VIRTUAL LEARNING FOR PERSONS WITH VISUAL IMPAIRMENT: AN EXPLORATION OF LEARNING PLATFORM IN A HOME ENVIRONMENT FROM UTH SPECIAL SCHOOL IN LUSAKA, ZAMBIA

BY

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DECLARATION

I, *Esnart Mwanza,* hereby declare that this piece of work is as a result of my own independent investigation and that the information used is of my own work and that it has never been presented at any other university, and all other sources of information used have been duly acknowledged in the text.

Signature……..… Date……

CERTIFICATE OF APPROVAL

This dissertation of *Esnart Mwanza* is approved as fulfilling part of the requirements for the award of Master's Degree in Special Education of the University of Zambia.

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Examiner	Signature	Date
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Supervisor	Signature	Date

DEDICATION

This dissertation is dedicated to my family, my husband and children. They are the best people in my life, always encouraging me when things were tough. I thank them for their support and faith in me.

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ABSTRACT

The purpose of this study was to explore the accessibility of virtual learning platforms for person with visual impairment in a home environment. The study was purely qualitative in nature and took the form of a case study and interview guide and Focus Group Discussion were used to generate data. Purposive sampling was used to sample fifteen participants who took part in the study, who comprised of one head teacher, seven parents and seven learners with visual impairment. The responses from semi-structured interviews and Focus Group Discussion were analyzed qualitatively using thematic analysis.

Emergent from this study were a host of findings among which included: availability of computers and smart phone with screen readers and installed WhatsApp, Zoom, Google Meet/ Classroom or Email used to access virtual learning. In addition, radio and television were used by learners. Further, it was revealed that a child with visual impairment require computers with JAWS, smart phones with speech reader and readily available internet facility, some radios and TVs to access and benefit from the virtual learning environment at home. The study found accessibility of virtual learning in a home environment depended on internet connectivity and having rightful gadgets which were user-friendly to individual with visual impairment as well as low socio-economic background as it determined the purchasing power. Furthermore, challenges faced included: children lack of computers and phones with bundles to go online, poor internet connectivity and unconducive home environment. Equally, it was revealed that parents needed social-support and financial support from well-wishers and government to support them with ICT gadgets specifically designed for children with visual impairment. Besides, they needed internet services and with ITC gadgets instilled with speech readers or JAWS. Thus, the study suggested that teacher could start using video and audio-conferencing teaching, open up virtual resources Centre for learners to log-on and chat or download work, to strength the collaboration between teacher and parents and lowering prices on ICT equipment for the visually impaired. It is recommended that an awareness raising campaign on parents to know the available user-friendly ICTs and assistive technology facilities for the visually impaired children to access virtual learning at home. Parent should shoulder their responsibilities of providing appropriate state-of-the-art ICT-based facilities like computer, smart phones and access to internet connectivity to enable the children with visual impairment access and use virtual learning at home.

Keywords: *Virtual Learning, Platforms, Visual Impairment, Home Environment.*

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ACRONYMS AND ABBREVIATIONS

ANTA	National Training Authority
CCTV	Closed Circuit Television
DAISY	Digitally Accessible Information System
DEBS	District Education Board Secretary
DGBL	Digital Game-Based Learning
DTT	Digital Talking Textbooks
FGD	Focus Group Discussion
ICT	Information and Communications Technology
JAWS	Job Access With Speech
LAN	local area network
LMS	Learning Management System
MEDA-ETE	Euro-Mediterranean Partnership Education and Training for Employment
MOOC	Massive Open Online Courses
PST	Psychomotor Skills Trainers
TV `	Television
UTAUT	Unified Theory of Acceptance and Use of Technology
VPS	Virtual Patient Simulations
VRE	Virtual Reality Environments
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

1.1 Overview

Zambia, like most countries in the world, ordered all schools to close to try and stop the spread of COVID-19. Many schools also asked parents to ensure that learning continues at home. Virtual learning is an obvious way to keep lessons going; however, only a few schools have well-established virtual learning systems. This calls for the study to analyze the accessibility of learning platform in a home environment for person with visual impairment. In addressing this study this chapter will highlight the background of the study, statement of the problem, purpose of the study, objectives as well as the research questions. Then, the significance, delimitation, limitations of the study, definitions of terms and the summary of the chapter.

1.2 Background

Home environment learning constitutes a method suitable for people with disabilities and, more particularly, for people with a visual impairment, as it can contribute to their easier accessing learning whilst in the home environment. The home environment means the family background of the child, which includes all the human and material resources present in the home, that affect child's living such as the parent's level of education, occupation, social-economic status and the socializing facilities available in the house (Johnson-Jones, 2017). Thus, the home is the basic situation for providing the child's primary socialization and laying the educational foundation for the child upon which the other agents of socialization build. Therefore, philosophy underlying at-home learning is the creation and provision of alternative educational opportunities, as well as the open access to these opportunities for everyone so that the ideal of home learning may be fulfilled (Johnson-Jones, 2017).

It is a well-known fact that home is very connected and crucial to the child's well-being and development in later life. Home environment is the most powerful informal learning situation in which the families, especially parents, act as educators. Providing educational opportunities to everyone is linked directly with the opportunity to access education and, as a result, with the widening of the constraints and the potentials of home environment through the utilization of various methods and means. Such a widening though needs to take into account people with any kind of disability, and to investigate the ways in which these people can be involved in

home environment learning (Garrison, Schardt and Kochi, 2000). Besides, this type of education is already developed to such a level that with the utilization of virtual learning (Information and communication technologies) offers innovative applications as well as alternative learning opportunities for person with visual impairment. What is not fully established is how the learners with visually impairment access learning platform in a home environment.

The home learning context has been studied extensively, especially in the area of developmental psychology, and has been linked to the child's cognitive and social development (Bradley, 1994). In his study, Kapinga (2014) found that, home environmental factors (such as parents, educational level, parents, occupations, parents, income, learning environment within home, parental motivation, and availability of learning facilities at home like tables, books and maps) greatly affect the academic performance of the learner. Also, a study by Hill, (2014) revealed that, a child's home environment has significant effect on learning and school performance since it provides foundation for learning. Despite this facts, accessibility of virtual learning platforms for person with visual impairment in the home environment has largely been under-explored in the scholarly literature. It is imperative to conduct this study to fill the information gap mentioned above.

The history of virtual learning starts around early 1960s when the University of Illinois established a classroom system equipped with linked computer terminals. Students could access informational resources on a particular course while listening to the lectures. The 1970s and 1980s saw notable contributions in computer-based learning by researchers at the New Jersey Institute of Technology as well as developments at the University of Guelph in Canada (Salmon, 2013). In 1976, Bernard Luskin established Coastline Community College as a "college without walls" by using television station KOCE-TV as a medium of delivery. In the UK the Council for Educational Technology encouraged the employment of educational technology, thus, utilizing the National Development Program in (Computer Aided Learning) in the period (1973–1977), and the (Microelectronics Education Program) between (1980 and 1986). By the mid-1980s course materials became accessible via the libraries at many colleges. With the emergence of World Wide Web into the public domain in the 1990s, academics started using newly introduced technologies to employ multi-object-oriented sites (which are text-based online virtual reality systems) to create course websites along with simple sets of

instructions for their students. Improved Internet functionality and speed enabled new methods of communication involving multimedia, interactive material or webcams (Salmon, 2013).

The American National Centre for Education Statistics estimated the number of high school students registered on online learning courses increased by 65 percent from 2002 to 2005, due to the greater flexibility, ease of communication between teacher and student, and quick lecture and assignment feedback. Armstrong, Murray and Permvattana (2010) revealed that a study in 2008 was carried out by the U.S Department of Education estimates that during the (2006-2007) academic year about 66% of postsecondary schools offered some distance learning courses. The study also shows 77% of enrolment in courses with an online component. In 2008, the Council of Europe passed a statement endorsing e-learning's potential to drive equality and education improvements across the**.** In modern days, it is no longer sufficient to operate an education/training system under an 'Industrial Model' that simply teaches the 3 R's:- reading, writing and arithmetic. Learners today need to develop creative thinking, digital literacy, collaboration and teamwork skills, with the ability to evaluate and apply knowledge in the rapidly changing information-rich digital work and community environments (Armstrong, Murray and Permvattana, 2010).

Virtual learning, generally, adopts different principles and criteria to what is common to traditional education (Redmond, 2011). These differences stem from the fact that this new approach is based on digital computers and communication lines rather than on timely physical existence in a class. Educational institutions (schools, colleges, and universities) in Zambia are currently based only on traditional methods of learning, that is, they follow the traditional set up of face-to-face teaching in a classroom. Although many academic institutions have also started blended learning, still a lot of them are stuck with old procedures and the sudden outbreak of a deadly disease called Covid-19 caused by a Corona Virus (SARS-CoV-2) shook the entire world. The World Health Organization declared it as a pandemic. This situation challenged the education system across the world and forced educators to shift to a virtual mode of teaching overnight. Many academic institutions that were earlier reluctant to change their traditional pedagogical approach had no option but to shift to the virtual teaching and learning (Affouneh, Salha and Khlaif, 2020).

For example, Ayebi-Arthur (2017) conducted a case study of a college in New Zealand which was badly affected by seismic activities. In her study, she found that the college became more resilient to virtual learning after that disastrous event. Technology helped them overcome the

barriers in those difficult times. But they suggest that robust IT Infrastructure is a prerequisite for virtual learning. Infrastructure needs to be so strong that it can provide unhindered services during and after the crisis. The central premise of this research is that learners with visual impairment are not effective participants in virtual learning due to challenges interacting with learning tools. Approximately 45 million people around the world lack the functional vision to read from a computer screen. These individuals interact with the Web by listening to screen-reader software or using screen-magnifying software. Web-based systems, including course management systems, lack the accessibility and usability needed for such speech-based interaction. A lack of accessibility and usability is undesirable for all, and it creates additional challenges for learners with visual impairment in performing virtual tasks (Kalpana and Hema, 2012). This has a negative impact on their learning outcomes in virtual learning, where interaction with course management systems is necessary to accomplish coursework.

Affouneh, Salha, and Khlaif (2020) posits that as per the World Economic Forum, the Covid-19 pandemic also had changed the way how several people receive and impart education. To find new solutions for our problems, we might bring in some much-needed innovations and change. Teachers have become habitual to traditional methods of teaching in the form of face-to-face lectures, and therefore, they hesitate in accepting any change. But amidst this crisis, we have no other alternative left other than adapting to the dynamic situation and accepting the change. It will be beneficial for the education sector and could bring a lot of surprising innovations. We cannot ignore and forget the students who do not have access to all virtual technology like those with visual impairment (Affouneh, Salha, and Khlaif, 2020).

Learners with visual impairment are among the most vulnerable, facing multiple forms of exclusion linked to education, health, gender equity, and social inclusion (Jacko, 2011). The schooling and learning deficit experienced by learners with visual impairment can become the most challenging impediment to earning an income as adults. Learners with visual impairment are less likely to attend school, more likely to be out of school, less likely to complete primary school, and, therefore, less likely to possess basic literacy skills. The COVID-19 pandemic magnified the systemic inequalities that exist in the inclusion and protection of learners with visual impairment in accessibility of various learning platform in the home environment.

Therefore, during the COVID-19 pandemic, many countries relied on technology to mitigate learning loss. In many low-income countries, the virtual learning approach has been supported by the use of radio and broadcast media and virtual digital learning portals. However, the digital

divide between learners related to access to equipment, electricity, the internet, and teacher ability is further exacerbating the learning divide in every country, especially for learners with visual impairment who have the additional barrier of inaccessible learning content. It is estimated that exclusion from education has compounded during the COVID-19 pandemic, causing 40 percent of disadvantaged learners in low- and lower- middle-income countries to be left entirely unsupported in their education. Lack of accessibility in the design of virtual learning programs continues to hinder students with vision impairment (Shepherd, 2016). Virtual learning materials are predominantly vision-centric, incorporating images, animation, and interactive media, and as a result, students with vision impairment do not have equal opportunity to gain tertiary qualifications or skills relevant to the marketplace and their disability. If that is the case, there is the need of a study like his one to unearth the accessibility of virtual learning platforms for persons with visual impairment in the home environment (Knarlag and Olaussen, 2016).

Shepherd (2016) argued that learners with visual impairment are at a higher risk of exclusion in these circumstances. For example, many virtual learning options are not accessible to blind and deaf learners. Children with visual impairment may need additional support, depending on their disability for example, simplified messages and sign language support to understand health and safety measures. In some instances, parents and families are not able to support their children in using sign language or Braille texts. As education systems respond to COVID-19 pandemic, the global education community must ensure that children with disabilities are included. This is not only the right thing to do, it is the smart thing to do. Evidence from other countries shows that the returns on investing in education for persons with disabilities are two to three times higher than that of persons without disabilities (Kotsopoulou, 2011). Building education systems back better will require disability inclusion to be considered from the design and planning stages to ensure that delivery and recovery efforts are inclusive of all and are sufficiently differentiated to meet the specific needs of learners with visual impairment.

The Zambian government took an immediate action to ensure educational services are delivered during the COVID-19 crisis. However, it is often difficult for governments to know what programs are effective because there is a dearth of rigorous research that assesses the extent to which students are accessing the various types of alternative learning services. The impact of the various learning platforms on outcomes has also not been fully explored for all learners. Understanding whether and how the platforms work from children's own assessment

and the virtual or at-home learning experience is also needed. Accordingly, there may be even less awareness of how these learning platforms address the needs of students with visual impairment.

Therefore, in response to COVID-19, the focus of learning has automatically shifted to parents and families to support home-based learning for their children. Notwithstanding the role of the teachers in guiding the content of the learning, it is still predominantly parents and caregivers who need to support younger children to complete tasks, whatever the mode of transmission: radio, television, digital learning platforms, or printed materials. Designing effective virtual learning programs requires planning and targeted professional development. Teachers who did not expect to teach virtually were caught understandably unprepared in the final leg of the school year. Some schools have the support systems in place that will make the transition easier, while many others have students who do not have reliable internet access (Ruchi, Armstrong and Murray, 2013).

An understanding of the needs of learners with visual impairment is an essential component when designing an effective and accessible virtual learning environment. However, there are a number of overlapping areas which also need to be investigated and incorporated into a model in order to generate a more holistic approach for persons with visual impairment in accessing virtual learning in home environment. Consequently, very scant research investigates the virtual learning experiences of visual impairment users in home environment. This creates a gap in the literature about a clear understanding of the problem from the perspective of visual impairment users. Without an understanding of the nature of the problems visual impairment users face in interacting with virtual learning tools, we cannot create an accessible and usable environment where visual impairment users can enjoy equal learning opportunities in a home environment (Pogrund, 2018). This study attempts to fill this gap in research, especially in the Zambian context.

