uganda was selected because it had the highest number of persons with visual impairment in the country according to Uganda Bureau of Statistics (UBOS, 2014).

3.4 Target population

The target population is defined as the group of people or participants with specific attributes of interest and relevance to the research problem under investigation (Asiamah et al., 2017). The target population of this study was tutors and pre-service teacher trainees with visual impairment. Tutors were particularly identified as potential participants since they were directly involved in teaching and training of pre-service students with visual impairment during the training process while pre-service students with visual impairment were picked because they are the key beneficiaries on the utilization of ICT resources as a pedagogical tool in the teaching process. The whole population for the study was 54 participants; 40 tutors and 14 pre-service students with visual impairment from Institution "Y".

3.5 Sample size

A sample is described as a group of people, objects or items that are taken from the larger population as a representative for measurement (Mujere, 2017). Mujere notes that this is often done to ensure that the results from the sample can be used for generalizing over the entire

population. For this specific study therefore, the sample comprised of 3 tutors who taught pre-service students with visual impairment and 7 pre-service students with visual impairment, giving a total of 10 participants. This study was in line with Creswell's (2014) whose argument was that having a case study involving a limited number of participants helps a researcher to gather as much detailed information as possible from each participant.

Table 1 : Suggested Sample of participants

S/N	Category	College "Y" Population	Sample size	Sampling technique
1	Tutors	40	3	Purposive
2	Pre-service students with VI	14	7	Snowball
Total		**54**	**10**	

3.6 Sampling technique

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population to determine the characteristics of the entire population (Mujere, 2017). To carry out the study, purposive sampling was used in selecting tutors and snowball sampling technique was used to select pre-service students with visual impairment as participants. Purposive sampling is a non-probability type of sampling, within which the selection of units including people, organizations, documents, and items is based on the understanding of the research problem and phenomenon in the study (Creswell, 2013; Bryman, 2016). Creswell (2014) further expounds that purposive sampling increases the usefulness of information to be collected from the participants. This sampling technique was also preferred because it attempted to select participants on certain attributes or criteria (Mwakyeja, 2013). Snowball

sampling is a non-probability sampling method where new units are recruited by other units of specific traits to form part of the sample (Kassiani, 2022). It is also known as chain sampling or network sampling which begins with one participant then it continues on the basis of referrals from those participants. This process continues until a desired sample or saturation point is reached.

3.7 Sampling procedure

The criteria used to select tutors were based on three assumptions. First, the tutor trained in special needs education since he/she was believed to be knowledgeable about special educational needs of pre-service teacher trainees with visual impairment in the college. Secondly, a tutor in charge of the resource room/computer laboratory where ICT resources for teaching pre-service students with visual impairment are kept.

The fact that he/she interacts with pre-service students with visual impairment as he/she attempts to support them in using ICT deems him/her to be useful for the study. Thirdly, the director of studies who was responsible of academics in the Institute as he/she was in-charge of time tabling subjects from the curriculum and actual teaching.

For pre-service students with visual impairment, their records from the SNE department were used to get those students with low vision and blind. In the absence of students' records the researcher together with the SNE tutor would use an E- chart to obtain those students with low vision. The criterion used under snowball method in this study was that one student with visual impairment was interviewed and then he/she referred the researcher to another SwVI for the interview until the desired number was reached for the sample. Besides, gender sensitivity was observed but where situations would limit to a particular gender, that present gender would be considered for the study.

3.8 Methods of data collection

There are many methods of collecting data in a qualitative research approach. These are interviews, document analysis, observation, archival records and artifacts and focus group discussions (Yin, 2014). Based on the nature of this study, interviews and observations were used in collecting data. The two methods were used to balance the information collected and also check on the accuracy of the information given.

3.8.1Interviews

An interview is a conversation between partners (interviewer and interviewee) that aim at having in-depth information about a given topic or subject, through which the phenomenon could be interpreted in terms of the meanings from the interviewee (Alshenqeeti, 2014). There are three types of interviews used in collecting information in qualitative research (Bryman, 2016; Alshenqeeti, 2014). The structured interview is also called a standardized interview which entails the administration of already predetermined questions to all participants; semi-structured interview where the interviewer has a series of questions on the interview guide but has freedom or flexibility to vary or adjust the questions to suit the needs of the interviewee; and unstructured interview in which topics or issues to be covered are provided but the questioning style is informal.

To obtain data for the study, a semi-structured interview was preferred to collect data about the nature of ICT resources, how tutors used ICT to train pre-service teacher trainees with visual impairment to use it as a pedagogical tool and the perceptions of tutors on the use of ICT as a pedagogical tool. The selection of this type of interview was linked on the freedom and flexibility to adjust questions accordingly, probe and expand the interviewee's responses during the data collection process (Bryman, 2016). He further added that it enables the

interviewee to elaborate on key issues to provide detailed information as may be deemed necessary to the study.

3.8.2   Observation

This is an act of noting a phenomenon in a given setting through the five senses including sight, smell, hearing, touch and taste of the observer, often with an instrument and recording it for a scientific purpose (Creswell, 2013). Observation method was used because it enabled the researcher to obtain first-hand information from the natural setting of which the participants might not have provided and verified what the participants said as well as non-verbal expressions (Kawulich, 2014). The researcher used this method to obtain information on available ICT equipment/resources and ICT facilities as a way of confirming the verbal responses that was obtained from the participants. None the less, before the researcher went ahead to observe the ICT equipment/resources available in the college, he sought permission from the college administration to be allowed to access the resource room/ICT laboratory.

3.9 Pilot study

A pilot study is a small scale pre-liminary study conducted to gauge feasibility, duration, cost, adverse events and improves upon the study design before performance of a full-scale research (Lowe, 2019). It was developed with the intention of testing several components of the procedures envisioned for a bigger, more thorough, or confirmatory inquiry. In order to find any possible weaknesses in the questions, I pre-tested my data collection tools. After the research proposal was approved, a pilot study was conducted in a college with a similar learning environment for students with visual impairment.

Following the completion of the pilot study in a comparable setting, the researcher identified a few ambiguous questions in the research instruments and modified the questions to fit the main study. This made it easier to gather pertinent data for the study.

3.10 Data collection procedure

Before undertaking the real study in the proposed area, approval of the research proposal by the supervisors as well as the Department of visual impairment of Kyambogo University was done. The researcher obtained permission to conduct the study from the head of Department, in which an introductory letter was given. After obtaining permission, the researcher went personally and formulated a request letter addressed to the participants and thereafter visits the proposed study location to meet the participants. The researcher then sought permission from the college administration to be allowed to meet and establish rapport with the prospective participants to present the request, seek consent and also get expectations of the participants. The researcher sought rapport with the participants by presenting the request letter asking them to participate in the study and there after appointments were made for the interviews to take place. On agreement between the researcher and the participants, interviews were arranged and conducted with each participant. During the interview, the conversations were audio-recorded and at the same time, there was also note-taking by the researcher. Meanwhile the researcher moved to observe and ascertain the nature of ICT resources in the ICT resource room as a way of confirming the narrations from the participants.

3.11 Data analysis

Thematic analysis is the process of identifying patterns or themes within qualitative data (Stranges et al., 2014). The primary data that was collected from the field could not have given much meaning. Data analysis was therefore crucial as it described and interpreted these raw

data to obtain the meaning and pattern from it (Mwakyeja, 2013). When the process of data collection was over, raw data was then transcribed from audio format into text format. The data transcribed from the semi-structured interview schedules and observation was checked and subjected to inductive thematic data analysis procedure to obtain patterns, categories and themes. Bryman (2016) observes that when trying to find themes, it is recommended that the researcher looks at re-occurring topics relevant to the research questions, categories of data which can be patterned, and similarities and differences in the discussion.