Accessibility of learning platform for learners with visual impairment in a home environment especially during lockdown for Covid-19 leaves much worries on how learners with visual impairment were catered for by not leaving anyone behind. When visually impaired students enter in inclusive education, they have peers who help them in their daily educational and social activities. To some extent peers read scripts and take notes for them, as well as guide their physical movements. Abubakar (1990) opined that which a child receives from his or her parent is most likely to have a highly significant and dominant effect on his or her behaviour in his or

her later life invariably, what the child learns at home and how his family motivates him towards education contributes to the child's success or failure at school. The environment plays a very remarkable role in the life of every individual includes his education life. This close association removes the chances of discrimination by fellow students and other members of staff and as such, they won't be taken as second-class citizens (Romney and Celeste, 2015). No known research in Zambia has managed to determine clearly the learning platform used by students with visual impairment in the in a home environment. The study will look at valuable insights into learning platforms available and ways of improving the learning environment and opportunities for students with visual impairments in home learning environment.

1.3 Statement of the Problem

Globally, as initial rapid response solutions to COVID-19 were being identified, it was observed that children with disabilities were often overlooked in discussions, and where they were mentioned, more in-depth attention was lacking (World Bank, 2020). The COVID-19 pandemic swept the world more quickly than many expected, leaving education systems unprepared on how to implement virtual and at-home learning (Affouneh, Salha and Khlaif, 2020). Thurber and Bandy (2018) posits that home environment is as important as what goes on in the school. Lack of accessibility in the design of virtual learning courses continues to act as an obstacle in the learning way of students with visual impairment (Pogrund, 2018). Notwithstanding these alarming trends, the gendered dimensions of incapacitation towards persons with visual impairment has largely been under-explored in the scholarly literature. One of the most prominent problems is that virtual learning is not specifically designed for vision impaired students (Ruchi, Armstrong and Murray, 2013). Hence, the need for this study to explore the accessibility of virtual learning platform for the persons with visual impairment in a home environment in selected schools catering for learners with visual impairment.

1.4 Purpose of the Study

The purpose of the study was to explore the accessibility of virtual learning platforms for person with visual impairment in the home environment.

1.5 Objectives of the Study

The objectives of the study that guided the study are:

i. To describe forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment.
ii. To establish virtual learning needs of person with visual impairment in a home environment
iii. To explore the determinants of accessibility of virtual learning in a home environment.
iv. To explore the alternative interventions in use on virtual learning for person with visual impairment.

1.6 Research Questions

i. What forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment?
ii. What are the virtual learning needs of person with visual impairment in a home environment?
iii. What are the determinants of accessibility of virtual learning in a home environment?
iv. What are the alternative interventions in use on virtual learning for person with visual impairment?

1.7 Significance of the Study

The information that was gathered in this study might be vital to policy makers, stake holders, donors, service providers and administrators, civil society organizations and the general public in the provision of intervention strategies to address the plight of students with visual impairment conditions in their accessing to learning platform even when at home. The study may add new information and also opens new avenues for further research in the education of students with visual impairments in exploration of other learning avenues for person with visual impairment.

1.8 Delimitation

Delimitations indicate the boundary of the study in the context of content and geographical coverage (Creswell, 2014). The study was confined in a special school having learners with visual impairment. The institution was chosen by virtue of them being the only special school having enrolled learners with visual impairment in Lusaka district of Lusaka Province.

1.9 Limitations

Limitations of the study is described in Best and Kahn (2009) who stated that it includes conditions which were beyond the control of the researcher and may also place restrictions on the conclusion of a particular study. The observable limitation of this study was that it was not a general survey covering several schools like the entire Lusaka province. This was because the study was a case study premised on gaining deeper insights of the accessibility of virtual learning platforms for person with visual impairment in a home environment in Lusaka. This deprive the study of the benefits of breadth insights which could have only be obtained by conducting a large-scale survey. The results of the study are to be interpreted within the context of the study area and would in no way be taken as a reflection of what would be obtained in other areas. The extent to which the study could be generalised would also be compromised by the small size of the sample due to time and financial resources that could not allow, a larger sample would require more time and more financial resources.

The researcher also anticipated the participants would be skeptical about being interviewed for reasons best known to themselves. However, the researcher would do everything possible to ensure that the findings of the study remained valid. Notwithstanding the significance of the study mentioned above, this study's limitation was that some key informants may not have a good understanding of accessibility of virtual learning platforms for learners with visual impairment in a home environment. Qualitative research, like other research designs, has its limitations. Due to the usually small sample size in qualitative research, it was difficult to generalise the findings to a similar population (Creswell, 2014).

1.10 Theoretical framework

This study was inspired by theoretical insights from the unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh and others in "User acceptance of information technology: Toward a unified view". The UTAUT aims to explain user intentions to use an information system and subsequent usage behaviour. The theory holds that there are four key constructs: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions.

The first three are direct determinants of usage intention and behaviour, and the fourth is a direct determinant of user behaviour. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behaviour.

The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour (theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined theory of planned behaviour/technology acceptance model, model of personal computer uses, diffusion of innovations theory, and social cognitive theory).

1.11 Operational Definitions of Key Terms

Home environment refers to important social and physical contexts within which children develop. Home environment as the immediate social environment of the child.

Home refers to the institution the child enters that is to say that the home is a place where the child's earliest education and socialization begins. According to Nwachukwu and Agulaana (2002), the home is described as the primary and most important human institution fir the socialization of the child.

Virtual learning refers to learning that can functionally and effectively occur in the absence of traditional classroom environments (Simonson and Schlosser, 2006). A system that offers educators digitally- based solutions aimed at creating interactive, active learning environments.

Visual impairment Includes blindness, and is an impairment in vision that, even with correction adversely affects a child's education performance. This includes both partial sight and blindness

Learning platforms refers to an integrated set of interactive online services that provide teachers, learners, parents and others involved in education with information, tools and resources to support and enhance educational delivery and management.

Diffusion refers to a process that communicates an innovation through specific channels among the members of a social system.

1.12 Summary

This chapter presented the theoretical and contextual background of the study, statement of the problem, purpose and significance of the study, objectives of the study, research questions, and delimitation and limitations of the study, theoretical framework and operational terms used in the research. The literature suggests that home environment is as important as what goes on in

the school. This is because it ensures learning continuity during the time of school closures and it became a priority for governments the world over, many of which has to turn to virtual learning, requiring teachers to move to virtual delivery of lessons for learners to receive lessons in a home environment. But the study grounded to explore the accessibility of virtual learning platform of learners with visual impairment in a home environment in selected special schools and units catering for learners with visual impairment. The next chapter contains a review of related literature to support the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter comprises of an overview of relevant to the study on the accessibility of virtual learning platforms for person with visual impairment in the home environment. It will also give forms of teaching and learning of virtual learning being utilised in a home environment; virtual learning needs of person with visual impairment in a home environment; the determinants of accessibility if virtual learning in a home environment; and lastly this chapter will bring out alternative intervention that can be instituted to improve on virtual learning for person with visual impairment.

2.2 Forms of teaching and learning of virtual learning utilised in a home environment

Everyday Technologies for Children with Special Needs is a collaborative initiative aiming to increase the possibilities of children with special needs to make choices and influence their environments in everyday life by developing individualised technical environments and tools for children and their families (Yuping, 2011). Pauline Chitra and Antoney Raj (2018) reported that learning management system (LMSs) are commonly used because, in addition to the function of course delivery, they also provide tools for managing students and communications between students, teachers and tutors. Virtual Learning includes, but is not limited to, offline and online computer-based eLearning, Digital Game-Based Learning (DGBL), Massive Open Online Courses (MOOCs), Virtual Reality Environments (VRE), Virtual Patient Simulations (VPS), Psychomotor Skills Trainers (PST) and m-Learning. Each of these types of eLearning has its own specificities, and related advantages, limitations and challenges. (Pauline Chitra and Antoney Raj, 2018). This implies that the frequency of accessing virtual learning facilities depends on the availability and the functionality of such facilities when it comes to supporting learning for the students with such special needs. There is also need to find out on the forms of teaching and learning of virtual learning being utilized in a home environment. Therefore, the research sought to address the gaps identified in this literature.

In Belgium, European Agency for Development in Special Needs Education, (2011) revealed that a Bednet was developed, the ‘Bednet system’, is a dedicated environment with an intuitive interface that mirrors the learner’s classroom situation on a laptop desktop at home. It facilitates

the use of virtual learning resources, video conferencing tools and remote access by the teacher and learner to scanners and printers at the school and the learner's site for the exchange of documents, assignments and exercises. The Bednet system makes it possible to act as in a normal class situation: anything that can be done in the classroom is also possible for the learner at home. The service wants to avoid or at least reduce educational delay caused by the illness and to re-establish / maintain social contact of ill learners with the 'outside world', in particular their schoolmates and teacher(s) by means of ICT. The system is easily accessible and user friendly. All the functionalities that are necessary for the teaching/learning process and communication between actors are included in the system. Through the webcam the learner has visual contact with the teacher and classmates. The child can take snapshots of the school's blackboard with the digital camera. The printer and scanner are used to exchange documents (notes, exercises, illustrations, etc.) The system can be used during classes but also outside classes to interact with teacher and peers, enabling social contact and collaboration that replaces physical interactions (European Agency for Development in Special Needs Education, 2011).

In Portugal, a national network of 25 ICT Resource Centres for Special Needs was developed. The main task of the Centres is to recommend assistive technology for pupils, including: tactile screens, hearing-microphone sets, switches, adapted mouse/joysticks, lenses, talkers/communicators, special keyboards (Intellikeys), Braillers, Braille printers, embossers, pointers, OCR, robots, projectors, scanners (audio readers), didactic embossed materials, adapted toys, AAC software, authoring software, screen readers, speech synthesisers, virtual keyboards, sign language resources, cause-effect software, amplifiers, didactic resources. By using a virtual community, using the Moodle platform of the central department connects the teams working in the home environment. Through the virtual platform frequent messages and resources are exchanged and various activities worked upon, namely: repository of special needs resources; case studies; video casts; online training courses on augmentative communication. This initiative has made it possible for SEN teachers to exchange practice and resources through a virtual platform (European Agency for Development in Special Needs Education, 2011).

Armstrong, Murray and Permvattana (2010) posits that Web-enhanced instruction is a common practice for delivering academic programmes using course management systems. These individuals interact with the Web by listening to screen-reader software or using screen-

magnifying software, for example, they used commuting time to listen to DAISY (Digitally Accessible Information System) materials or MP3s, or to read with the aid of a magnifying glass; used their free time at work to read (with a screen reader or with screen magnifiers, or even with the help of low-vision aids), listen to the learning content, prepare for tests and written assignments, or reply to the forum; and used waiting time to read or listen with a laptop or even a mobile phone to the learning content and take notes on it. To date, little is known on the extent to which virtual learning is accessed and utilized to support learning among learners with visual impairment in a home environment (Armstrong, Murray and Permvattana, 2010).

Therefore, Home Access Programme is one of the forms of teaching and learning of virtual learning being utilised in a home environment and provide access to learning at home for all pupils via a computer connected to the Internet. In addition, assistive technology and specialist software to support learning for all, including special adaptive technology for those learners with particular needs as to be provided. In other studies, the tape recorder and computers are frequently accessed and used by most of the learners with visual impairment (Kalpana and Peese, 2012). However, this literature did not tell us about the forms of teaching and learning of virtual learning being utilized in a home environment.

Also, by using different software and programmes supporting recording and listening to audio-visual lecture notes, e-books and other contents accessible in PDF and HTML formats. Furthermore, they use of alternatives to the visual display such as screen readers like JAWs, NVDA and Windows Eyes programmes, using software including MS Word and Open Office Writer during learning activities. Salmon (2013) support the findings that computer operating systems and common word processing applications usually have a range of accessibility options. These adjustments are important for the visually impaired students' learning process, thus providing them with higher contrast and can enlarge icons, display fonts and mouse cursors can be enlarged. The facilities frequently accessed are also those which are tailored to meeting the needs of the learners with visual impairment in terms of content provided for a specific period. Virtual learning facilities allow learners with visual impairment to gain from the learning process through seeking and accessing information and other learning materials (Eligi and Mwantimwa, 2017). Use of ICT in the learning process for learners with visual impairment is hindered by their inability in most cases to access learning facilities and accessible virtual infrastructure suitable for them.

Other facilities mentioned to be accessed to support learning among learners with visual impairment were the Braille embosser and the note-taker. Braille was also one of the most required ICT facilities to support the learning process of the visually-impaired students. With the use of the Braille embosser, the visually-impaired students can benefit much as they can print out Braille using an embosser. Indeed, the Braille is highly required in learning as it saves time in producing lecture notes and paper exams for the learners with visual impairment as it simplifies the work which can be tedious when using the Perkins Braille and Slate and Stylus (Muwanguzi and Lin, 2010).

Also, Tape-recorders and note-takers enhance the learning process among learners with visual impairment as they used them for recording and listening to lecture notes. In the same line, Malburg (2012) found that these devices support recording lecture notes, class discussions and visual presentations. Also, they offer detail descriptions to the learners with visual impairment for making copies and listening to them again. Other favoured attributes include the computer's portability for the learners to hold it without worrying about its bulkiness and be able to listen to lesson notes anywhere where they were. Additionally, they are measured as an assistive technology that creates new room for learning for learners by allowing the voice to be heard that otherwise could not be heard.

Further, the internet provides a wide range of learning because of its multiple-functional virtual environment and the resources it provides. In this regard, UNESCO (2012) asserts that the use of the internet's cloud-based solutions such as content and applications includes assistive technologies and, in fact, the internet presents the possibility of overcoming issues of affordability and availability. Moreover, the internet provides other alternatives for learners with visual impairment when it comes to accessing different relevant formats that support learning activities. On the whole, website and web applications have proven to help improve the learners with visual impairment access to a wide range of learning materials. Indeed, virtual learning facilities for the visually-impaired students support communication, improve access to educational materials in addition to serving as curriculum tools for development concepts of subject areas and means of production of learning materials in alternative format (Eligi and Mwantimwa, 2017).

As advances in technology improved, these developed into electronic books (e-books) and digital talking textbooks (Redmond, 2011). Jacko (2011) listed the features of the Digital Talking Textbooks (DTTs), which include a visual display is not needed, multiple playback

speeds, content accessible at a fine level of detail, usable table of contents, easy skips, ability to manage notes, setting and labelling bookmarks, fast forward and reverse, and presentation of visual contents in alternative formats. One of the assistive technologies that helped the students with visual impairments, especially low vision students, was Closed Circuit Television (CCTV). Therefore, the digital talking textbooks might help me access the contents of the syllabus. Without an understanding of the nature of the problems VI users face in interacting with e-learning tools, we cannot create an accessible and usable home environment where VI users can enjoy equal learning opportunities (Jacko, 2011).

Romney and Celeste (2015) argued that as for alternative options to the computer and portable reader, the CD can be burnt, and a leaner could listen to the content by using the MP3 player. Also, the portable external speaker, which most participants bought from the school's bookstore, is one alternative device for listening to the digital talking textbooks' content. The external speaker that could be used the thumb drive, simultaneously. We could buy from the school cooperation shop. We could transfer the digital talking textbooks' files into the thumb drive, and then access the contents of the digital talking textbooks through the external speaker. The learning using audio devices should be incorporated to aid the teaching process. These include things like audio cassettes and compact discs. However, lesson contents with diagrams and tables cannot be well explained in an audio format (Salisbury, 2008). Moreover, a lesson can be tape recorded and given to learners with visual impairments for later playback at their convenient time. Moreover, if a videotape for example has to be shown, it is wise to show it to students with visual impairment so that through a specialized teacher's or a classmate's explanation, they understand all the visual concepts in it before the class watch it. For a film with sub titles, a classmate or teacher can read aloud to the class to help those with visual impairment (Romney and Celeste, 2015).

Furthermore, Screen Readers enables the blind to access most text-based computer displays output using speech generated by screen readers. In any case, the technology only perusing the content of the screen and changing over it to human speech (Norman. 2013). The screen reader tends to read the screen content in blocks of words and in sequential manner which web-based application navigation like internet surfing requires real time reading of the screen therefore in some cases not perfect for web-browsing. In addition, the fact that the screen reader always "reading aloud" every item on a Web page and consequently asking the user to make succeeding correct choices will definitely constitute a heavy burden on a human short-term

memory which will render it a poor HCI technique (Newa, 2012). In order to activate the next Web page, the user still needs to point to a specific hypertext link and click the mouse, an action which is nearly impossible for learners with visual impairment, hence innovative methods must be developed if learners with visual impairment are to have natural access to the Internet (Chungurski et al, 2012). Consequently, very scant research investigates the virtual learning experiences of VI users. This creates a gap in the literature about a clear understanding of the problem from the perspective of VI users.

The Euro-Mediterranean Partnership Education and Training for Employment (MEDA-ETE) project uses Moodle, an open-source LMS whose philosophy relies on the same socio-constructivist approach used in designing the course. The stated philosophy of Moodle emphasises that learners (and not just teachers) can contribute to the educational experience in many ways. The use of virtual learning platform (MOODLE) at home also ensures that students, regardless of geographical location or time can download course materials in electronic format (Goode, 2010). The study shows that at home environment the availability of electronic-format course materials (such as Word, PDF, and MP3) is very inadequate, this is because most of the course materials for most academic programs have not been digitized. And even those which have been digitized, most of them cannot be read using screen readers. This is because most of these course materials were created by scanning the hardcopies and therefore creating image PDF instead of characters PDF which can be easily read by screen readers (Goode, 2010). Despite the availability of a growing number of technology-enhanced and sophisticated assistive devices that provide alternative formats to support the learning of visually impaired students, there are numerous challenges in when it comes to accessing and using ICTs tools in a home environment.

Reyes-Chua et al, 2020) revealed that most of the teachers find the Facebook Messenger to be one of the most convenient mode of alternative learning. This is most especially when the students could not afford to be connected with Wi-Fi. In FB messenger, if the students have free data, they could easily see the instruction of their professors including the tasks they need to do. The Google Classroom is one of the best platforms which could be accessed for free by an institution or an individual faculty member. In this platform, a teacher could create a class, assignments, tasks, announcements, or chats with his/her students.

Edmodo is another popular virtual learning platform that has a similar feature like the Google Classroom (Reyes-Chua et al, 2020). Edmodo is a user-friendly platform that could create a

class, submit assignment, post a message or announcement, and could upload and share materials for the students. Zoom is a free video call meeting where a teacher can share his/her slide presentation that everyone could see. Students could interact and raise questions to their professors. They could also see each other virtually and ask questions during the lecture. For those who have slow connections, the teacher could even write the important messages on chat boards. There are no empirical studies related to the virtual learning classroom at a home environment as an intervention in times of crisis, or studies related to determine the status of virtual learning utilised by learners with visual impairment in a home environment, hence this study (Reyes-Chua et al, 2020).

With this platform, students feel comfortable and easy to learn the topic. Just like Google Classroom and Edmodo, Schoology allows the teachers to create a class and uploads resources and materials online (Chen, 2014). This is something new to them and would continue to explore its usefulness. Google Meet has similar features with Zoom. Learners could be seen virtually and interact with their teacher. Moodle has also a similar feature with Edmodo and Google Classroom while the chat is used for chatting and uploading materials to learners. Although these virtual learning platforms are free, the availability of resources could be the hindrance why learners or teachers could not fully utilize them. However, teachers and learners alike should be grateful that these virtual learning platforms could be available without charge from the institution or individual. They make the academic life easier most especially during these COVID-19 crises (Reyes-Chua et al, 2020).

The virtual learning platforms the educators have been using, are the most popular ones. However, there are other platforms which have not been explored yet like: Lark, Odilo, Big Marker, and many others. This means that virtual learning classrooms are very popular around the world, most especially during crisis or emergency. The COVId-19 has revealed vulnerabilities in schools, colleges and universities around the globe (Reyes-Chua et al, 2020). It is clear that society needs flexible and resilient education systems while facing the unpredictable futures and this study want to establish the learning platforms which are more appropriate to individual learners with visual impairment. Several research studies indicate that while there has been a great improvement in universal access to technology, learners with visual impairment still struggle with poorly designed computer interfaces that continue to lag behind in some web design features. Ruchi Armstrong and Murray (2013) further mention that most of the adaptive technologies used by visual impaired individuals only help them to

navigate the Internet in a linear and serial pattern. Yet, web designs are increasingly incorporating Java-based hypermedia and multimedia elements with various sophisticated visual elements such as graphics, hyperlinks and pop-up windows. However, little is known on forms of technology facilities being used for virtual learning in a home environment by learner with visual impairment. This research sought to fill the gaps in the literature.

2.3 The determinants of accessibility of virtual learning in a home environment

The successful usage of virtual learning system relies on understanding the adoption factors as well as the main challenges that face the current virtual learning systems. For example, Xia (2010) analysed the survey results of 58 countries. The analysis showed that student's home socio-economic environment impacts access to virtual learning systems. Some surveys showed that besides the direct impact student's home environment has also the indirect impact on learning achievement, for example parents belonging to higher social class have higher academic expectations as regards their children and this has a positive influence on provision of virtual learning equipment's (Kalpana and Hema, 2012).

Developing home environment competence for virtual instruction requires a careful approach to training online instructors and a workload investment in staff training and development (Gregory and Lodge, 2015). While it is acknowledged that face-to-face teaching competencies such as knowledge of curricula and pedagogy do transfer to virtual contexts, it is also important to recognize the unique competencies required for virtual teaching success, and the role of institutions in setting instructor duties and responsibilities (Alvarez et al., 2009). Despite much prior research attention exploring the notion of virtual student readiness, virtual learning teacher's readiness is now emerging as an equally important construct (Oomen-Early and Murphy, 2009). However, the study did not investigate exact determinants of accessibility of virtual learning in a home environment for the learner with visual impairment.

Nonetheless, technology, organization, and environment are the three dimensions that influence an organization's ability to adopt or reject new technology (Lee, Wang, Lim, & Peng, 2009). Virtual learning literature reviewed trends to look at determinants of virtual learning adoption mostly from a single-factor approach. For instance, Czerniewicz and Brown (2009) saw policy and organizational culture as the determining factors for virtual learning adoption in universities. Duan et al. (2010) from an innovation adoption perspective studied Chinese undergraduate students' intention to adopt virtual learning. Also, Motaghian et al. (2013)

considered the technological factors that influence virtual learning adoption. Other virtual learning studies (Chen, 2014; Palacios-Marqués, Cortés-Grao, and Carral, 2013) looked at virtual learning from the technical perspective such as e-learning interface design, data centre management, security, performance, and service management.

According to Buchmann (2002), the following components are mostly used for the calculation of student's family socio-economic status: parents' educational attainment, parents' professional status and family income determines the provision and accessibility of virtual learning in a home environment. This is in line with the results of Agulanna and Nwachukwu (2009) which reveal that parents who have high socio-economic status motivate and encourage their children to seek academic success through provision of gadgets for virtual learning. The attitude towards learning is also strongly related with learning environment (KIM, et al. 2013).

Mahmud (2010) carried out a study that illustrated technological, psychological, socio-cultural and economic factors affecting successful implementation of virtual learning for higher education in Bangladesh. Unwillingness to change the learning atmosphere, poor level of competence in English, lack of funds and technical resources in universities, lack of confidence to practice computer applications and absence of infrastructures such as electricity and telephone lines are some of the factors that were identified as affecting virtual learning implementation in Bangladesh. Hence the study to ascertain if the same factor can determine the provision and accessibility of virtual learning in a home environment.

Tedre et al. (2010) study provide a holistic review of a virtual learning implementation process that captures experiences over an 11-year period. Tedre et al. (2010) presented the determinants on the provision and accessibility of virtual learning in a home environment on virtual learning implementation. The aspects were: staff training, equipment, funding, pedagogical issues, networks and system administration. These have since been elaborated as: tools and equipment; connectivity; pedagogical framework; economic environment; staff recruitment and training (replacing system administration), motivation and country's educational context and content (Tedre, 2012).

Oye et al. (2011) revealed determinants of the accessibility of virtual learning in a home environment depends on vision and action plans for virtual learning, good government policies and financial support, earmarked action programmes and set committees with sufficient funds to pursue their goals, belief in research as a fundamental part of virtual learning strategy, and

lastly awareness, training and motivational programmes. Further, Malamud and Pop-Eleches (2011) pointed out aspects such as electricity, awareness and training of staff on the use of ICTs, motivation, bandwidth and Internet connectivity impacted on the provision and accessibility of virtual learning in a home environment.

Also, Nawaz et al. (2011) provide a review of the current virtual learning implementation trends at the university level in Pakistan. The study identifies the following factors as having an impact on virtual learning development: teachers' ability to integrate technology into teaching and learning activities, development approaches and attitudes, project management techniques, user participation, user training, change management. Furthermore, the studies reveal that bandwidth and computer access were predominant factors affecting the provision and accessibility of virtual learning in a home environment. Mahmud (2010) points out that because of bandwidth and connectivity limitations downloading content is slow and creates frustration among students in learning environment.

Auxiliary, limited access to computers demystifies the notion that virtual learning creates flexibility if students in developing country contexts cannot access learning anytime and anywhere because they have to share the few computers available to them (Suhail and Mugisa, 2007). Given the limited number of computers used by numerous students with varying ICT skills there are bound to be failures; frequent power fluctuations also affect computers and there is a need for skilled technical staff to support the available virtual learning infrastructure. Bhuasiri et al (2012) affirm that quality infrastructure and systems is one of the important elements required to ensure proper functioning of virtual learning environments. The physical equipment such as computers, servers and communication networks that must be available to apply virtual learning. In addition, availability of the software applications and operating systems is very important, also stated another important technological factor, which is technical skills and support through the knowledge, understanding and abilities that are used to accomplish tasks related to maintenance and upgrading of the infrastructure of computers, networks, communications, as well as providing support to users when they face technical problems (Bhuasiri et al., 2012).

Ben Zammel, Najar and Belghith (2018) results suggest that IT infrastructure services play a critical role in generating information with high quality, enhancing the aspects of virtual learning system quality, and improving service delivery quality. The impact of IT infrastructure services, system quality, and information quality on perceived usefulness is fully mediated by

service delivery quality. Universities need to be aware of the critical impact of IT infrastructure services and consider how investment in these services could improve system and information quality, service delivery quality, and the usefulness and success of virtual learning systems.

Also, the efficiency and quality of virtual learning system was the main topic with the experts as a feasible method for gathering their opinions regarding the main factors that effect on the virtual learning system adoption in a home environment. Kotsopoulou (2011) reported that the current virtual learning systems are experiencing some potential hurdles regarding accessibility, availability and usability, especially for those who have less knowledge of the internet. The success of the virtual learning system should be measured based on student satisfaction and personalization. There is significant correlation between ease of use and system adoption, as students could lose confidence in the system if they find it difficult to use". (Mohammed, Al-Khasawneh and Althunibat, 2020).

Furthermore, cost is frequently mentioned as one of the most significant determinants to virtual-learning implementation and adoption. Technology is important in virtual learning, and it is also unpredictable and expensive which makes the initial costs of implementation and continuous costs of maintenance excessive (Murray, 2001; Simmons, 2003). Although the cost of developing a virtual learning system may not be accurate the first time, particularly if the system is new or complex, it still should be carried out to give the developing team a goal to aim for.

Another determinant factor is time. Time here refers primarily to the amount of time required to develop and maintain virtual learning systems. It also refers to the amount of time that learners are able to make available for virtual learning. In traditional learning, all the materials are put into outlined form and the instructor will fill in a lot of the gaps, such as leading or integrating the learning processes.

On the other hand, with virtual learning all the materials and procedures are set up and the system will perform the learning processes by itself. Hence, virtual learning has usually been a lot costlier up front and it takes more time to develop. In general, it takes at least four times as long to develop virtual learning materials, then it does with classroom teaching (Williams, 2017). Obviously, this depends on other factors such as the tools have been used, learning methods, and the types of content have been used. The setting of virtual learning, either at work or at home, seems not enough to reduce the intensity of the time factor as a key barrier for most

users. The time factor is a significant determinant to virtual learning. In fact, it occupies an important rank among the top three determinants to implementing virtual learning in organizations (Baldwin-Evans, 2004; Simmons, 2003).

Technology is critical in implementing and adopting virtual learning. It requires adjustments from both sides; the users and the organization. For home learning to effectively implement virtual learning, they need to ensure that they have the appropriate capacity to run virtual learning systems and that serious consideration is given to hardware compatibilities and capabilities. Romney and Celeste (2015) said all technological factors should be taken into consideration during the implementation process. For example, if the home environment has the necessary hardware and software for adopting virtual learning system; but the home environment lacks the technical skills that are necessary to use those hardware and software, the result might be failure.