The data was then transcribed, categorized through coding individually against themes derived from research objectives/questions. Common themes were identified by trying to find keywords or phrases and grouping them into categories and sub-categories.

In reporting the information collected, some direct quotations from participants were used as recorded. Reporting direct verbal accounts from research participants was vital because it upholds the taste of the first data (Mwakyeja, 2013). Also, the researcher's views/comments are made on the responses from participants' answers given, backed up by literature reviewed in chapter two while codes have been used to protect the identity of participants where direct quotations from the participants are applied (Creswell, 2013).

3.12 Ethical considerations

Research involves ethical issues which cannot be disregarded. Respecting these principles contributes to the integrity of research, the protection of study participants' rights, and the growth of their sense of reliability. Research ethics were observed at all stages of the study with a focus on permission and information confidentiality to preserve the participants' reputation and privacy in order to promote credibility and authenticity (Vanclay et al., 2013).

In an effort to keep these ethics, the participants were informed of the study purpose, duration, how the information collected was to be kept and used. If participants wished to decline participation in the study, they had the right to do so. Informed consent from the participants was sought through signing and a written communication requesting them to provide necessary information for the study including recording their views as a way to avoid violation of their rights in one way. Anonymity was observed by using codes during data analysis as a way of protecting the participants' identity. The essence of anonymity in research was that information provided by participants should in no way reveal their identity (Vanclay et al., 2013).

3.13 Credibility and authenticity

Credibility and authenticity refer to the qualities/dispositions for judging how true, believable, credible, dependable and transferable the study findings are in the face of not only the researcher but participants and also the readers of the study in addition (Yilmaz, 2013).

To ensure credibility and trustworthiness of the research findings, the following procedures were undertaken: The instruments were designed, discussed and validated along with my supervisors; pretesting of the instruments through a pilot study was done under the guidance of the supervisors; data triangulation methods involving semi-structured interviews and observation was done and data was collected from more than one group of participants and real narratives from the participants presented in the data analysis as a confirmation of what transpired in the field (Bryman 2016).

3.14 Limitations of the study

The following factors affected the researchers work:

Some participants (pre-service students with visual impairment) could not open up to speak freely as if they were not sure of themselves.

Some participants delayed to arrive in time to the venue for the interview and this affected the planned time especially pre-service students with visual impairment.

Financial constraints were also experienced by the researcher to facilitate his movement for data collection.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

The study examined how Teachers' Training Institute are training pre-service students with visual impairment to use ICT as a pedagogical tool. The following objectives served as the guidelines for this study; to examine the nature of ICT available in Teachers Training Institutes for training pre-service students with visual impairment; to explore how tutors use ICT to train pre-service students with visual impairment to use it as a pedagogical tool and to examine the perceptions of tutors on use of ICT as a pedagogical tool. This chapter is for presentation, interpretation and discussion of the findings. Data is presented in the order of the research objectives that are stated above.

In the data presentation, narratives from the participants are presented to maintain the originality of the information collected. In each section, the presentation of the findings starts, interpretation and the discussion of these findings in relation to the literature reviewed in chapter two immediately follows. In the interest of upholding privacy and or anonymity, codes have been developed for pre-service students with visual impairment as (SwVI) and tutors as (TR) respectively to conceal the identity of the participants. The results have been presented, interpreted and discussed according to the themes and sub-themes developed from the data collected and the literature review.

4.2 Demographic Information of the Participants

The study targeted tutors and pre-service students with visual impairment in one Teachers Training Institute. The total sample size of participants anticipated was 10 comprising of 3

tutors and 7 pre-service students with visual impairment respectively. All the ten participants participated for the study. This was possible due to the small number selected, the scheduled date and time observed.

Table 2: Sampled Participants for the study

Category	Gender		Total
	Male	Female	
Tutors	2	1	3
SwVI	4	3	7
Total	**6**	**4**	**10**

Source: primary data

The tutors were purposively selected for the study despite the various subjects they teach. This study was interested in the tutors who had experience of more than five years as trainers and interacting with pre-service students with visual impairment both in the classroom and out of classroom activities. The individual characteristics are presented below:

TR1: She is female with a Bachelor's Degree in teacher education with an experience of 6 years training SwVI in this Institute. She teaches special needs education and professional education studies. She heads the department of special needs studies in this college and was expected to have more information regarding students with visual impairment as a unit in the Institute.

TR2: He is male with Bachelor of Education (Science) Degree with experience of 12 years teaching SwVI in this Institute. He teaches Mathematics in both year one and year two and also doubles as Director of Studies who is responsible of students' academic affairs and time tabling of subjects in the Institute.

TR3: He is a male with a Bachelor of information Science with Education Degree and experience of 10 years teaching pre-service students with visual impairment. He teaches ICT to year one and year two students and he heads the ICT department in this Institute. He was expected to be knowledgeable about the use of ICT for persons with visual impairment.

The participants also included students with visual impairment (low vision and blind) who were expected to share their experiences in their Training to use ICT as a pedagogical tool. These students were fourteen (14) as targeted for the study. Of the seven (7) students selected, four (4) were blind and three (3) had low vision all of them were in year two since there was no year one class.

4.3 Nature of ICT available for training pre-service students with visual impairment in Teachers Training Institutes

The first objective examined the nature of ICT resources available in the institute and this was important because it influences how pre-service students with visual impairment acquire knowledge and skills on using ICT during their teaching career. When participants were asked to mention the ICT resources that are used in the institute, the emerging issues were; Hi-tech or Low-tech ICT resources of varying quantity, quality and status as presented below;

Table 3: Presentation of ICT resources available in the PTC

ICT resources available	Number	Number of Participants by codes	Category
Computers	45	TR1, TR2, TR3, SwVI-2, SwVI-4, SwVI-8, SwVI-14	Hi-tech
Embosser	1	TR1, TR3 and SwVI-4	Hi-tech
Projector	2	TR1, TR3	Hi-tech
Internet source	1	TR3	Hi-tech
Printers	4	TR3	Hi-tech
Perkins Braillers	10	TR1	Low-tech
Magnifying lenses	6	TR1	Low-tech
Talking calculator	1	SwVI-6	Low-tech
Smart phones (owned by some SwVI)	5	TR1, TR2, SwVI-4, SwVI-6, SwVI-10, SwVI-12, SwVI-14	Hi-tech

Source: primary data

4.3.1 Categories of ICT resources available

The data shows that there are two main categories of ICT resources available in the institute and these are Hi-tech and Low-tech resources. When participants were asked to mention the categories of ICT resources available in the institute, participant (TR1) said: -

> Hi-tech, we have the embosser, computers and smart phones then the Low-tech can be the magnifiers, the glasses they use and then the braille machines including the white cane also for mobility.

Another participant (TR 3) said: -

> Hi-tech is the embosser machine but ever since we acquired it we haven't put into use because of lack of the software for it and can't work without it. Low- tech we have a laptop of course, the projector and the braille.

Another participant (SwVI 8) said: - "*Actually to me I have heard of Hi-tech devices, but I have not seen a Hi-tech device".*

From the data above, it was noted that there are Hi-tech and Low-tech ICT resources available in the college for use during the training of pre-service students with visual impairment. This was important because it enables pre-service students with visual impairment to have a variety of ICT resources to use during their training. For example, when power was off some SwVI could use Low-tech ICT resources like talking calculators to do their work.

From the data, it was noted that some of the tutors and pre-service students with visual impairment could not differentiate between Hi-tech and Low-tech ICT resources available for use in the college. This could have been as a result of inadequate exposure to using them and/or negative attitude towards adopting the technology which may render them to be digital illiterates thus affecting their pedagogical practice. The limited knowledge about the Hi-tech and Low-tech ICT resources could be attributed to lack of training on their use, lack of the soft wares that enable their accessibility and few ICT resources available for use by every pre-service student with visual impairment.