Further, Pogrund (2018) publicised that cultural factors are the determinants of accessibility of virtual learning in a home environment. Culture is a vital factor to increase the rate of virtual learning system adoption among students. Cultural aspects are one of the critical factors that needs to be addressed in order to ensure that all students will use the virtual learning system largely. Also, one of the factors that should be implemented to increase the use of virtual learning system is to increase ICT literacy and skills of virtual learning users.

Also, one's attitude towards virtual learning is fundamental for accepting and adopting this technology (Pogrund, 2018). To realize the promises of virtual learning, learners need to embrace it and parents need to support it. Indeed, resistance to change towards using technology is emerging as one of the most visible determinants in virtual learning success. Not only that, self-efficacy is one of the core elements in determining the adoption of virtual learning system in educational institutions. The Knarlag and Olaussen (2016) stated that in order to increase the adoption of virtual learning system, it is important to ensure students in home learning environment have high self-efficacy in order meet the intended functions, otherwise it's hard to achieve the learning activities through virtual learning system if students show low self-efficacy.

In addition, the implementation of virtual learning systems can't be carried out smoothly without having regular awareness sessions in order to let students feel confident and motivated in using the virtual learning system. In addition, trust is a vital factor to increase the rate of

virtual learning system adoption in home learning environment. Learning institution are always attempting to assure that the virtual learning system is trustworthy. The trust factor includes system protection, information privacy, and system reliability. In addition, one of the important trust factors that lead to increase the use of virtual learning system among students is providing efficient, effective and transparent means of virtual learning activities through the e-learning system project, and can surely be secure and free of threats (Mohammed, Al-Khasawneh and Althunibat, 2020)

Another determinant factor is the opposition to change towards accepting virtual learning system is an issue since there are students or instructors who prefer the traditional learning and teaching method (Redmond 2011). The running cost of ICT facilities might also be a challenge due to university budgetary constraints that affect the acquisition and maintenance of ICT facilities and software that meets the special education needs. Many students shared the bandwidth which slowed down the speed of internet access particularly in the absence of a wireless access point at the UDSM's Special Unit's building. Also, the wireless access points were installed in a few buildings and spots. In the face of few wireless access points including in the library, the students found it quite difficult when the LAN internet was so busy in the absence of the wireless connectivity (Redmond, 2011). In consequence, there was poor access to alternative formats for learning, hence limiting access to materials at home learning. The current virtual learning system is experiencing some potential hurdles regarding accessibility, availability, usability and the virtual learning website service quality (Mohammed, Al-Khasawneh and Althunibat, 2020). The determinants of accessibility of virtual learning in a home environment for the learner with visual impairment have not yet been investigated, hence, the study.

2.4 Virtual learning needs of person with visual impairment in a home environment

Accessibility is a very important criterion to make virtual learning inclusive to students with different abilities. According to Pogrund (2018) unless design of the courses is accessible to all students, including those with disabilities, the ultimate goal of distance learning to make education available to everyone be accomplished. However, accessibility is rarely a priority for virtual course developers and learners with disabilities are not considered as a large group (Knarlag and Olaussen, 2016).

Onukotun's statement reveals that technologies do not only enhance access to information but also promote education and lifelong learning. Additionally, technology is a tool for fostering equality as technology provides assistive, adaptive and rehabilitative devices for people with disabilities through proper selecting, locating and using of these tools depending on their disability (Belay, 2005). In fact, assistive technology has been used by blind and partially-sighted people to help increase the independence and boost their social inclusion when it comes to education access. For example, Lucky and Achebe (2012) list the most important ICT facilities that are beneficial in learning for the visually-impaired as the Kurzwell Reading Machine, Computer, Video conferencing, the Internet and the World Wide Web (WWW). Also, the application of different AT devices such as Screen reader, Braille translation software, Braille writing equipment, Closed- Circuit Television (CCTV), Braille embosser and Scanners for students with visual impairment are important to support learning. The Australian National Training Authority [ANTA] (2003), Gronlund et al. (2010) and Borg (2011) support the view that assistive technologies are powerful tools for fostering the learning of the students with visual impairment worldwide through simplified access and retrieval information, contacting friends and sharing of information as sighted people do. ICT plays a crucial role in fostering the inclusion of the students with visual impairment especially in learning activities. In fact, ICTs do help decrease and may cut off the sense of discrimination and open access to knowledge in extraordinary ways. Generally, ICT is being used as a tool for improving the quality of life by improving efficiency and enhancing effectiveness in different socio-economic sphere including in learning.

Knarlag and Olaussen (2016) recommended that virtual learning environments should incorporate physical classrooms that support the Web-based learning materials. Even distance learning students with vision impairments require an appropriate physical learning space. The analysis demonstrated that the requirement for an accessible physical classroom for students with visual impairment should include considerations to ensure the physical environment is safe and accessible, including appropriate computer desks and workspaces, ergonomic chairs, personal computers and laptops, microphones, printers, electronic USB Whiteboards, accessible teaching aids and an effective and safe classroom layout.

Goode (2010) suggested that virtual learning in a home environment for person with visual impairment include creating virtual home classroom, accessible learning materials, a remote computer laboratory, and delivery of the learning materials by vision impaired instructors. In

line with the progress in visual technologies there has been a noticeable increase in the use of graphics, images, and animation in the presentation of virtual learning materials across the board. The nature of virtual learning materials in the sciences and technology is predominantly vision-centric, incorporating large amounts of diagrams, colour images, visual cues, and animation (Jacko, 2011). The virtual home learning environment should include a broadcasting and call management application enabling instructors to broadcast lectures and tutorials to local and remote students. To date, little is known on the extent to which virtual learning is accessed and utilized to support learning among students with visual impairment in a home environment. Therefore, the knowledge gap between the inaccessibility of virtual learning at home environment by persons with visual impairment and the practical workable solutions provided to solve the problem is a fundamental challenge this study is aimed to address.

Ruchi, Armstrong and Murray (2013) argued that each student has a different set of circumstances relating to their disability, and virtual learning environments need to take into consideration the limitations posed by these circumstances. Students with visual impairment need tools to enable them to use computers. Screen readers are used to translate text to audio for those students who are totally blind, and screen magnifiers enlarge text and objects on the screen display for those students who have a small amount of usable vision. Screen reading software is designed specifically to translate text into audio, and features beyond this are limited. Instructional designers need to be mindful of accessibility issues for screen readers to be able to translate accurately (Ruchi, Armstrong and Murray, 2013). Therefore, when designing accessible virtual classroom and delivery mechanisms should include consideration of assistive technologies, vision impaired teachers, Voice over Internet Protocol (VoIP) or equivalent, accessible manuals for virtual classroom operations, sighted teachers to manage the entire environment and assistive technology technicians. However, this literature did not tell us about the vvirtual learning needs of person with visual impairment in a home environment. This research sought to address the gaps identified in this literature.

2.5 Alternative intervention that can be instituted to improve on virtual learning

Henaku (2020) claimed that parental participation has a greater impact on children's academic achievement than others. Chopra, Madan and Jaisingh (2019) also indicated school children benefit from discussions about learning and school-related issues with their parents and from joint readings. There is need for a clear policy leading to an established virtual learning infrastructure that allows small-scale initiatives to be maintained, developed

and exploited needs to be in place for virtual learning to be sustained in the long term in a home environment. This call for promotion of offline computer-based virtual learning interventions were used to deliver the learning content of the course (Eligi and Mwantimwa, 2017).

Armstrong, Murray and Permvattana (2010) revealed that in order to improve on virtual learning we need positive attitudes of all stakeholders as crucial, if the potential of virtual learning in education for people with disabilities is to be achieved in particular those with visual impairment. It also calls for the need for awareness raising regarding the potential of virtual learning in education of different learners with disabilities and special needs. One critical factor in fostering positive attitudes towards virtual learning is the provision of multifaceted training in the use of virtual learning in teaching and learning for all teachers and educators (Armstrong, Murray and Permvattana, 2010).

However, for this to be made possible, it is necessary for a range of stakeholders in education and virtual learning to be involved in developing simple virtual learning solutions that can be personalised in different ways for everyday usage by learners with disabilities. Making different stakeholders in education aware of the possibilities virtual learning can offer requires systematic approaches (Armstrong, Murray and Permvattana, 2010). European Agency for Development in Special Needs Education (2011) indicated that the personal knowledge and attitudes of policy makers and practitioners need to be influenced through awareness raising exercises that make clear the potential benefits of using virtual learning in education for people with disabilities. Just as important is the need to develop positive attitudes towards virtual learning amongst teachers and other educational professionals in order that virtual learning is still understood to be a valuable tool for supporting of learning and teaching.

The promotion of local partnerships by each community is also very important. The concept and praxis of networking, sharing experiences and knowledge is fundamental for continual updating in the field of virtual learning and assistive technology. Virtual platforms are important to foster exchange and communities of practice. There should be successful collaboration between the learning institutions and different stakeholders sharing of responsibilities to foster education excellence for the students with visual impairment. For example, collaboration between the parents and the Ministry of General Education in planning for the students with visual impairment to receive great benefits from ICT-based assistive tools in learning activities. There is need to increasing access to virtual learning infrastructure, virtual

learning can be an invaluable tool in the education of people with visual impairment and so increasing access to virtual learning infrastructure remains a target (Kalpana and Peese, 2012).

However, it should be clear that this target is not an end in itself the main purpose of providing virtual learning in education for people with disabilities and those with visual impairment in particular must be kept in mind, and that is promoting both educational inclusion and wider social/societal inclusion. The ultimate goal of increasing access to virtual learning that support learning must be increasing the short and long term life chances and quality of life of people with disabilities. For this goal to be achieved, it is essential that there are integrated policies across education, information technology and the social sectors that have common goals for meeting the needs of people with visual impairment in relation to virtual learning access and usage.

Further, there is need for promoting basic ICT literacy because familiarity with and the ability to effectively use ICT for a range of purposes remains an objective for many groups of disadvantaged learners, including many people with visual impairment (Jacko, 2011). Increasing access to ICT infrastructure benefits all citizens, not just those with particular needs. More research is necessary in order to understand experiences of this specific student group in online courses in order to design effective online learning in a home environment. Other alternative intervention that can be instituted to improve on virtual learning should be based on efforts should also be made to monitor the implementation of education and ICT policies for the students with visual impairment in particular and persons with disabilities in general. The education policy and ICT policy should specify how the students with visual impairment are to be provided with equitable access to ICT-based assistive tools to enable them to learn effectively. In this regard, governmental and non-governmental organisations as well as the general society should pool their resources together to provide appositive learning environment for the students with visual impairment have access to assistive ICT-based technologies that enhance the quality of their learning opportunities (Jacko, 2011).

Having a consistent schedule for school work will allow parents to plan the workday and let students more easily transition in and out of school time. Try to build as much structure and consistency as possible, setting times for meals, school work and other activities. Before embarking on creating a schedule, there are a couple of things to consider. Try to get children on the same schedule they had when they were going into school. That means the same wake-up time. Have kids start school work at the same hour they used to start classes. Observe your

child to see what works best. Many children are more engaged and focused during the morning (Kotsopoulou, 2011). Many children miss receiving reinforcement and reassurance from teachers and counsellors. Building a reward system can help maintain motivation (Redmond, 2011).

Feedback is an essential component of all effective learning environments – including virtual. As a virtual teacher, your feedback will help to create a virtual learning experience that is informative, engaging, and motivational for the learner. Your feedback should be continuous during the virtual learning process, with constructive feedback offered as soon as possible so that students can clearly identify which behaviours or skills need to be improved. You can encourage group feedback through collaborative exercises, which also helps to promote peer engagement. Which forms a gap in the Zambia situation as little is known in the alternative intervention that can be instituted to improve on virtual learning for leaners with visual impairment.

2.6 Summary

The student needs a desktop computer, laptop, or good tablet. If this is an issue for your family, contact your school because the school district is responsible for ensuring students who need equipment get it. But there is also the matter of internet access. Not every household has a reliable internet connection available. Keep in mind that most phones and laptops have built-in technology that can aid kids with special needs. For example, read aloud or text-to-speech can help struggling readers, and speech-to-text can help struggling writers. Learners with visual Impairment look at virtual-learning as an alternative for their educational development. But they do have several concerns which create emotional blocks in their minds against participating confidently in virtual learning systems. The accessibility challenges in virtual learning tools and the usability limitations of assistive technology further aggravate the situation. Consequently, very scant research investigates the virtual learning experiences of visual impaired users in a home environment. This creates a gap in the literature about a clear understanding of the problem from the perspective of visual impaired users. Without an understanding of the nature of the problems visual impaired users face in interacting with virtual learning tools, we can create an accessible and usable virtual learning home environment where visual impaired users can enjoy equal learning opportunities. The next chapter provides the methodology the study used in order to explore the accessibility of virtual learning platforms for person with visual impairment in the home environment.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter highlights methodological details appropriate to the study. Methodology defines how the researcher went about studying the phenomenon at hand. In this study the qualitative method was used. It is an inquiry application useful for exploring and understanding a central phenomenon, which are learners with visual impairment. Qualitative researchers are interested in understanding the meaning people have constructed; that is, how they make sense of their world and the experience they have in the world. In this chapter the methodology of research is presented. The areas that are captured in this chapter are the research design, sources of data, population of the study, the sample size, sample techniques used in selecting the participants, the data collection tools and the data analysis techniques.

3.2 Research Design

The research design is the plan to be followed in order to realize the research objectives. It represents the master plan that specifies the methods and procedures for collecting and analysing the required information. A framework is developed to address a specific research problem or opportunity. This study was designed in line with qualitative research approach. The reason for adopting this approach is that it is more flexible in discovering the perceptions and the interpretations in the study, and it is more effective in the analysis of the data collected. Qualitative studies are about how individuals give meaning to their lives, how they interpret what they experience, doing research to explore their point of views, events, phenomena and values (Merriam and Tisdell, 2016). In the literature, the definition of qualitative research is not consistent, situational variations can be done by different researchers (Creswell, 2014), so it is still difficult to talk about a standardized process in qualitative data analysis. But the basic

characteristics of qualitative research are such that it is undertaken within the habitat of the participants, relies on spoken words of participants rather than on books, it is a meaningful way of collecting human experiences, qualitative research design keeps on changing as new data and additional sources become available.

For this particular research a case study approach or exploratory study was chosen. A case study or exploratory study was found to be ideal for this particular study as it brings out facts and insights about the topic under investigation. The method was also influenced by Yin. Yin (2003) argues that a case study approach is appropriate when the focus of the research is on a contemporary phenomenon within a real-life context. In such settings case studies are helpful in bringing up in depth insights of the study (Kamal, 2019).

Besides, this study was grounded on the interpretive paradigm. Paradigms are central to research design, because they impact on the nature of the research question; that is, what is to be studied. According to Merriam and Tisdell (2016) the paradigm of a study provides the frame and the structure of the study, and guides the researcher's actions. Therefore, according to Mohajan (2018) interpretive paradigm is the way of studying human experience through empathetic identification with the individual. Thus, it is essential to understand the experience from the participant's perception. The interpretive paradigm functions on the assumptions that there are no fixed realities; rather people make individual, subjective meaning of the world as they interact with it. The researchers sought to understand social members' experience and perception of their situation from the standpoint of their unique contexts and backgrounds. Rooted in the interpretive paradigm, the researcher explored the accessibility of virtual learning platforms for person with visual impairment in the home environment.

For the purpose of this study, the research paradigm that was followed is of qualitative nature, using semi-structured interviews as discussed later in the chapter. Mertens (2011) explains that qualitative research is based on the belief that first-hand experience provides the most meaningful data. It is also believed that qualitative data gives large volumes of quality data from a limited number of people. It is aimed at understanding the world of participants from their frame of reference (Kasonde-Ng'ndu, 2013). In qualitative research, the researcher is in continuous interaction with the participant in an attempt to discover the participants' experiences on the accessibility of virtual learning platforms among person with visual impairment in the home environment

3.3 Population

By definition a population refers to the larger group from which the sample is taken (Creswell, 2014). It could also be defined as a group of individuals with at least one common characteristic which distinguished that group of individuals from other individuals. The study's target population comprised head teachers, parents for, and learners with visual impairment.

3.4 Sample size

A sample is a group of subjects or situations selected from a larger population (Hughes, 2010). Marshall (1996) affirms that an appropriate sample size for a qualitative study is one that adequately answers the research question. However, in qualitative research you do not have a predetermined sample size but during the data collection phase you wait to reach a point of data saturation. The researcher reached at a point were no new information were coming forth, it was assumed that data saturation was reached and stopped collecting additional information after a sample of fifteen participants. That's how the sample size was arrived at and it comprised of one Head teacher, seven parents and seven learners with visual impairment.

3.5 Sampling procedure

When conducting research many types of sampling are possible, although researchers in qualitative research usually focus on relatively small samples. Research participants are generally selected because they are able to provide rich descriptions of their experiences and are willing to articulate their experiences, thereby providing information that is rich and which was able to challenge and enrich the researcher's understanding (Roller and Lavrakas, 2015). Wilson 2011) defined sampling as a process of selecting a number of individuals or objects from a population. Such a selected group contains elements representative of the characteristics found in the entire group.

Therefore, one non-probability sampling approaches was used to select the participants for this study. Homogeneous purposive sampling was used as a sampling method as the researcher sampled a group of people who are believed was reliable for the study. The choice of homogeneous sampling is based entirely on the judgment of the researcher, in that a sample composed of elements that contained most characteristics representative or typical attributes of the population. That are only parents with children with visual impairment and their children were sampled. For the head teacher critical case sampling was used because the respondents

are critical cases that could contribute the most useful information for the study (Kombo & Tromp 2013), has it enabled a researcher to select a sample based on a certain purpose.

3.6 Research Instruments

Within the tradition of qualitative research, there are three broad categories of data collection: participant observation; interviewing; and the use of personal documents (Wilson, 2011). The research instruments that were used in this study included; semi-structured interview guide and Focus Group Discussions guide because the study was exploratory in nature.

Therefore, semi-structured interviews were used as they intensively investigate a particular topic. Traianou, (2014) argues that interviews are valuable tools for collecting data in qualitative research. Ghosh (2011) defines interviews as a systematic way by which a researcher enters imaginatively into a life of a comparative stranger who has the data that the researcher requires. Through this method, the researcher gets direct and reliable data from the source. A one-on-one interview method allows the researcher to interact with the participants and to observe non-verbal cues during the interview process.

A semi-structured interview approach was adopted and this approach facilitated an understanding of the problem from the perspective of the participants under investigation. Through choosing interviews as a method of data collection the researcher hoped to gain a deeper understanding of the participants' constructions through dialogue and through the language, they use in constructing the different discourses. The interview method allows the researcher to seek clarity and probe for deeper understanding. As a result, the reporting and analysis of data is reflective of the views of the participants. Apart from this fact, a researcher can verify the responses through cross examination. As a result, the attitudes, feelings and opinions of the respondent are revealed. Roller and Lavrakas (2015) maintains that a semi-structured interview involves a set of open-ended questions that allow for spontaneous and in-depth responses. Also interviews also make the respondent free to bring out as much information as possible. In order to keep the obtained data, the interviews will be recorded.

Then, Focus Group Discussion is defined as a carefully planned discussion designed to obtain perception on a defined allow pupils and teachers to freely express their feelings and ideas Focus Group Discussions was used because the target population like pupils are in almost the same age. This enables a lot of information to be produced which may be good to explore beliefs, ideas or opinions.

This method was used to solicit information from pupils. Patricia (2017) explains that a Focus Group Discussion (FGD) is a qualitative research technique consisting of a structured discussion and used to obtain in-depth information (qualitative data) from a group of people about a particular topic. The purpose of the discussion is to use the social dynamics of the group, with the help of a moderator/facilitator, to stimulate participants to reveal essential information about people's opinions, beliefs, perceptions and attitudes. Focus groups are often conducted among homogenous target populations, who usually share a common characteristic such as age, sex, or socio-economic status, which encourages a group to speak more freely about the subject without fear of being judged by others (Mohajan, 2018). After discussions the learners will be asked to individually write short informative paragraphs on their perceptions on the accessibility of virtual learning platforms for person with visual impairment in the home environment, particularly with the intention of fully expressing what they could not say in groups due to fear.

3.7 Trustworthiness

Trustworthiness in qualitative research method is equivalent to the terms of validity and reliability in quantitative research (Mohajan, 2018). Qualitative researchers do not use instruments with established metrics about validity and reliability; it is relevant for qualitative researchers to address how the research findings are credible, transferable, confirmable, and dependable. In short, trustworthiness is all about establishing these four things in the research project.

Credibility is how confident the researcher in the truth. The researcher will address this issue by adopting an appropriate and well-recognized research method and by conducting the study in the researcher's home country to use the advantage of familiarity with the culture of the participants' and also to minimize the language barrier. Regarding subjectivity, the researcher will empathize with the respondents when they will share the painful and harsh experience of their past as well their current condition with virtual learning platform. However, the researcher

will maintain objectivity by staying neutral and, for example, giving no hint to the respondents of what the researcher wants to hear.

The note-taking process will also be focused on recording the whole statements of the participants as they are responding. This will be helping the researcher focus on the facts and the statement of the participants rather than personal assumptions and biases. Further, the sharing similar stories but not identical which validates the reliability of the sources (Pierre, 2016). Crosschecking the interview of the participants will also applied.

The second element is Transferability, which addresses the question of how the research findings apply to other contexts. The others contexts mean similar situations, similar populations, and similar phenomena. Therefore, in the study, the researcher will try to achieve transferability through a detailed description of the context.

The third element is Conformability, that the degree of neutrality in the study findings and it will make sure the findings are free from biases or personal motivation of the researcher. To address the issues of conformability, the researcher will try to discuss with the supervisor throughout the analysis and theme creation process to avoid individual biases.

Lastly, Dependability is the extent to which other researchers could repeat the study and find a similar and consistent result (Patricia, 2017). The researcher will address these critical elements of trustworthiness through in-depth and detailed methodological description and by providing background data and information in the literature review and introduction. Recognition of potential shortcomings of methods and the data collection process is also another strategy that will be employed in the study.

The general reliability of the sources that was used in the study was considered to be relatively high reliability overall. As the sources will not attempt to hide their originators the openness is an indicator of the general reliability of the sources. The time frame was further taken into consideration since the sources that was used are reviewed by the date they are updated as well as cross-checked against other sources to review the dependency of the sources. To achieve trustworthiness of the study, triangulation and peer debriefing were applied to the study. Triangulation is the use of more than one method of data collection or information gathering. Peer debriefing provides the researcher with the opportunity to test his or her growing insights and to expose himself or herself to searching questions. Course mates and some friends who

are experts in qualitative research provided an opportunity for peer debriefing and they guided and provided feedback on qualitative instrument formulation (Patricia, 2017).

3.8 Data collection procedure

According to Kamal (2019) data collection refers to gathering specific information aimed at proving or refuting some facts. A researcher's choice of data collection procedure is guided by a clear understanding of what they hope to obtain and how they hope to obtain it. Permission were sought from the head teachers in the sampled school where the research was carried out by presenting an introductory letter from the Institute of Distance Learning at the University of Zambia to carry out the research. Appointments was made to each respondent prior to the interview. The semi-structured interview guide was administered by the researcher to the interviewees and the FGD was also conducted by the researcher.

The researcher conducted a face-to-face interview with head teachers and parents. To those parents who don't drop their children at school with the help of the schools' staff, parents where be contacted on phone and visited by the researcher in their homes and some in workplaces for conducting interviews during the data collection period. The goal of in-depth interviews is not to get answers or to examine hypotheses but to understand the experiences of other people and the meaning they give to on the accessibility of virtual learning platforms for person with visual impairment in the home environment. It made the participants express the meanings they ascribe to the behaviour, feelings, thoughts and perceptions that they and others hold, in their own language and concepts. An audio recorder was used with the permission of the interviewees and the researcher will also took down notes in her note book as a reference point when presenting and analysing data.

Further, focus group discussions was conducted with pupils by the researcher on their virtual learning experience. The researcher ensured that the topics under discussion was limited to the study topic. A recorder was used for records and reference purpose. Data from the participants were collected using voice recorder and later transcribed in questions and responses in word documents.

3.9 Data analysis

Kasonde-Ng'andu (2013) defines data analysis as a manipulation of the collected data for the purpose of drawing conclusions that reflect on the interest, ideas and theories that initiated the

study so as to uncover the underpinning structures and extracting cardinal variables thereby testing any underlying assumptions. The analysis process used thematic analysis. Thematic analysis is selected as the data analysis method because, according to Bryman (2016), thematic analysis is one of qualitative data analysis approach involving the use of themes (categories identified). The researcher motivated this choice of the analytic method because of its flexibility and simplicity. It is easy to identify and validate themes from the transcript by just reading through and providing a quotation from the data set.

Thematic analysis is more extensive and pursues issues in greater depth. Also, the researcher sees the critical elements of the subject's experiences (Wilson, 2011) meaning interpretation. Here the meaning of the thematic areas that are explained in the cross-case analysis interpreted, and attempts have been made to answer the research questions through the interpretations. Given the small sample size, the researcher could not generalize beyond this context. Qualitative data from semi-structured interviews and focus group discussion the researcher will analyse the thematically. These techniques allow for narration of themes which will be coded, where possible, verbalisms were used to indicate actual voices of the participants. Pseudonyms names was used to show actual verbatim such as for Parents P1, P2…P7 and for learners L1, L2…L7 and the head teacher by virtue of the office the HT were used.

3.10 Ethical considerations

Traianou (2014) explains that ethical issues or ethics in research are those practices that ensure that no harm is made to the respondent; that respondents participate in the study out of their own volition; that the privacy of respondents is respected and that there is no deception involved in bringing the respondents into the study. Further, this study adhered to the research ethical principles.

Permission to carry out the research was obtained from the District Education Board Secretary (DEBS) in Lusaka. Before going in the field for data collection, permission was requested from UNZA Ethics Committee and an introductory letter from the Assistant Director Post Graduate at the Institute of Distance Education. Each of the interviewee received a consent letter of permission. As the appointments were made for the interviews, in each case, a brief explanation of the aim of the study, as well as a tentative interview schedule was given.

The right to withdraw: The participants were informed about the purpose of the research, expected duration and procedures, their rights to decline to participate, and to withdraw from

the research once participation had begun. Wilson (2011) also states that in qualitative research, informed consent is particularly important due to the personal and in-depth nature of the data to be collected.

Anonymity and confidentiality: an anonymised data as data from which the client cannot be identified by the receiver of the information. In any qualitative study, the ethical issue regarding the protection of participants is of a greater concern. The researcher addressed concerns regarding privacy, confidentiality and anonymity. Participants were informed that their names will not be mentioned; pseudo names will be used. Participants in this study were asked to give their consent to participate in the research. Parents of learners with visual impairment were given letters requesting their consent to their children's participation in the research focus group discussion.

Finally, adhering to the ethical consideration in dealing with reporting of the end product of the research, no fabrication and plagiarism was practised. The researcher obtained written informed consent from research participants prior to making the recordings. Once the research is completed, all information will be kept in a safe place and only the participants and the supervisor will have access to the research data.

3.11 Summary

This chapter focused on the methodology that will be used in this study. An explanation of qualitative research as a method for data collection and analysis has been given. Measures followed during the data collection are discussed in this chapter and the information about the sample was provided. The next chapter presents the findings of the study.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.1 Overview

The previous chapter presented the methodology that was used to undertake the study in which different methods and techniques were employed to get information for the study. Therefore, this Chapter carries a presentation of the study findings based on the research questions that were raised in chapter one. The study findings were presented using common themes generated from research questions, as well as verbatim expressions made by the participants during data collection. The chapter is arranged according to the order of research questions as follows: what forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment; what are the virtual learning needs of person with visual impairment in a home environment; what are the determinants of accessibility of virtual learning in a home environment; and what are the alternative interventions in use on virtual learning for person with visual impairment? The findings are presented in themes and verbatim. The results showed that various themes emerged from the interviews.

4.2 Demographic information

The table below provides details of the sample size for the study which had a total number of fifteen participants. Table 1 below shows the distribution of respondents by status and gender of participants.

Table 1 Distribution of Respondents by Status and Gender

Status	Gender		Total
	Male	Female	
Learners	5	2	7
Parents	2	5	7
Head teacher	0	1	1
Total	**7**	**8**	**15**

In relation to status and gender of the participants, there were seven males out of that number five were male learners while two were male parents. There were eight female participants who participated in the study. Out of this number, five were female parents while two were female

learners and the remaining one was he female head teacher. In case of seven parents who took part in the study, all were parents of children with visual impairment.