The study findings are in line with Shikden (2015) who identifies computers, talking calculators and clocks as ICT resources available in schools for use by pre-service students with visual impairment. The findings however contradict with Shikden's study findings which reveals that schools had more Low-tech ICT resources readily available than the Hi-tech ICT resources.

As guided by the HAAT model in this study, ICT resources are meant to act as external enablers in aiding pre-service student with visual impairment to access curricula activities during the teaching and learning process. The pre-service students with visual impairment and the tutors

have to be knowledgeable and skilled (physical, cognitive and emotional) in using the different categories of ICT resources to facilitate the teaching and learning process.

The findings are also in line with Mathevula and Uwizeyimana (2014) who reveals that schools had scarce ICT resources for integration during teaching, with only television sets, photocopiers and computers available and that projectors were rarely used by teachers.

4.3.2 Quantity and quality of ICT resources in Primary Teachers' College

The data on the table above shows that the college had limited number of different categories of ICT resources available in the college for use by tutors when training pre-service students with visual impairment. The number of computers available were forty-five (45) and was found to be fair compared to the other categories of ICT resources which were ten (10) or even less. Having a reasonable number of each category of ICT resources with accessible soft wares would help a tutor to engage all individual pre-service students with visual impairment on an activity without making them share equipment or work in shifts which may be tiresome and time consuming. This helps pre-service students with visual impairment to gain knowledge and skills necessary to be independent in their pedagogical practice. Providing Hi-tech ICT resources alone without accessible soft wares like (JAWS, DBT) for pre-service students with visual impairment to use does not make sense to them in any way.

One participant (TR1) said:

> ICT equipment in the college, there are some computers in the lab, we have an embosser, they have their braille machines, some use magnifiers and then others use glasses and they also have smart phones.

Another participant SwVI 6 said:

> As for learning purpose…, the one I know now days just of recent is phones. For the visually impaired others have talking phones but some doesn't have. From here there isn't any, but no there is also a calculator for the college but the phone for the students.

Similar to that was participant (SwVI 14) who said: - "*We have got the computers from the computer lab there; computers lack soft wares for us to use, besides the computer we also have smart phones because they are mostly owned by students*".

When the researcher entered the ICT laboratory for an informal observation as a confirmation from the participants narratives, he observed some computers, a projector and its board, internet source (WiFi), a scanner, photocopier, Braille embosser, audio recorders, talking calculator, audio players, micro-phones, printers, magnifying lenses, Perkins Braillers and a white cane. Besides that, the researcher saw some students with visual impairment having their private smart phones during interviews. The above resources are used by tutors while training pre-service students with visual impairment in the college.

From the table above, the magnifying lenses are few compared to the number of pre-service students with visual impairment in the college. These magnifying lenses could be of help to students with low vision to use them during their Training for pedagogical purposes. The Perkins Braillers available in the college are also not commensurate to the number of pre-service students with visual impairment which makes them to share during their Training . The limited number of Perkins Braillers may render some pre-service students with visual impairment less active during the teaching and learning process and hence may lack important skills needed to use it as a pedagogical tool.

The data also show that there are many Hi-tech ICT resources than the Low-tech ICT resources. This could have been as a result of supply of equipment by donors or government which preferred Hi-tech ICT resources to Low-tech ICT resources. It could also be due inadequate awareness by the tutors and administrators on the use of Low-tech ICT resources for pre-service

students with visual impairment. Balancing the two categories of ICT equipment would help tutors have a variety of knowledge and skills to be utilize during the Training of pre-service students with visual impairment and equip them with necessary pedagogical skills.

From the data on the table, it was noted that some pre-service students with visual impairment used their smart phones to access relevant information which the inaccessible computers provided by the college would have served the purpose. If all pre-service students with visual impairment had smart phones, they would be able to compliment the few college ICT resources available however, those pre-service students with visual Impairment without smart phones continued to miss out learning how to use it as a pedagogical tool.

These findings are related to a study by Eguavoen (2016) who observed that a majority of students with visual impairment apply smart mobile phones while a few made use of personal computers as well as e-learning platforms including internet implying that ICT resources which are most likely to facilitate teaching them are either not available for them to use or not accessible.

According to HAAT model (Human, Activity and Assistive Technology) as used in this study, it is clearly noticeable that the available ICT resources in the college that pre-service students with visual impairment have to use in an activity in order to get the output do not have access soft wares that help them use the ICT equipment. For example the forty five (45) computers available all do not have (JAWS) and the embosser machine does not have the DBT software to enable it work. The HAAT model requires the ICT equipment to be suitable for the human resource (tutors and pre-service teacher trainees with visual impairment) to manipulate it because they are knowledgeable on how to use the ICT in order to do the activity effectively.

Contrary to the above are findings by Douglas et al., (2011) who cited ICT resources like computer magnification software, screen-reading software as very appropriate in enabling low vision print readers to start optimal print size or alternative means to access print text materials provided in soft copy during teaching.

4.3.3 Status of ICT resources

The data shows that some of the ICT resources were in a good working condition and that the computer laboratory was spacious. However, others were not but also the ICT laboratory needed expansion to have enough space. One of the participants (TR1) said:

> Condition of the computers… I may say it is in good condition for the ordinary student, but still wanting on the side of students with visual impairment… yeah… because they should be having a narrator for them to manipulate them in terms of JAWS, yes….

Another participant (TR 3) said: *"The devices are all in good condition only the room needs expansion"*.

Similarly, another participant (SwVI 12) had this to say: -

> The computers are in good mechanical conditions but only that somehow some where we the SwVI mostly do not have the JAWS programme which would facilitate their use by us.

Whereas the status of the ICT facility was good as alluded by most participants, many of them noted that the computers were lacking soft wares like JAWS to cater for pre-service students with visual impairment. This was later on confirmed during an observation by the researcher which showed that no computer had JAWS while others were spoilt.

Given the study's findings, it is also evident that some of the visually impaired pre-service students are unaware of the condition of the ICT in the computer lab. However a majority of

them said that all computers were not accessible due to lack of soft wares and others were spoilt.

This made some of them to use their smart phones. The presence of computers without soft wares and spoilt computers implied that there was a limited opportunity for pre-service students with visual impairment to interact with the ICT resources. This would ultimately result to pre-service teacher trainees with visual impairment lacking essential ICT pedagogical skills needed in the profession because the tutors who were to use them during their Training cannot use.

Assistive technology, according to HAAT model, includes intrinsic and extrinsic enablers; intrinsic enablers are the functional status of a computer while extrinsic enablers are the environmental factors surrounding the computers. For instance the soft wares are in this case the intrinsic enablers while the extrinsic enablers are the power supply, computers keys, internet source and the general conducive environment of the ICT facility. According to the model above, the ICT should have the hard ware and the software in good working status for the Human (tutors and pre-service teacher trainees with visual impairment) to perform the Activity well. Given that some ICT resources are not functioning, it implies that tutors may experience challenges in supporting pre-service students with visual impairment to acquire skills in using ICT as a pedagogical tool.

The findings are in line with Yusuf et al., (2012) who revealed that a majority of the ICT laboratories in academic institutions/schools lacked the required ICT equipment for students with disabilities including pre-service teacher trainees with visual impairment. They further argue that most of the equipment available was outdated and that some of the schools had computers but used them for administrative purposes other than for instruction.

Likewise, a study by Majinge and Stilwell (2014) observes that libraries did not have adequate and appropriate adapted ICT resources available for persons with visual impairment to use for study purposes. The data therefore, indicates that this college is not well stocked with the current ICT resources and worse still; the few that are present do not have the soft wares to enable pre-service teacher trainees with visual impairment use during their Training . To cope up with this challenge, some pre-service teacher trainees with visual impairment who have smart phones now tend to rely mainly on them for study purposes. Many of them might get out of the institute without the pre-requisite knowledge and skills for using ICT as a pedagogical tool.

4.4 How tutors use ICT to train SwVI to use it as a pedagogical tool.

This objective sought to explore how tutors use ICT to train student teachers with visual impairment in the Teachers Training Institute to use it as a pedagogical tool.

This aspect was very important because it is believed that student teachers teach the way they were taught and therefore knowledge and skills in ICT transmitted by tutors to pre-service teacher trainees with visual impairment on how to manipulate and operate ICT resources as well as supporting them during teaching is paramount.

The sub themes that emerged were; ICT wass used before and during the teaching learning process, recording and storing information as presented below:-

ICT is used for researching and group discussions

Participants were asked to describe various ways in which ICT was used during the Training of pre-service teacher trainees with visual impairment in the Teachers Training Institute and

participants stated that they use ICT for research, discussing in groups and presenting findings to the class.

Participant (TR3) said: -

Mmm… I do tell them to research some topics from a particular subject so that they read and enrich their knowledge which they use in their content delivery during teaching. Even after the course they will continue downloading relevant notes or information on a specific subject content for teaching.

Participant (SwVI 2) said: -

Well, we are also given group work to research, discuss and present findings before others using a projector. I use my smart phone to search for information and I liked using a projector since it was my first time.

Similar to the above was a response from participant (SwVI 6) who said: -

Aaahh… sometimes we are given group work to discuss in groups and later the tutor tells each group to present their work using a projector to the whole class. Some of us with visual impairment do well but others may not and this is where he/she comes in to help them learn how to use a computer and a projector.

Participant (SwVI 12) said: - "*Aahh… some tutors give us group work to research on and discuss but later they tell us to present the work using a machine called a projector in front of the class*".

ICT is used for presenting work to the class

Participant (TR 1) said: -

I sometimes give all students tasks and I demand them to present using a projector. Some of the student teachers with visual impairment do well but others may not and this is where I come in to help them learn how to use a computer and a projector.

From the data above, it is clear that there is an attempt by some tutors to use ICT to support pre-service students with visual impairment carry out their learning and solve given tasks while in the course. This effort needed to be scaled up by all tutors to encourage pre-service students

with visual impairment to develop ICT skills so as to solve future challenges as professional teachers in the world of work.

These findings above are in line with the study by Mathevula and Uwizeyimana (2014) who recognized that ICT has benefits in teaching including enabling students to share learning resources, promoting collaborative learning as well as autonomous search for information by pre-service students with visual impairment for learning purposes.

Also Pacheco et al., (2017) adds that SwVI (especially low vision) can use PowerPoint projection, handheld electronic magnifiers, CCTV to access textual materials especially books; audio recorders to acquire notes; zoom text software to govern text fonts on the computer as per their needs which increase their reading pace; searching, retrieving and accessing the larger amount of data from different sources in a very dynamic and timely manner. On the side of teachers/tutors, they observe that ICT enriches teaching in an exceedingly way that they use it for downloading notes and providing access to learning materials online in addition as using PowerPoint presentations in enlarged formats to boost the teaching of SwVI.

ICT is integrated in subject lessons

When participants were asked on how they use ICT in the institute, participants stated that they used to integrate it in other lessons during the teaching and learning process.

Participant (TR 2) said: -

> I integrate ICT in my subject lessons like when am teaching about reproductive physiology in animals, I can have audio visual illustration of animals mating as the students who are blind listen to the background sound and many other topics in science.

Participant (SwVI 8) said: -

Ok, like some tutors integrate ICT in their lessons when teaching us some topics in a certain subject like science and this inspires me to be like that tutor only that am limited by some factors like computer knowledge and skills of doing that.

Another participant (SwVI 10) had this to say: -

Mmm… I attended a lesson where ICT was integrated in the teaching of science topic and it was so interesting that I wish I had sight I would have seen exactly how animals behave during mating. So to me I thought the tutor was using ICT in teaching us

From the above data, it is evident that some tutors were able to integrate ICT in their lessons while teaching students. This was a great effort done, however, if all tutors could integrate ICT in all their lessons there would be an increased exposure of pre-service students with visual impairment to the use of ICT as a pedagogical tool which they have to emulate and use after the training.

This ICT integration may help pre-service students with visual impairment to enrich and merge similar content across some subject areas to avoid duplication thus holistic teaching and learning.

The data however also indicates that some tutors do not integrate ICT in their subjects and this limited integration of ICT in the teaching of other subjects may be linked to un installed soft wares for both tutors and pre-service students with visual impairment and/or inadequate knowledge and skills by the tutors in the use of adapted ICT for pre-service teacher trainees with visual impairment. However, there is need for tutors to use ICT like the projector in all their lessons because it enlarges the small words/diagrams presented on the chalk board thus catering for students with low vision as tactile diagrams would help students who are blind.

The above finding is similar to Tedla, (2012) who points out that teachers use ICT to train content in their respective subjects and present it to students in an accessible format making it

easy for them to understand; makes a classroom a playfield where both students and teachers can interact, communicate and collaborate during the time of instruction.

However, in line with integration of ICT with other subjects, participants also stated that there are some subjects where ICT is difficult to integrate. Participants were asked to identify the challenging subjects to integrate ICT during their Training in the college. From the interview, participants said it was mathematics.

One of the participants (SwVI 8) had this to say: - "*Now me who a visually impaired one the most difficult subject is mathematics but the rest it's very simple to use ICT*".

Similarly to that, participant (SwVI 10) said: - "*I see it in mathematics and science*".

Participant (TR 1) said: -

> The subjects that is quite hard to integrate ICT, (yes) I may take Kiswahili, there is also mathematics, majorly those two. (PE can be integrated?), yeah… aerobics they use this system and people enjoy…. hahahah…

Whereas Mathematics and Sciences have proved to be challenging for the ordinary students, they are seen to be more complex to pre-service students with visual impairment. Also whereas ICT is thought to reduce the challenges faced by pre-service teacher trainees with visual impairment in accessing useful information for their learning, it has not been reasonably used to eliminate those barriers in mathematics and science. This may be because Sciences and Mathematics have got complex diagrams, formulas, equations and other illustrations which seem to be very taxing to access/or understand using the ICT resources.

The above findings are consistent with a study by Cryer et al., (2013) whose observations were that several Science Technology Engineering and arithmetic (STEM) subjects heavily depend upon visual resources like graphs, diagrams and charts which are distant to partially sighted

students. They elaborate that it is difficult to provide accessible resources to those symbolic subjects than other literary-based subjects. Cryer et al, (2013) further argues that accessing aspects like equations via audio format, for instance, is challenging because by nature, it's linear. Similarly, Rule et al., (2011) asserted that whereas STEM fields are important in today's world, they are disadvantaged by students with disabilities and SwVI inclusive.

They argue that although SwVI are cognitively able like their sighted peers, they face challenges as STEM subjects are often taught using visual pictures. This implies that whereas ICT is extremely essential in teaching, it is yet to significantly break the barriers in these science areas.

ICT is used for recording and storing information

When participants were asked how ICT is used in the Teachers Training Institute, participants stated that they used it for recording and storing useful data like students continuous assessment.

Participant (TR 2) said: - "*Aaah…we use ICT for recording and storing students' continuous assessment for future use*".

Participant (TR 3) said: - "*We use ICT to record students' continuous assessment, store relevant information which might be needed later on by Kyambogo University*".

Participant (SwVI 12) said: - "*I hear tutors use ICT to record students' assessment and store it before sending it to Kyambogo University*".