When the head teacher was also asked to indicate how long she has been working with learners with visual impairment and the response gotten was that she has been working with learners with visual impairment for more than 7 years now. The study targeted grade seven and nine as they are in examination class.

4.3 What forms of teaching and learning of virtual learning being utilised in a home Environment for person with visual impairment?

One of the questions asked was finding out how often parents interact with their children with visual impairment in terms of helping them with school work. The findings showed that some parents always help their children with visual impairment on a daily basis while some they don't help at all citing they don't know how to read braille, other because of work commitments as they knock of late and tired.

4.3.1.1 Parents Help children

The theme that emerged from the findings was that some parents on the daily basis help their children. This either by supporting them with gadget to use to connect to virtual learning or reading for them when the teacher has sent work. In support of the above findings, participant (P4) said:

> *I help my child very often, when I am around I make sure that I help my son to do the work which the teacher send to him.*

Another participant (P2) indicate that:

> *I often help my child but the challenge is lack of material like braille paper to use to write the work received through WhatsApp from her teacher.*

When the same question was asked to the learners during a focus group discussion, participant (L6) had this say:

> *I often interact with my parents when teachers send work on my mother's phone, my parents they help me with school work, by making sure I read what teacher has sent and able to write them down.*

4.3.1.2 Parent don't help children

Another theme that emerged from the findings was that some parent doesn't help their children. Contributing to the same subject; during the interviews participant (P1) lamented that:

> *As for me it's difficult to help, as I still don't know how to write and read in braille because even if I tell her what to do when the work is sent from the teacher. I can't read what she will writes.*

Another participant (P4) lamented that:

> *No! I don't due to other job commitments, but I supervise the answering of tasks sent by the teacher sometimes especially during the weekend. I rarely do that because I'm always away from home.*

However, the findings show that participants acknowledged helping learners by parents but to others parents are not there for them.

4.3.2.1 Familiarity with ICT and Assistive Technology

As regards to familiar participants are with ICT and Assistive Technology for learner with visual impairment. A question was asked to the participants if they are familiar with ICT and Assistive Technology for learner with visual impairment. The theme which emerged was that some parent were familiar with computer and some smart phone gadgets which has to be installed with screen reader called JAWS which provides text-to-speech and braille output. This text-to-speech software can help those who are blind or visually impaired use computers and also can read scanned printed material. In response, participant (P6) had this to say:

> *As a parent, with this virtual learning, children with visual impairment can access their respective learning by using computers and related facilities via the use of internet, the most common one lately is the use of a hand held device like mobile phone, iPads and computers with JAWS.*

Contributing on the same, participant (P2) said:

> *Yes, computers and big phones. The best gadgets for the blind are those with either a Windows or MAC operating system because they have quality built-in accessibility options. Windows and MAC offer screen reading software, screen*

magnifiers, text-to-speech, and more programs to assist individuals with visual impairment. That's the kind of a laptop even my child uses at home.

In confirmation, during focus group discussion with learners, participant (L4) said

I am using a computer which talks at home to study, in short, I play it then it reads for me, and then I am following.

On the same, participant (L1) had this to say:

I know some gadgets to help me with studies such as smart phones and computer. I have a computer at home which narrates the elements on the display as the user navigates around the screen via the keyboard. My teacher send work on my email which I download to read and at sometimes we used to have a zoom meeting with the teacher.

4.3.2.2 Not familiar with ICT and Assistive Technology

While with some parents they don't know the type of ICT and Assistive Technology that can be used by learner with visual impairment in a home environment. Participant (P7) during interviews indicated:

No, I am not familiar with ICT and assistive technology which my child can use apart from the phone if I had a smart phone. For me I can say that am not very much familiar with these things, and I think not each and every child has access to these things and maybe I can't even afford to buy them.

It can be confirmed that the most common ICT and Assistive Technology for learner with visual impairment which are familiar, include computers, laptop and smart phones with screen readers. Although same parents can't afford them due to vulnerability.

4.3.3. Forms of technology facilities used for learning

In an attempt to understand the forms of technology facilities being used by learners with visual impairment during virtual learning at home. A question was asked to find out from the participants on the forms of technology facilities being accessed to support learning among the visually-impaired at home.

Another theme that emerged from the findings was that learning was taking place by with some form of technology facilities which are accessible. Using some form of technology facilities most participant in this study indicated computers or smart phone that enables them to access the internet and their online learning which had screen readers, or uses a screen magnifier which has also WhatsApp, zoom, google meet/ classroom or email on it at home.

4.3.3.1 Using of WhatsApp zoom, google meet/ classroom or email on phone

WhatsApp on the phone came out to be one form of technology which children with visual impairment were using to support their virtual learning in a home environment. In support of the findings above, participant (P2) had this to say:

> *The teacher has been sending work and other assigned tasks for my child on my phone. The teacher uses WhatsApp for conducting lesson with my child; and some work are sent on my email.*

Contributing on the same participant (L3) had this to say during focus group discussion:

> *I use the smart phone for mum when I want to ask something from teacher and teacher know phone number for mum so he sends work using mum's phone.*

Other parents indicated Facebook Messenger, Google Classroom, zoom has some of the convenient forms of virtual learning facilities they use with their children with visual impairment at home. Using this platform, the teacher could create a class, tasks, announcements, or chats with his/her learners. Participant (P5) interviewed said:

> *With my son the teacher likes using Zoom on my phone. Using my phone my child is able to engage with the teacher and raises questions to the teacher. When we experience slow connections, the teacher even writes the important messages on chat boards. With this platform, child feel comfortable and easy to learn.*

4.3.3.2 Using of Zoom, google meet/ classroom or email on computer

Another theme that emerged from the findings was the use of Zoom, google meet/ classroom or email on computer. Those children with computer at home where accessing virtual learning were using zoom, google classroom to have discussion with their teacher and sometime the teacher could email the work. This confirmed by participant (L3) during focus group discussion:

My teacher used to teach me using Zoom or google Classroom when Zoom has a problem. I download work sent to me on email and put on the computer for me to be reading from there.

Contributing to the same subject; the participant (HT) had this to say:

This children with visual impairment need a computer, laptop or smart phone with speech reader with instilled software like WhatsApp, zoom, google meet or Facebook messenger.

4.3.3.3 Using of radios and TVs

Another great theme that emerged from the findings was the use of radio and television to access virtual learning organized by government through nation broadcasting media. In support participant (P1) indicated that:

My child just listens to those lessons on Edu.TV on Zambia national broadcasting services since they closed school and there is another radio which broadcast the lesson for different grade although I don't know the timing for each grade.

Contributing on the same another participant (P4) had this to say:

As at now we can say that yes there are these radios and TVs but not all of our learners benefit from these facilities. We need a writing frame and braille paper to use at home. Because sometimes the teacher sends the work which needs to listen to and able to written them down.

4.3.4 Not learning at home during closure of school

During the data collection trying to find out on form of technology facility children with visual impairment use in a home environment theme that emerged was that children were not learning due to lack of any form of technology facility to use for virtual learning. It was narrated that some parent lack of knowledge of ICT and Assistive Technology for learner with visual impairment and lack of resources to secure them, their children had no learning from school and using any platform offering virtual learning. Commenting on the same, participant (P7) had this to say:

> *Some of the families are coming from poor backgrounds of which these things are expensive and are not even accessible gadgets for ordinary parent like me to afford to buy for my child to be using for virtual learning at home*.

The findings show that the majority of the respondents accessed learning material through various mobile devices, with mobile phones being the primary device used for virtual learning. The WhatsApp platform on the phone was the most used software by learners during virtual learning. The availability of mobile phones helped online learning succeed because most learners with visual impairment used their mobile phones in this context. Although these virtual learning platforms are available, the availability of resources could be the hindrance why some learners or teachers could not utilize them virtual learning at home during covid-19 school lockdown.

4.3.5 Respond to alternative mode of learning

When a follow up question was asked on how child with visual impairment respond to alternative mode of learning in the home environment. From the responses gotten participants theme that emerged from the findings indicated that it is enjoyable and exciting for learners with visual impairment to learn using online. At the beginning, it was difficult for them, but with time got used. To some children with visual impairment, it is their first time to utilize these platforms and they had difficulty accessing them. Although some could not afford buying gadgets to use to access virtual learning. Reacting to the question, participant (L2) had this to say:

> *Learning using a computer when connected to internet it's exciting and enjoyable, you can even interact with the teacher and other learners when they are connected also. Sometimes when using mum's phone my teachers used to ask question on WhatsApp. It used to be like am just chatting with the teacher while learning using a phone.*

On the other hand, to some children, they thought that this crisis is temporary and they had preferred to go on vacation rather than to learn or to study, but they were also those who are eager to learn and stay positive that this crisis would not last long. Contributing on the same, participant (L3) said:

There was nothing progressive on my school. For me during the period of covid-19 school lockdown I was doing nothing, I don't have a phone or a computer to be going online, for me it was just another holiday doing nothing at home.

The findings generally showed that some children with visual impairment had access to a phone or computer where WhatsApp, zoom were mostly used to access learning during this covid-19 school closure and the inability by others to have ICT gadgets made it difficult to access learning while in the home environment

Table 4.3.1 showing emerging themes

Key words	Near themes	Emerging themes
▪ Helping on daily basis ▪ Familiar with ICT/Assistive technology ▪ Not familiar with ICT/Assistive technology ▪ Technology facilities	▪ The often interaction ▪ Job commitment ▪ Gadgets such a computer and phones ▪ Accessibility to internet ▪ Accessibility of online learning with computer and phone ▪ Learning through Radio and TV	▪ Parents help ▪ Computer with JAWS ▪ Smart phone with screen reader ▪ WhatsApp, Zoom, Google meet and Email instilled on phone and computer ▪ Use of radio and TV

Clearly, from the above verbatim, near themes analysis were generated from common or key words. The following themes emerged under forms of teaching and learning of virtual learning being utilised in a home Environment for person with visual impairment which included parents help, having computer with JAWS and smart phone with screen reader. Then WhatsApp, Zoom, Google meet and Email instilled on phone and computer and use of radio and TV in accessing online lessons.

4.4 What are the virtual learning needs of person with visual impairment in a home environment?

It should be recalled that another objective of this study was to establish virtual learning needs of person with visual impairment in a home environment. One of the questions participants were asked was to describe their experience with the Virtual learning needs and technical

support a child with visual impairment require for using virtual learning environment at home to access lessons or material for learning. The findings showed various themes that emerged from this objective. Through the process of analyzing the themes that emerged from this research study, child with visual impairment require computers with JAWS, smart phones with speech reader and readily available internet facility for using virtual learning environment at home. While others need radios and TVs so that they can benefit and listen to those lesson provided on those platforms by the ministry of general education.

4.4.1.1 Computer with JAWS

The theme that emerged from the findings on virtual learning needs for person with visual impairment was computers with JAWS. JAWS, Job Access With Speech, is the world's most popular screen reader. JAWS will assist users who are blind or low-vision to use a Windows computer. JAWS has a variety of features, including Braille support, multi-lingual speech synthesis, and multi-screen support. In support of the findings, participant (P6) said:

> *The children require ICT and assistive technology such as computers fitted with software's such as JAWS. They help visually impaired users to read and select text or move to different elements on the page with it.*

Contributing to the same subject; participant (HT) had this to say:

> *As a school we have not fully engaged in virtual learning but we have a computer lab for them in school. But teachers were encouraged to engage learners during Covid-19 school closure within their own means. That is by using their computers and smart phone whenever they have bundles to send some work to their learners in order to keep them busy during this time they are way from school due to Covid-19. As we believe some parents have got computers and smart phone.*

Contributing to the same subject during focus group discussion, participant (L7) had this to say:

> *I just need a computer instilled with jaws*

4.4.1.2 Smart phone with speech reader

Another theme that emerged from the findings on the virtual learning needs of person with visual impairment in a home environment was having Smart phone with speech reader. In support of the finding, participant (P4) had this to say:

> *When having a phone with speech reader then a child with visual impairment can access virtual learning with a teacher from school while am home.*

In contribution the participant (HT) had this to say:

> *Looking on what learners with visual impairment need in order to access virtual learning at home. Most of our parents have phones, they just need a smart phone with a speech read a software they can just down load and install on the phone. When it comes to phones yes! maybe the issue of bundles can come in, in that instance we can also ask or lobby to the government to introduce free internet to all learners with visual impairment during this period of Covid-19.*

Also, participant (L2) from the focus group discussion has this to say:

> *For us children with visual impairment to learn on the internet, we need a computer or a smart phone, line me I use a phone for mum she has installed speech reader on it*

4.4.1.3 Access to internet facility

Another theme that emerged from the findings was the virtual learning needs of person with visual impairment is access to internet facility. Participant (P5) said:

> *We need readily available internet facility. So children in home they don't have access to a computer or an internet connection. Having internet connectivity can allows the child to be holding a video conference with teacher*

Contributing on the same participant (L5) from focus group discussion said:

> *We need internet connective or money to buy data buddle to use to connect to internet*

The participant (HT) said:

With internet connectivity of buddle teachers can also make use of the internet by proving the students with extra study material and resources such as interactive lessons, educational quiz as well as tutorials. Teachers can record their lesson and provide it to the students for revisions which is better than reading from notes

4.4.1.4 Having radio or TV

Another theme that emerged from the findings was having a radio or TV. The national broadcast ZNBC televised pre-record lessons which learners with visual impairment could listen to. In support participant (L5) indicated that:

Sometimes when you talk of these radios and TVs, they do not use internet they can be accessible anywhere. So, parent should be aware that there are lessons being televised on TV and radio which our children can listen to in the comfort of their homes.

Clearly, from the above themes, namely having computer with JAWS, smart phones with speech reader, available internet connectivity and radio or TV have implications on the teaching of learners with visual impairment using virtual learning in a home environment.

4.4.2 Benefits of virtual learning to child with visual impairment

When a question was asked on how virtual learning has benefited the children with visual impairment. One of the themes that emerged was no transportation of going to a learning instituting. Online learning made their lives easier because there were no travel plans to make or commuting hassles to manage. In response, participant (P3) had this to say:

One benefit of online classes is the fact you no longer have to worry about transportation to and from an outside location. Instead, your classroom comes to you in your own home! If you have a computer or smart device, you will have access to these online resources. If transportation was prohibiting you from taking on-site classes, this is a great opportunity for you to look into online classes.