From the above study findings, it is evident that ICT is used by some tutors for assessing and storing students' assessment. This is a good practice as tutors will cultivate into pre-service students with visual impairment a practice of doing so when they complete the training as

teachers in the primary school they will teach. The storage of assessment records in soft copies helps in better record management for future use by the college which pre-service students with visual impairment ought to emulate it for practice in their teaching. This finding is in line with McKnight et al., (2016) who reported that students with visual impairment can be assessed, recorded and their work stored for future use by different stakeholders.

He further stated that teacher's digital recording of students assessment is necessary as opposed to filing work which can get misplaced.

ICT is used for communication in large classes

Participants said tutors use ICT for communicating to students in a large class during the lesson and in the assemblies. They said they use speakers and microphones to amplify sound so that they are heard by all students. One participant (SwVI 12) said:

> Mmm… one, they make use of the ICT through communication to students more so when making them aware of the available programmes in the college, they also use ICT to carry out research, the tutors also use ICT to promote long distance learning like when we were in COVID/lockdown tutors always gave students work using the social media platforms mainly what Sapp

Another participant (SwVI 4) said: -"*They can use them for typing exams, for communicating to us in class, assemblies… that's all*".

The information presented above indicates that some tutors made use of the available ICT resources for communication in teaching a large class and during assemblies. This is consistent with Tedla, (2012) who points out that teachers use ICT to train and present content to students in an accessible format making it easy for them to understand to understand what is being taught. This makes a classroom a playfield where both students and teachers can interact and collaborate during the time of instruction and keeps students interests and motivations intact

and or high within the process of teaching. Use of ICT for communication also makes teachers spend less time and increases the extent of participation by students with visual impairment.

Related to the above is a study by Eligi and Mwantimwa (2017) whose report showed that students with visual impairment made use of different ICT resources in varied ways. For example, computers are used for multiple functions such as writing notes during teaching sessions, reading audiobooks and notes, listening to and other contents accessible in portable document format (pdf) and hypertext mathematics language (HTML). Others use alternatives to visual displays such as screen readers like JAWS and NVDA and window's eye programmes to access audio information; note-takers and tape recorders for recording and listening to notes while the internet is considered by students with visual impairment as a vital resource due to its multifunction platform to access to online learning resources/materials in alternative formats that support their instruction.

The study findings above and the related literature presented, shows that the tutors made use of the available ICT in the college for communication during the lessons in large classes. However, this was done majorly during college assemblies and little in class lesson teaching which was highly needed to improve on the skills of pre-service students with visual impairment in the use of ICT as a pedagogical tool.

4.5 Perceptions of tutors towards using ICT to train SwVI to use it as a pedagogical tool

This objective was intended to find out perceptions of tutors towards the use of ICT to train pre-service students with visual impairment to use it as a pedagogical tool in the PTC. Inadequate knowledge and skills in ICT by tutors, lack of soft wares in the available ICT resources, negative attitude from some pre-service students with visual impairment and power shortages in the college were among the major issues that evolved.

Inadequate knowledge and skills in ICT

The tutors stated that they did not have any formal ICT training.

One participant (TR 1) said:

> Yeah… we got some we got some dose when i was for my masters in Kyambogo where we were introduced to some of these devices although we didn't have enough time to interact with them.

Also another participant (TR 2) had this to say: -"*No training gained on ICT for SwVI"*.

Similar to the above participant (TR 3) reiterated like: -

> Not really, I find it hard to teach them, I also lack the skill of handling students with special needs, I gamble in teaching SwVI using the ICT.

When tutors lack knowledge and skills in ICT it becomes difficult for them to integrate their subjects with ICT during their teaching to pre-service students with visual impairment thus the students with visual impairment may not gain ICT skills as a pedagogical tool. The participant's narratives show that there is a greater need for training of tutors in specialized adapted ICT for persons with visual impairment. This would help them to gain ICT knowledge and skills required to train pre-service students with visual impairment at the institute.

From the data above, it indicates that tutors had some little knowledge on ICT generally but not specific to adapting the latest technology in ICT for persons with visual impairment. It also shows that due to limited knowledge on adapted ICT from tutors, pre-service teacher trainees with visual impairment may not be helped to learn using the available ICT in the institute during their training .

According to the HAAT model, the human element consists of physical, cognitive, and emotional components that are concerned with learning new information and skills in order to

make better use of the assistive technology, in this example, ICT. The study's findings run counter to the model, necessitating more tutor training and ongoing professional development on ICT integration in teaching and learning, especially for pre-service teachers who are blind or visually impaired.

The study's findings concur with those of Eady and Lockyer (2013), who contend that teacher's expertise and role in the design and delivery of learning experiences are crucial. Furthermore, they contend that simply making ICT available in schools or Institutes does not guarantee that tutors would utilize it or that it will be used effectively. This argument is valid since tutors need to have some knowledge and expertise in ICT resources adaptation in order to use them in the teaching process. A college's ICT resources should be accessible and compatible with the tutor's pedagogical engagement skills.

Similarly, Msila (2015), points out that teacher inadequacy in application of ICT during teaching was common whereas without proper training, any attempt to utilize ICT in teaching can embarrass and expose their inadequacies in the classroom before students. Msila further elaborates that ICT competence is highly linked to training including continuous professional development and attitudes, as pertinent ingredients towards the success of its instruction, application and thus concludes that any innovation in education including ICT needs skilled teachers.

Also Mathevula and Uwizeyimana (2014), found that the majority of instructors/tutors did not have professional qualifications in ICT and those who had training, had basic or general training.

This had an impact on their abilities and confidence to use ICT in the instructional process of all students including students with visual impairment. They further observe that ICT requires

the emergence of new skills, attitudes and pedagogical approaches through continuous training programmes to build adequate capacity among teachers. This study identifies the following as important skills and abilities in ICT: managing files and databases; sending and receiving emails; communicating using digital tools; organizing tools to connect their classrooms; and presenting information using projectors, videos and podcasts.

Additionally, computer technology skills as part of the additional curriculum for students with visual impairment are emphasized as a means of providing access to the curriculum during teaching (Douglas et al., 2011). This however, has to correspond with tutors' training needs so that they can teach access skills to pre-service teacher trainees with visual impairment in ICT devices to optimize their access to print materials and this is taken as a long-term strategy of enabling them to have access to curriculum activities during teaching.

Also the study findings above relates well with a study conducted by Odeke (2021) which pointed out that tutors training in ICT can only be done if they are still not proficient in using the available ICT resources at their disposal.

Similarly, Zhou et al., (2011) in their study indicated that the majority of the teachers (74%) reported having a significantly lower level of information and skills than they should have in ICT, indicating dismal knowledge and skills to use ICT as AT for pedagogical purposes.

They further observe that the teachers were also less confident to use ICT in teaching students with visual impairment in their classes. This had a bearing on their teaching and thus needed the training to meet the need of teaching students with visual impairment.

Equally, a study by Shikden (2015) shows that only 0.07% of the teachers were experts in using ICT resources (devices) while a higher number of teachers either had no experience or were at the level of a beginner or novice in using ICT as an AT to teach students with visual

impairment. This means that most of the tutors were not proficient in teaching students with visual impairment using ICT resources.

Although the study findings relates well with the literature reviewed, based on the HAAT model it is still necessary that the tutors acquire knowledge and skills in the use of ICT so that they can in turn help to train pre-service students with visual impairment to use it as a pedagogical tool. This would be achieved by organizing continuous professional development for tutors at national and college level. This consequently affects their learning and later on their practice as teachers.

Lack of software for computer accessibility

The participants revealed that the computers had no soft wares like JAWS, DBT that would help them use the available ICT in the college. These already hold a barrier to pre-service students with visual impairment to use ICT for learning purposes as one of the participant (TR 2) said:

> I beg your pardon; uhhh… first of all the biggest challenge is the soft wares they use are very expensive other than piloting those soft wares accessing them is very difficult and you meeting the cost is a big problem

Participant (TR 1) said: -

> Uumh… the challenges I have encountered in using ICT as teaching students with visual impairment majorly their equipment tends to be so costly when it comes to using embossing machine eeh it requires soft wares like DBT which we try to ask and it's really having a lot of costs to be incurred to get it.

Participant (TR 3) also reiterated this: - "*Aahh…one of them is lack of special computers with soft wares for them to use because they cannot access computers without them and yet they are expensive to maintain*".

This was noticed during observation in the ICT laboratory; the researcher found no computer had the software which agrees with the participants responses. The study findings show that most ICT resources in the college do not have soft wares to enable pre-service students with visual impairment use ICT for pedagogical reasons.

These therefore require immediate redress by the college administration as provision of ICT without soft wares would be a dis service for pre-service students with visual impairment to use ICT as a pedagogical tool during their training .

This finding is contrary to the HAAT model which stipulates that the Assistive technology (ICT) must have both intrinsic and extrinsic enablers for the Human to do the Activity.

Similarly, Eligi and Mwantimwa (2017) say that students with visual impairment make use of different ICT soft wares resources in varied ways. For example, computers are used for multiple functions such as writing notes during teaching sessions, reading audiobooks and notes, listening to and other contents accessible in portable document format (pdf) and hypertext mathematics language (HTML).

Others use alternatives to visual displays such as screen readers like JAWS and NVDA and window's eye programmes to access audio information; note-takers and tape recorders for recording and listening to notes while the internet is considered by students with visual impairment as a vital resource due to its multifunction platform to access online learning resources/materials in alternative formats that support their instruction.

Negative attitude from some pre-service teacher trainees with visual impairment

When participants were asked the challenges faced in the use of ICT in the institute, some stated negative attitude from some pre-service students with visual impairment as quoted from participant (TR 2) who said: - "*Sometimes aahh… not necessarily with technology that SwVI can learn but positive change of their attitude towards technology would help them learn*".

Similarly another participant (TR 3) said: - "*Aahh…one is that some students may be negative because they are sharing computers another during the learning process which makes some idle*".

Negative attitude greatly affects the utilization of ICT at any institution of learning and if not improved, it may not benefit pre-service students with visual impairment to use ICT in their Training as teachers.

The HAAT model under the Human component emphasizes positive change of attitude in a person who is to interface with the ICT resource to do the activity effectively. Negative attitude as shown in the data may hinder pre-service students with visual impairment from learning how to use the ICT resources as a pedagogical tool.

The negative attitude in some pre-service students with visual impairment is also related to the study findings by Andoh, (2012) who illustrated that technology adoption and integration into the classroom are influenced by the instructors' views about technology. If teachers have a good attitude about using technology, they will be able to offer helpful insight into the adoption and integration of ICT into teaching and learning with ease.

Tokareva and Turner (2011) also highlighted barriers in using ICT as negative attitudes and limited ICT training. They emphasize that digital competence is one in all the key aptitudes within the new skills especially within the use of ICT equipment and digital content and tools in teaching for learning. Tokareva and Turner (2011) observe that the aim is to reinforce digital skills and literacy for improving accessibility by students with visual impairment. To ensure that teachers have the necessary expertise on the use of ICT for pedagogical purposes as a technique of addressing the particular requirements of students with visual impairment, they advise staff development and training in ICT.

In light of the aforementioned research findings and the relevant literature, pre-service students with visual impairment need to adopt a novel attitude towardss using ICT in order to expand their knowledge and skills, which will then be used as a pedagogical tool in their teaching. To minimize negative attitude however, the social and physical surroundings may need to be modified and reasonably accommodated.

Power shortages

The other emerging issue from the tutor's perceptions was intermittent power shortages where participants had expressed disappointments as presented below.

Participant (TR 1) said:

> Uumh… the other challenge I have encountered in using ICT as teach students with visual impairment is the intermittent power which causes some problems in case you have planned to use the projector and it's on and off …yet the time table is fixed.

Another participant (SwVI 10) said: - "*Aaahhh… there are sometimes challenges we face like when the lessons are being conducted then power goes off it demoralizes us a lot because it forces us to end learning abruptly.*"

From the above data, it is clear that some physical factors in the institution/ college like electricity shortages may lead to low morale in the use of ICT in the Training of pre-service students with visual impairment in that it disrupts the teaching learning process. To this end, the college needs to have an alternative power source to avert this challenge so that using of ICT to teach pre-service students with visual impairment does not only rely to one power source.

Based on the empirical study findings it is possible that hiccups like power shortages affect the use of ICT by pre-service students with visual impairment in their Training and this contradicts with the HAAT model. The context includes physical, social, cultural, and institutional contexts where electricity is fused in the physical set up of the institution.

This study finding partly relates with a study by Serero (2011) which revealed that there was a disparity within the Training of teachers of which those in rural special schools had received training in Braille apart from ICT while those in urban areas had some training in ICT use. The

study, therefore observes that utilizing ICT as a pedagogical tool has consequences on the side of teachers' training needs and physical set up of the institution.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusion and recommendations of the research study. Additionally, suggestions for further research in related areas are also presented. These presentations are aligned with the study objectives which were; to examine the nature of ICT resources available for training pre-service students with visual impairment in Teachers Training Institutes; to explore how tutors use available ICT to train pre-service students with visual impairment to use it as a pedagogical tool and to examine the perceptions of tutors in the use of ICT resources as a pedagogical tool.

5.2 Summary of study findings

On the nature of ICT resources available for training pre-service students with visual impairment in the Teachers Training Institute, different categories were seen as Hi-tech and Low-tech ICT resources. The Hi-tech ICT resources were more than the Low-tech ICT resources available and many of the Hi-tech ICT resources lacked software which made tutors and pre-service students with visual impairment to hardly use these Hi-tech ICT resources during their training.

Tutors used ICT resources while training pre-service students with visual impairment from the Teachers Training Institute in various ways like; researching and group discussions, presenting work to class, integrating ICT in subject lessons, recording and storing information and communicating to large classes.

The study findings also revealed tutors perceptions in the use of ICT for training pre-service students with visual impairment to use it as a pedagogical tool. These included; inadequate knowledge and skills in ICT, lack of software for computer accessibility by pre-service students with visual impairment, negative attitude from some pre-service teacher trainees with visual impairment on use of ICT and power shortages.

While these challenges leave a widening gap in the learning of ICT by pre-service students with visual impairment in PTC to use it as a pedagogical tool, this study also found out possible strategies to avert the situation such as installing soft wares to computers like JAWS, DBT, clear readers among others, training of tutors in ICT and having refresher courses on adapted ICT for students with visual impairment in particular, buying new computers, repairing some computers, having alternative power source, giving ICT more time in the time table and continuous guidance and counseling of some pre-service teacher trainees with visual impairment and some tutors to develop positive attitude towards using ICT for persons with visual impairment.

While a few participants thought all subjects can be integrated with ICT by pre-service students with visual impairment, this study also found out that some tutors find it challenging to integrate mathematics and partly science with ICT during their teaching. This automatically would not be possible for pre-service students with visual impairment to integrate ICT in those particular subjects.

From the above summary, this study acknowledges ICT as an important ingredient to teacher Training in Teachers Training Institutes regardless of ones' disability. Therefore, different stakeholders should play their roles to ensure that students with visual impairment are not left out in any way.