Contributing on the same, participant (P1) had this to say:

During this time of covid-19, virtual learning has helped my child to stay home where it's a bit safe and keep others safe and avoid crowded places like in school and buses when going to school.

Yet from the focus group discussion, participant (L1) said:

> *We are able to interact and it is motivating. It is also an important element that facilitates the learning subject material while at home. Each of us can contribute their views and experience in the subject matter. In my opinion, this enriches my learning a lot.*

In addition, the participant (HT) had this to say:

> *The COVID-19 pandemic taught us the importance of wearing masks and maintaining social distance as a way of protecting public health. With virtual learning, children can stay home when sick without missing out on too many lessons. Not only is this a more comfortable way to learn when they're under the weather, but it also shows the teacher that you value the wellbeing of the entire class. That's why as a school we are striving to have permanent connectivity of internet since we have computers for visual impaired in place.*

Another vital theme that emerged was access to learning materials online. On access to learning materials as a benefit of virtual learning, these were some comments made by participant (L4):

> *Before we start the online lessons, sometimes the teacher put the lesson notes online that is through our emails and WhatsApp groups and this help us to make advance preparation before lesson start.*

Another vital theme that emerged was continuity learning. Continuity of learning is the continuation of education in the event of a prolonged school closure due to Covid-19. In support, participant (L2) said:

> *It made us to continue learning while at home during the school closure due to escalating covid-19 cases.*

Another participant (P7) had this to say

> *The communication with teacher has made my child not to remain behind completely, otherwise he is kept busy during this time, teacher send a lot of work for him to read and write*

Yet another theme that emerged was learners learn at their own pace. This was evident from participant (L3) and (L7) had this to say:

> *When the teachers were teaching online, I record the lesson and listen to it at the time. More so, there are times that I am assisted to access the platform after lessons for information. I for instance, I normally listen to audios sent to us by the teacher in the night and this gave me the opportunity to be able to understand the concepts as compare to the traditional classroom where every student is supposed to be in class at the same time and start the lesson together*

From the study, it is clear that in order for learners with visual impairment to experience virtual learning they need a computer or a smart phone with speech reader while connected to the internet should be available and some a radio or a television is ideal to access lessons while at home.

Table 4.4.1 showing emerging themes

Key words	**Near themes**	**Emerging themes**
▪ JAWS ▪ Speech reader ▪ Data bundles ▪ Pre-recorded lessons ▪ Home environment	▪ Computers and phone fitted with speech software ▪ Internet connectivity ▪ Having data bundles ▪ Edu. Radio/Tv lesson broadcasting ▪ No movement to school ▪ Enhance continuity in teaching and learning from home	▪ Computer with JAWS ▪ Smart phone with screen reader ▪ Access to internet facility ▪ Having a radio and TV ▪ No transportation ▪ Accessing to learning materials online ▪ Continuity in learning at while at home

Clearly, from the above verbatim, near themes analysis were generated from common or key words. The following themes emerged under virtual learning needs of person with visual impairment in a home environment which include computer with JAWS, smart phone with screen reader, access to internet facility, having a radio and TV, no transportation, accessing to learning materials online, and continuity in learning at while at home

4.5 What are the determinants of accessibility of virtual learning in a home environment?

This objective was trying to asked participants on the determinants of accessibility of virtual learning in a home environment. They were asked on to describe their positive experiences on accessibility of virtual learning in a home environment for children with visual impairment. The findings showed various themes that emerged from this objective.

4.5.1 Determinants of accessibility of virtual learning in a home

The findings showed various themes that emerged from this objective. It was found that accessibility of virtual learning in a home environment depend on internet connection and having rightful gadgets which are user-friendly to individual with visual impairment. It was found that some families may have access to technology like computer with internet, smart phones, TV, radios and DVD player. Videos can be shared with families in DVD format or on a flash drive if possible. Some online content can also be accessed "offline" on a computer or tablet.

4.5.1.1 Rightful gadgets

The theme that emerged from the findings is having rightful gadgets. That is having a computer or smart phone which user-friendly. In support, participant (P7) had this to say:

> *When having assistive technology like smart phone, TV, computer they help a lot since the child does not need to move to a far place to learn. A child will still learn while at home by using the type of ICT facility someone has.*

Contributing to the same subject; another participant (P2) had this to say:

> *The positive experience of accessing virtual learning in a home is that the child will not miss out on learning. The child is able to access education within the*

comfort of the home environment by using a phone. This reduces the time spent on going to and from school

Also, participant (L3) during focus group discussion said:

It was helpful since I was able to learn at home. Dad bought a computer for me to be using.

4.5.1.2 Internet connectivity

Another great theme that emerged from the findings when participants were asked to describe their positive experiences on accessibility of virtual learning in a home environment for children with visual impairment. Internet connectivity came out has an emerging theme. For everyone to access virtual learning content you need to be connect to internet. One needs to have data bundles. In support the, participant (HT) had this to say:

I think, there is need to have internet connection on a computer or smart phone, which is not easy for most of the parents again. But teachers were encouraged to find means to continue interacting with learners as they are home by sending work to children through WhatsApp on phones and emails. Those who are teaching examination class were even using zoom to teach the learners who have access to zoom through their parents' phones.

4.5.1.3 Socio-economic background

To those children coming from well to do families noted that virtual learning is convenience as it enables a person to experience less trouble accomplishing a task, or possibly a lighter schedule or workload. On the other hand, those child with visual impairment from low socio-economic background never accessed virtual learning during covid-19 school closure. Participant (P5) commented that:

With me, think parent respond to the needs of their children according to their financial capacity. Some of our fellow parents were able to buy what was needed for their child with visual impairment to access online learning, but some of us, money is hard to find, you can see only have a small phone, I can manage to buy a smart phone. But my wish is to have a computer or tablet for her to be using.

4.5.2. Challenges faced to accessing virtual learning at home

As beneficial the virtual learning in a home environment to learners with visual impairment during the covid-19 pandemic, there were still some noticeable challenges, it is so bad to the extent that ICT seem not to be fulfilling the purpose of existence among children with visual impairment. When parents were asked to indicate the challenges their visually-impaired child faced when accessing and using virtual learning facilities in learning in a home environment. The findings showed various themes that emerged from this objective.It was found that most of the children with visual impairment had no ICT facilities of their own, faced issues to do with internet speed, online access due to poor network, high cost of data; high cost of ICT facilities. Very few among students, were able to afford the procurement of data to stay connected online, coupled with the fact that people were unable to move freely during covid-19 pandemic lockdown in search of daily foods talk less of having more funds on them to procure data to actively stay online and have easy access to online teaching-learning process.

4.5.2.1 Low socio-economic background

As most of the parent are coming from a low background it difficult to have enough recourses to buy ICT facilities for child with visual impairment. There are also some other issues that the learners faced; such as, the lack of digital skills in using a computer, the need for all online learning equipment. This was as result of high cost of ICT facilities and parents lack resources to purchase them. Some of the views given by the participants for example, included the following as indicated in transcribed verbatim, participant (P1) said:

> *It is very difficult to improve on the learning of my child through virtual learning as most of the parents with these children are like me, we are vulnerable, and we can't manage to buy these equipment. Also, to some parents and our children it new so they know nothing about it.*

Yet another participant (P2) had this to say:

> *For me, as of now I can say that there is no any positive experience which I have experienced the reason is simple the government and the parents are not working together, unless when they will start doing that, that is when we will see the positive experience that will show something positive starts coming out, because*

in the first place the government should help parent to purchase needed ICT facilities for virtual learning.

4.5.2.2 Poor Internet connectivity

Poor internet access hinders student access to virtual learning platforms. Another great theme that emerged from the findings with regard to challenges is poor internet connectivity. When the same question was asked to children with visual impairment during focus group discuss, children faced issues to do with internet speed, online access due to poor network, high cost of data, participant (L4) has this to say:

Lack of internet buddle and lack of electricity. Internet is sometimes so slow that you end up leaving the work you were doing

Another participant (L6) said:

The problem that I face is internet connection, because I don't have enough money to buy airtime. Most of time I used find that my parent they don't have money to buy data bundle for me. My parents are not working to buy a device for accessing internet

Yet another participant (L7) had this to say:

The problem that I will face is internet connection, because I don't have enough money to buy airtime, my parents are not working to buy a device for accessing internet

Contributing to the same subject; participant (HT) had this to say:

The major challenge is that of internet connectivity, the internet is not reliable. As I earlier alluded the other challenge is that these learners are coming from the vulnerable households, where parents cannot afford to buy these things.

4.5.2.3 Unconducive home environment

Another great theme that emerged from the findings with regard to challenges in teaching using virtual learning among learners with visual impairment is unconducive home environment. The challenges faced by children with visual impairment in a home environment were not only

technology related, but also social factors had an impact on how they experienced virtual learning. Some respondents indicated that their home environments where they stay is not conducive for learning. In support of this view, participant (L2) stated that:

> *Some of us stay in noisy places, not finding a quiet place. And the facilities I have to access virtual learning are shared at home so my time to be online is very limited*

Contributing to the same subject; participant (P1) commented that:

> *Some of us stay in noisy places. Not finding a quiet place when it come for my son to study*

4.5.2.4 Limited access to peer support.

Another them which emerged was limited access to peer support. Peer support has been paramount to the visually impaired. However, during online studies where students stay apart, it is difficult for students with visual impairment to access the support of their sighted peers which affect their use of virtual learning platforms. These were some comments of participant (L5):

> *During face-to-face instructions, our friends in the same classroom give support by explaining concepts to us which make our learning easy as compare to the virtual learning where every child is at his/her home. Peer support is very important in every academic endeavour but we students with visual impairment lost that opportunity during the virtual learning.*

Generally, the findings show that this children with visual impairment they lacked the experience and confidence to learn using virtual learning. Many of them really could not access virtual learning in a home environment due to lack of computer or phone with bundles to go online. Therefore, some learners with visual impairment faced a challenge in accessing virtual learning in a home environment as most of them come from vulnerable homes.

Table 4.5.1 showing emerging themes

Key words	Near themes	Emerging themes
▪ Teachers and learners not having appropriate computer and phones to support virtual learning ▪ Lack of internet facility at home ▪ Low standard of living status ▪ Living in noise places	▪ Having a computer and phone with software that support online learning for VI ▪ Having data bundle to connect to internet ▪ Lack of financial capacity ▪ Lack of resources ▪ Lack of internet ▪ Noisy home place ▪ Lack of peer interaction	▪ Rightful or appropriate gadgets ▪ Internet connectivity ▪ Socio-economic background ▪ Low socio-economic background ▪ Poor internet connectivity ▪ Unconducive home environment ▪ Limited access to peer support

Clearly, from the above verbatim, near themes analysis were generated from common or key words. The following themes emerged under the determinants of accessibility of virtual learning in a home which include rightful or appropriate gadgets, internet connectivity, socio-economic background, low socio-economic background, poor internet connectivity, unconducive home environment and limited access to peer support

4.6 What are the alternative interventions in use on virtual learning for person with visual impairment?

The participants were asked on the support mechanisms that should be put place to support the development and delivery of virtual learning environment for learners with visual impairment. The findings showed various themes that emerged from this objective.

4.6.1.1 Social Support

Through the process of analysing the themes that emerged from this research study, parents indicated that they need social support from well-wisher like donor community and government to support them with ICT gadgets specifically designed for children with visual impairment. They indicated that if IPad that have speech reader if they can be donated to these children can be of help to them. Other indicated to access to free internet, braille paper, supply of books in braille and in large print and provision on writing flame and stylus to use at home can be provided. In support of this participant (P7) indicated:

> *Our wish is for Donors to come on board to give parents computer or smart phones that can be used at home by our children with visual impairment. To buy more learning aids which they can be using at home to enhance accessibility and usage of virtual learning.*

In support of this view, participant (P4) stated that:

> *We need the provision of internet services to learners with visual impairment and with ITC gadgets instilled with speech readers or JAWS.*

Yet, participant (P5) said:

> *There is need for a donor who can empower the parents to children with visual impairments in terms of providing computers and smart phones for their children with visual impairment to use for online learning at home.*

In support, participant (HT) had this to say;

> *We need a donor who can provide these children with computer, iPad or phones with speech reader and free internet as some of us we can afford them. Also books in braille and in large print of those with low vision. We also need a Perkins*

brailler since using a writing flame becomes tedious, writing is also important we also need braille paper.

On a contrary participant (L4) said:

At the moment the support is not yet made available. The need for support is very inevitable.

4.6.1.2 Financial support

Another theme that emerged from the findings was the need of financial support. The findings showed that parents cannot provide the needed resources for virtual learning to their children on their own, they need help from cooperate world if they had to buy the needed ICT facilities for learner with visual impairment. Some of the views given by the participants included the following as indicated in transcribed verbatim. For example, participant (L4) stated that:

I don't work, what am asking from people who can help me with money so that I can buy what is required for my child to be learning online

Contributing to the same subject; participant (L2) during focus group discussion had this to say:

I need money, I need support in buying of computer or smart phone to use, with support of buying of bundles.

Yet, participant (HT) commented that:

What some don't have is money, any assistance toward buying even a smart phone can be very helpful to them.

The results show that parent need much support from well-wishers or donors who can in supply them with ICT and assistive technology for children with visual impairment which they can be using in the home environment.

4.6.2 Solution to improve virtual learning

In an attempt to further establish a lasting solution to virtual learning among individual with visual impairment, participants were asked on what they think should be done to improve the delivery of education through virtual learning for learners with visual impairment. From the

results when it comes to online learning, it demands improved utilizing of technology is absolutely crucial for it to succeed.