5.3 Conclusion

In view of these study findings, it is therefore concluded that;

1. Teachers' Training Institute have some available ICT resources in the ICT laboratories in the form of Hi-tech and Low-tech ICT resources. The Hi- tech ICT were more in number than the Low- tech ICT resources in the laboratory. The Hi-tech did not have the soft wares that enable pre-service students with visual impairment utilize ICT during their Training . The ICT resource room has got small space for storage of ICT resources and working of pre-service teacher trainees with visual impairment during their lessons. It was also noted that some pre-service students with visual impairment used their smart phones to help them during their Training in the PTC since the Hi-tech ICT were not accessible to them (lacked software).

2. The Teachers Training Institute tutors' use of ICT is at a lower level because it was mostly observed in research and group discussions, presenting work in class, integrating ICT in subject courses, recording and saving information, and interacting with large classes. This could have been as a result of insufficient ICT pedagogical knowledge and skills. Some of the pre-service students with visual impairment who had smart phones had the zeal to learn ICT using the soft wares they installed to access information while some pre-service students with visual impairment without smart phones became redundant only to communication and social media fun.

3. Tutors perceptions on the use of ICT resources to train pre-service students with visual impairment to use as a pedagogical tool were seen as recommendations.

4. While the use of ICT by pre-service students with visual impairment in Teachers' Training Institute is still gaining ground, it has to some extent improved on the

pedagogical knowledge of some pre-service students with visual impairment as they are seen with rich and resourceful information needed in the teaching profession.

5.4 Recommendations

The following suggestions are derived from both the study's strengths and weaknesses as being of the utmost importance, driven by the aims of the study;

1. Ministry of Education and Sports and other stakeholder involved in primary teachers' college should invest highly in ICT facilities by ensuring that they are well stocked with appropriate ICT resources, both high-tech and low-tech meant for supporting the teaching of pre-service students with visual impairment. This will not only ensure availability but also accessibility by pre-service students with visual impairment.

2. There is a need to accord tutors in primary teachers' Institutes opportunities for in-service training in ICT with specific reference to adapting and integrating ICT in teaching pre-service students with visual impairment. This will not only train tutors to have proficiency skills in ICT for training pre-service students with visual impairment but also as digital literates because many of them are digital migrants.

3. There is an urgent need for MoES to restructure curricula for teacher-training institutions and universities so that focus is not only on imparting general ICT skills in teacher trainees in their formative stages as teachers but training /teaching them to adapt and use ICT as a subject and/or a pedagogical tool in the teaching of all students but specifically those with visual impairment in primary teachers' college.

4. Teachers' Training Institute that have enrolled pre-service teacher trainees with visual impairment should establish collaboration with other institutions having pre-service teacher trainees with visual impairment either nationally or international with a view of enabling teachers to link up with their counterparts with the view of bench marking best

practices on how to use ICT resources and ideas on how to effectively integrate ICT in teaching to all subjects for the benefit of students with visual impairment.

5.5 Suggestions for further research

Evolving from the study findings and the recommendations herein, I therefore suggest that;

Another study should be carried out in the near future to explore on how ICT can be used in the teaching of mathematics and sciences to pre-service students with visual impairment in Teachers' Training Institute, given the fact that it was stated as one of the challenging subjects to integrate ICT.

Another study should be carried out to examine the stakeholders' role on the utilization of ICT in teaching and training pre-service students trainees with visual impairment in Teachers' Training Institute in Uganda.

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APPENDICES

Appendix i: Interview guide for tutors

I, **Elipu Stephen,** is a student of Kyambogo University, pursuing a Master's degree in Special Needs Education. I am conducting a research study entitled, **"Use of information and communication technology in training pre-service student teachers' with visual impairment in Bishop willis Teacher Training Institute, Uganda".** This research is carried out for academic purposes only. Your participation in this interview is highly appreciated.

1. Background information

What is your;

     i.   Gender …………………………………………..

    ii.   Subjects………………………………………….

   iii.   Classes taught ……………………………

   iv.   Teaching experience of SwVI………………..

2. **ICT resources available in Primary Teachers' College**

i. What ICT resources are available for use by SwVI in the college?

ii. Of the ICT resources are available, which ones are Hi-tech and Low- tech ICT resources?

iii. What is the condition of the ICT resources that are used for teaching SwVI in the college?

3. **Tutors' ability in using ICT resources to teach SwVI (Formal/informal training in using ICT for teaching)**

   i.   How often do you use ICT when teaching SwVI?

   ii.   What specific training in the use of adapted ICT devices for teaching SwVI have you gained?

  iii.   What ICT devices have you adapted for use in teaching SwVI?

  iv.   Which skills can you demonstrate in using adapted ICT devices during teaching?

   v.   Based on your experience, what challenges do you face in an attempt to utilize ICT as a teaching tool for SwVI in the college?

  vi.   What plans do you have to overcome these challenges mentioned above?

4. **How ICT is used as a pedagogical tool for instruction of SwVI in Teachers' Training Institute**

   i.   In which ways do ICT resources help you teach academic subjects to SwVI?

   ii.   Which subjects do you use ICT during your teaching and their learning?

  iii.   Which subject areas do you find difficult to utilize ICT to teach SwVI?

  iv.   Apart from the above, in which other ways do you use ICT resources to teach SwVI?

   v.   How do your SwVI make use of ICT during instruction/ teaching?

  vi.   What is the college planning towards the use of ICT as a teaching tool for SwVI?

THANK YOU FOR YOUR COOPERATION

Appendix ii: Interview guide for SwVI

I, **Elipu Stephen,** a student of Kyambogo University pursuing a Master's degree in Special Needs Education. I am conducting a research study entitled, **"Use of information and communication technology in training pre-service student teachers' with visual impairment in Bishop willis Teacher Training Institute, Uganda".** This research is carried out for academic purposes only. Your participation in this interview is highly appreciated.

The background information class, gender, and type of visual impairment i.e. low vision and blindness

Class……….. Gender……… Type of visual impairment (tick) | **LV** | | **B** |

2. **Available ICT resources for use by SwVI in the school.**

a. Identify the low-tech ICT resources made available for you to use during instruction

b. Specify the available High-tech ICT resources you have access to for instructional purposes?

c. In which condition are the ICT devices in your college?

3**. Tutors' ability in using ICT resources to teach SwVI (Formal/informal training in using ICT for teaching)**

a. How often do your tutors use adapted ICT devices during their teaching in this college?

b. What specific training in the use of adapted ICT devices have you gained?

c. Which adapted ICT devices do your tutors use during teaching and learning?

d. What skills have you learnt in the use of adapted ICT devices used by the tutors in teaching?

e. What challenges do you face in learning when tutors use ICT during teaching?

f. How do you think the above challenges can be overcome?

4. **How ICT is used as a pedagogical tool in training SwVI**

a. How do tutors make use of ICT resources to support their teaching and your learning in the college?

b. In which subjects do your tutors mostly use ICT during teaching and learning?

c. Which subjects do you find difficulties in using ICT during instruction?

d. In what ways do you make use of ICT for learning purposes?

e. Apart from the above, which other ways are ICT used for instruction purposes?

f. What do you think Institutes can do to improve on the use of ICT in teaching SwVI?

THANK YOU FOR YOUR COOPERATION

Appendix iii: Observation guide

Aspect to observe	Items expected	Available	Comment
ICT resources available in the TTI	ICT laboratory/ resource room		
	High- tech ICT resources		
	CCTVs		
	Digital recorders		
	Smart boards		
	Computers with screen readers		
	Computers with screen magnifiers		
	Projectors		
	Internet		
	Scanners		
	OCR soft wares		
	Photocopiers		
	Digital books/e- books		
	Braille embosser		
	DTB soft wares		
	Large monitors		
	Telescope		

	Others		
	Low- tech ICT resources		
	Talking watches		
	Electronic globe		
	Audio recorders		
	Talking calculators		
	Audio players		
	Table lamps		
	Electronic magnifiers		
	Others		

Write in the space below any other high and low tech resources available in the institute.

Appendix iv: Introductory Letter

KYAMBOGO UNIVERSITY

P. O. BOX 1, KAMPALA
FACULTY OF SPECIAL NEEDS & REHABILITATION
Tel: 0414-286237/285001/2 Fax: 0414-220464
DEPARTMENT OF SPECIAL NEEDS STUDIES

21st November 2022

To whom it may concern

Dear Sir/Madam,

SUBJECT: INTRODUCTORY LETTER FOR DATA COLLECTION

This is to introduce the bearer. ELIPU   STEPHEN

Reg. No: 20/u/GMSN/13089/WKD who is a bonafide student of Kyambogo University in the Department of Special Needs Studies. As partial fulfillment of the requirements for the award of a Master of Special Needs Education, she/he is required to undertake a research on the approved area of study.
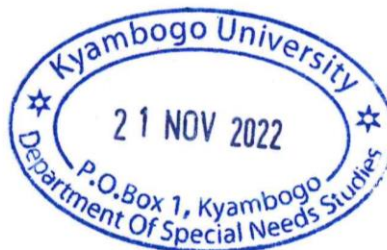
The purpose of this letter is to request you to allow him/her to collect data for his/her research study.

Kyambogo University will be grateful for any assistance rendered to the student.

Sincerely,

Dr. Okwaput Stackus

HEAD OF DEPARTMENT

Appendix v: Consent form

KYAMBOGO UNIVERSITY

FACULTY OF SPECIAL NEEDS AND REHABILITATION

DEPARTMENT OF SPECIAL NEEDS STUDIES

P.O BOX 1, KYAMBOGO

Tel 0414-286237/8/285584, 222935, Fax 0414-222961

Dear participant,

I am a student of Kyambogo university pursuing a master's degree in special needs education. I am carrying out research study on **''Use of information and communication technology in training pre-service student teachers' with visual impairment in Bishop willis Teacher Training Institute, Uganda''**. Its hoped that the findings of the study will help to enlighten the educators on how ICT as an innovation can be adapted to facilitate training of visually impaired teacher trainees and provide useful information to ministry of education and sports as well as other stakeholders for policy formulation, planning, developing and providing appropriate ICT research in Teachers' Training Institute in Uganda.

You have been identified as one of the participants who can inform the study through an interview. The interview will focus on research objectives. The interview is likely to last 20-25 minutes. The purpose of this letter is to request you to participate in the study. Whatever information you provide will be used for the purpose of the study and academics only and will be kept confidential. You will also be free to withdraw from the study incase you fill uncomfortable to proceed with the participation.

Thankyou very much for your support and cooperation in advance.

Your sincerely

ELIPU STEPHEN (0774554491)

Confirmation of acceptance

I have read and understood the purpose of the study and I hereby consent to participate.

Signature………………………………………… Date …………………………….

Appendix vi: Letter to the Participant

KYAMBOGO UNIVERSITY

FACULTY OF SPECIAL NEEDS AND REHABILITATION

DEPARTMENT OF SPECIAL NEEDS STUDIES

P.O BOX 1, KYAMBOGO

Tel 0414-286237/8/285584, 222935, Fax 0414-222961

Dear participant,

Re: Request to participate in the research study

I write to you as per the reference above. I am a student of Kyambogo University pursuing a master's degree in special needs education tenable in the department of special needs studies.

Currently, i am conducting a study entitled **''Use of information and communication technology in training pre-service student teachers' with visual impairment in Bishop willis Teacher Training Institute, Uganda''** and your college has been identified as an entity for data collection. The purpose of this letter is therefore to humbly request you to be a participant in this study. The information you will provide is strictly for academic purposes only and as such will be treated confidential. You are free to withdraw if you feel uncomfortable to proceed with the participation.

I will be very grateful if you positively consider my request. I thank you.

Yours sincerely

ELIPU STEPHEN

elipustephen@gmail.com/ 0774554491

Appendix vii: Letter to the College Administration

KYAMBOGO UNIVERSITY

FACULTY OF SPECIAL NEEDS AND REHABILITATION

DEPARTMENT OF SPECIAL NEEDS STUDIES

P.O BOX 1, KYAMBOGO

Tel 0414-286237/8/285584, 222935, Fax 0414-222961

The principal

Bishop Willis Core PTC

Dear sir/madam,

RE: REQUEST TO CARRY OUT DATA COLLECTION FROM YOUR COLLEGE

I hereby submit my request to your office as indicated in the reference above. I am a student of Kyambogo university pursing a master's degree in special needs education tenable in the department of special needs studies. Currently, I am conducting a study on **''Use of information and communication technology in training pre-service student teachers' with visual impairment in Bishop willis Teacher Training Institute, Uganda''** and I have embarked on data collection exercise as a requirement for the award of that degree. My study is targeting Primary Teachers' Institutes in Bishop Willis Teachers' Traininig Institute Uganda and in particular some tutors and students with visual impairment. This college has been chosen because it has a unit for pre-service teacher trainees with visual impairment. Thus, your institution is expected to have relevant information to answer the research questions for the study.

My study is purely qualitative and I am using interviews to collect data but I also request to be allowed to observe the ICT resource room where students with visual impairment learn from. The purpose of this letter therefore is to request your office to grant me permission to get information for my study.

I will be a grateful if my request meets your kind consideration. Attached are copies of my university identity card, introductory letter and admission letter from Kyambogo university. Thank you.

Yours sincerely

ELIPU STEPHEN   (elipustephen@gmail.com/ 0774554491)

Appendix viii: RESEARCH WORK PLAN

ACADEMIC YEAR	DATE AND MONTH RANGE	ACTIVITIES	STAGES
2021/2022	1St June - 30Th June, 2022	Concept writing and Presentations in graduate seminars	1
	1St July – 1St October, 2022	Research Proposal writing	2
	29Th Oct – 10Th Nov, 2022	Research proposal presentations	3
	10th Nov – 20th Nov, 2022	Incorporation of corrections, tools Training and submission	4
	21th Nov – 25th Nov, 2022	Obtaining research clearance from the University for data collection	5
	26th Nov –31st Dec, 2022	Piloting of the research tools and data collection	6
	1st Jan – 28th Feb, 2023	Data analysis interpretation and discussion	7
	1st March – 31st May, 2023	Research report writing and submission of the report	8

Appendix ix: PROPOSED BUDGET ESTIMATES FOR RESEARCH

S/N	ITEM	SPECIFICATION	QTY	UNIT COST	COST PRICE
1	Transport (Pilot study)	Public means by bus (to and from)	One route	Ush 80,000	Ush 160,000
3	Accommodation	Modest	3 nights	Ush 50,000	Ush 150,000
2	Transport (Main study)	Public means	One route	Ush 30,000	Ush 60, 000
3	Accommodation	Modest	2 nights	Ush 50,000	Ush 100,000
4	Meals		5days*2= 10meals	Ush 15,000	Ush 150,000
5	Lap top	Apple i5core	1	Ush 6,000,000	Ush 6,000,000
6	Typing, printing and photocopying	Stationery	1,500 papers	Ush 1,000	Ush 1,500,000
7	Recorders	Hi-tech recorders	1	Ush 750,000	Ush 750,000
8	Cells				Ush 50,000
9	Speakers	1 Pair			Ush 100,000
10	Camera	1 pc			Ush 2,000,000
11	SD card	1 pc		30,000	Ush 30,000
12	Memory card	1 Pair		30,000	Ush 60,000
13	Report presentation and publishing		1	Ush 1,000,000	Ush 1,000,000
14	Miscellaneous				Ushs 2,00,000
	GRAND TOTAL				**UGX 12,260,000 or 2,919.1 Euros**

Appendix x: A MAP OF UGANDA SHOWING AREA OF STUDY

KEY

IGANGA DISTRICT