4.6.2.1 Conferencing

Some of the best ways teachers can use technology to help create great learning environments for their students include conferencing. Parents suggested to teachers to be utilizing a variety of technology options. In support of the view, participant (P7) indicated:

> *Teacher can start using video and audio-conferencing systems using a smart phone, which I believe parents have phones, a teacher can explain concepts in a way that learners can understand just online while at home.*

Contributing to the same subject; participant (L1) during focus group discussion had this to say:

> *My teacher should continue teaching using conferencing. It was bringing the class together as he used to teach us at one by audio call*

4.6.2.2 Virtual resources Centre

Some parents proposed that teachers should open up virtual resources Centre for learners to log on and chat or download work for themselves. Chat channels can allow students to discuss things with their online class and have easy ways to connect even when they are far apart. In support of the findings, participant (P6) said:

> *I think teachers can just open up work bank in audio and video formant on the internet were the teacher can be positing work for the children and children can be accessing information or school work direct from there.*

In view of this, participant (HT) commented that:

> *With time, I this we planning when we open the website, we have to a part where teacher can be uploading the work both in text and audio according to grades, were children be downloading to read while at home.*

4.6.2.3 Parental involvement

Further, another vital theme that emerged during the interview was parental involvement. It was cited to play a huge role during this period in the education of children's school success. It's extremely valuable to teachers to communicate with parents about how they anticipate the lockdown will go so that parents can help and ensure their children have the equipment, setup, and technological skills they will need to succeed. Working with parents and talking to them often can help them feel successful as they help their learner navigate the lockdown due to covid-19. Participant (P5) said:

> *I think this is the time the teachers and us parents for these children with visual impairment we need to work together because some of the things (ICT and assistive technology) we need for my child to be using when learning online I don't know them, so the teacher should orient me on what I should have or buy for my daughter to continue learning here at home.*

When a follow up question was asked if teachers visit these children to strength the collaboration and making sure the children are doing the work being sent by the teacher. Parents confirmed that some teachers opt to visit, and have time with learners to see what they have been doing with work they send. In support participant (P1) had this to say:

> *At school where she goes they do what they call home-based learning where a teacher come home and teach at their own time, yes, they do that here. Although it is not that much again because I have only seen the teacher maybe once in a week or twice.*

4.6.2.4 Improvement in Lesson Content presentation on TV and radio

Another theme that was cited is urgent need to improve on lesson content presentation being aired on ZNBC. There is a lot of irregularities to how lessons are presented to make learners with visual impairment understand. In contribution, participant (P3) had this to say:

> *The other thing is that let us all including the government sensitize the importance of virtual or online learning, yes, we are in the covid-19 era where covid-19 is rampant as at now. so, these things are very much important and they can help us*

all in order for us to prevent this disease, so when the government comes in sensitize, deploy teachers with visual impairment who can teach via online on TV 3 and radios and the rest those things that are accessible even in deep rural areas because when you talk of a radio, a radio can be accessible as far as typical remote area. So, when the government has got that, they introduce programs that can also suit these learners with visual impairment then we shall appreciate and this country will go far in making education accessible to learners with visual impairment.

In addition, on the same, participant (P6) had this to say:

Let government also make these things such as the radios, TVs, phones accessible to each and every individual by the virtual of doing that maybe removing taxes so that those parents who are poor can afford to buy them to assist learners with visual impairment. Also, there is need improve on content of lesson by teachers who teaches on TV. In that part will shall appreciate and will shall say boss you are moving in the right direction for our children with visual impairment.

4.6.2.5 Low prices on ICT equipment for the visually impaired

One of the themes that emerged under this objective was the issue of lowering prices on ICT equipment for the visually impaired. The ICT equipment for children with visual impairment to use for virtual learning are expensive. Contributing on what should be done to improve the delivery of education through virtual learning for learners with visual impairment; participant (HT) had this to say:

There is need to encourage the procurement of ICT equipment for learners with visual impairments at discount price. Also, there is need of partnership with internet service providers to provide internet services to learners with visual impairment. Engage teachers who have need trained in handling learners with visual impairment with ICT and raise an awareness on parents to buy smart phones and bundles for their children with visual impairment to be accessing virtual learning

It can be a good thing if learners with visual impairment are introduced to virtual learning as a way of delivering lessons would very beneficial because leaners will be able to learn even at

home and will not miss out especially in a situation of pandemics like covid-19. What is lacking these children with visual impairment majority of them are coming from families with low socio-economic status who can't afford to buy ICT and assistive technology to use for virtual learning at home.

Table 4.6.1 showing emerging themes

Key words	Near themes	Emerging themes
▪ Donors to come on board to give parents computer or smart phones to use for virtual learning ▪ Parent need money to buy VI materials ▪ Improves teaching experiences through pre-recorded audio video lessons ▪ Foster working together ▪ Improve on lesson content delivery ▪ Advocacy for affordable ICT equipment for VI	▪ Lobby well-wisher like donor community and government to support them with ICT gadgets ▪ need support for fund to support purchasing of ICT equipment for VI ▪ Create work bank of audio and video of lesson ▪ Stimulating Strengthening parental collaboration ▪ Increase on lesson content presentation on TV/radio ▪ Promoting in affordability of on ICT equipment for VI	▪ Social support ▪ financial support ▪ conferencing lesson presentation ▪ creation of virtual resources centre ▪ promote parental involvement ▪ improvement in lesson content presentation ▪ lowing prices on ICT equipment for VI

Clearly, from the above verbatim, near themes analysis were generated from common or key words. The following themes emerged under alternative interventions in use on virtual

learning for person with visual impairment such as social support, financial support, conferencing lesson presentation, creation of virtual resources centre, promote parental involvement, improvement in lesson content presentation, and lowing prices on ICT equipment for VI

4.7 Summary

This chapter presented the findings of the study in line with the research questions. The study found that Result showed that some parent were familiar with computer and some smart phone gadgets which has to be installed with screen reader called JAWS which provides text-to-speech and braille output. The forms of technology facilities being accessed to support learning among the visually-impaired at home were computers or smart phone that enables them to access the internet and their online learning which had screen readers, or uses a screen magnifier which has also WhatsApp, Facebook messenger, zoom, google meet/ classroom or email on it at home. The findings generally showed that child with visual impairment require computers with JAWS and readily available internet facility for using virtual learning environment at home. While others need radios and TVs so that they can benefit and listen to those lesson provided on those platforms by the ministry of general education. Also, it was found that accessibility of virtual learning in a home environment depend on internet connection and having rightful gadgets which are user-friendly to individual with visual impairment. The study found that children with visual impairment had no ICT facilities of their own, faced issues to do with internet speed, online access due to poor network, high cost of data; high cost of ICT facilities. Other issues that the learners faced; such as, the lack of digital skills in using a computer, the need for all online learning equipment. Although these virtual learning platforms are available, the availability of resources could be the hindrance why some learners or teachers could not utilize them virtual learning at home during covid-19 school lockdown. The study showed that they need support from well-wisher like donor community and government to support them with ICT gadgets specifically designed for children with visual impairment and encouraged the utilizing a variety of technology options, open up virtual resources Centre for learners to log on and chat or download work for themselves. There is need for a donor who can empower the parents to children with visual impairments in terms of providing computers and smart phones with internet connectivity for their children with visual impairment to use for online learning at home. The next chapter presents the discussion of the findings.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Overview

The previous chapter concentrated on research findings. The findings were presented in order of the specific research questions. This chapter gives attention to the discussion of the research findings. The theory Learned helplessness offers a framework by which the findings of this study are discussed. The discussion of the research findings is discussed in order of the research objectives which were to:

i. To describe forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment.
ii. To establish virtual learning needs of person with visual impairment in a home environment
iii. To explore the determinants of accessibility of virtual learning in a home environment.
iv. To explore the alternative interventions in use on virtual learning for person with visual impairment.

5.2 Forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment

One of the questions that was asked was to find out how often parents interact with their children with visual impairment in terms of helping them with school work.

5.2.1.1 Parents Help children

The findings showed that some parents always help their children with visual impairment on a daily basis while some they don't help at all citing they don't know how to read braille, other because of work commitments as they knock of late and tired. The theme that emerged from the findings was that some parents on the daily basis help their children. This either by supporting them with gadget to use to connect to virtual learning or reading for them when the teacher has sent work. In support of the above findings, one female parent indicate that she often helps her child but the challenge is lack of material like braille paper to use to write the work received through WhatsApp from her teacher. The children confirmed that they often interact with their parents when teachers send work on their parent's phone, parents help this

with school work, by making sure the child read what teacher has sent and able to write them down.

5.2.1.2 Parent don't help children

On the other hand, the findings were that some parent don't help their children. Contributing to the same subject; during the interviews one female parent lamented she it was difficult to help, as she doesn't know how to write and read in braille because even if she tells her what to do when the work is sent from the teacher, she can't read what she will writes. Other parents don't help due to *job* commitments as he is always away from home., but supervise the answering of tasks sent by the teacher sometimes especially during the weekend. However, the findings show that participants acknowledged helping learners by parents but to others parents are not there for them.

5.2.2.1 Familiarity with ICT and Assistive Technology

As regards to familiar of participants with ICT and Assistive Technology for learner with visual impairment. The theme which emerged was that some parent were familiar with computer and some smart phone gadgets which has to be installed with screen reader called JAWS which provides text-to-speech and braille output. These findings are similar to Affouneh et al (2020) who said that Screen Readers enables the blind to access most text-based computer displays output using speech generated by screen readers. In any case, the technology only perusing the content of the screen and changing over it to human speech. This text-to-speech software can help those who are blind or visually impaired use computers and also can read scanned printed material. This was confirmed by parents who said virtual learning can children with visual impairment access their respective learning by using computers and related facilities via the use of internet, the most common one lately is the use of a hand held device like mobile phone, iPads and computers with JAWS. Therefore, Home learning is one of the forms of teaching and learning of virtual learning being utilised in a home environment and provide access to learning at home for all pupils via a computer connected to the Internet. In addition, assistive technology and specialist software to support learning for all, including special adaptive technology for those learners with particular needs as to be provided. In other studies, the tape recorder and computers are frequently accessed and used by most of the learners with visual impairment. The best computers and big phones for the blind are those with either a Windows or MAC operating system because they have quality built-in accessibility options. Windows

and MAC offer screen reading software, screen magnifiers, text-to-speech, and more programs to assist individuals with visual impairment. One learner indicated that he has computer at home which narrates the elements on the display as the user navigates around the screen via the keyboard. The teacher send work on my email which he downloads to read and at sometimes zoom meeting with the teacher. Aboagye, et al (2020) support the findings that computer operating systems and common word processing applications usually have a range of accessibility options. These adjustments are important for the visually impaired students' learning process, thus providing them with higher contrast and can enlarge icons, display fonts and mouse cursors can be enlarged.

5.2.2.2 Not familiar with ICT and Assistive Technology

While with some parents they don't know the type of ICT and Assistive Technology that can be used by learner with visual impairment in a home environment. Children' level of access to such computers for accessing information was unsatisfactory. One parent during interviews indicated she was not familiar with ICT and assistive technology which my child can use apart from the phone if I had a smart phone. The findings correlate with the finding of Eligi, I. and Mwantimwa (2017), who found lack of awareness on the use of information technology devices in many of the high education institutions for visually-impairment students despite there being various devices designed electronically to meet the needs of such users.

It can be confirmed that the most common ICT and Assistive Technology for learner with visual impairment which are familiar, include computers, laptop and smart phones with screen readers. Although same parents can't afford them due to vulnerability.

5.2.3 Forms of technology facilities used for learning

In an attempt to understand the forms of technology facilities being used by learners with visual impairment during virtual learning at home. A question was asked to find out from the participants on the forms of technology facilities being accessed to support learning among the visually-impaired at home. The emerged theme from the findings was that learning was taking place using forms of technology facilities which are accessible. Children were using computers or smart phone to access the internet and their online learning which had screen readers, or uses a screen magnifier which has also WhatsApp, zoom, google meet/ classroom or email on it at home. This finding is also in line with the findings of Alturise (2020) who indicated that student

used platforms such as emails for submitting their assignments, Microsoft teams, Google, and Zoom platform for conducting some lectures

5.2.3.1 Using of WhatsApp zoom, google meet/ classroom or email on phone

The research findings under this theme indicated WhatsApp on the phone came out to be one form of technology which children with visual impairment were using to support their virtual learning in a home environment. In support of the findings above, one female parent had this to say the teacher has been sending work and other assigned tasks for my child on my phone. The teacher uses WhatsApp for conducting lesson with her child and some work are sent on my email. Contributing on the same one learner had this to say during focus group discussion said he uses the smart phone for his mum when he wants to ask something from teacher and teacher know phone number for his parent so he sends work using mum's phone. Findings resonated well with Bulman and Fairlie (2016) who revealed that most required ICTs facilities include hardware and software that matches the user needs and preferences of the visually-impaired students to facilitate their learning and allow them to participate effectively in an inclusive learning environment.

Other parents indicated Google Classroom, zoom has some of the convenient forms of virtual learning facilities they use with their children with visual impairment at home. These findings are in line with Reyes-Chua et al (2020)'s findings who said Google Meet has similar features with Zoom. Learners could be seen virtually and interact with their teacher. The findings were agreeable with Chopra et al. (2019), who said teacher utilizes mostly the free platforms such as: Google Classroom, Edmodo, Zoom, FB messenger, Google meet, We Chat, Schoology, and Moodle. Using this platform, the teacher could create a class, tasks, announcements, or chats with his/her learners. One of the parents interviewed said wwith her son the teacher likes using zoom on her phone. Using the parent's phone, the children were able to engage with the teacher and raises questions to the teacher. The teacher even writes the important messages on chat boards. With this platform, child feel comfortable and easy to learn.

5.2.3.2 Using of Zoom, google meet/ classroom or email on computer

Another theme that emerged from the findings was the use of Zoom, google meet/ classroom or email on computer. Those children with computer at home where accessing virtual learning were using zoom, google classroom to have discussion with their teacher and sometime the teacher could email the work. The findings were agreeable with Aguayo, et al (2017), who said

Google Classroom is one of the best platforms which could be accessed for free by an individual member. In this platform, the teacher could create a class, assignments, tasks, announcements, or chats with his/her students. This confirmed by one learner during focus group discussion the teacher used to teach using Zoom or google Classroom when Zoom has a problem he could sent on email and which he downloads and put on the computer for him to be reading from there. Therefore, children with visual impairment need a computer, laptop or smart phone with speech reader with instilled software like WhatsApp, zoom, google meet or Facebook messenger. The results of this study are in line with Reyes-Chua et al (2020), who revealed that most of the teachers find the Facebook Messenger to be one of the most convenient mode of alternative learning. Also, Chopra et al (2019) said visually-impaired students require computers to support learning which has multiple functions, for example writing, reading, listening and serving. Also, by using different software and programmes supporting recording and listening to audio-visual lecture notes, e-books and other contents accessible in PDF and HTML formats (Eligi and Mwantimwa, 2017).

5.2.3.3 Using of radios and TVs

Another great theme that emerged from the findings was the use of radio and television to access virtual learning organized by government through nation broadcasting media. The findings of the study are positively linked to those of Kaisara and Bwalya (2021), who reported that the use of radio and television broadcast as virtual learning solutions is a powerful way to bridge the digital divide in the education sector and reach the most marginalized learners. Parents indicated that child can also listen to those lessons on Edu.TV on Zambia national broadcasting services since they closed school and there is another radio which broadcast the lesson for different grade although she did not know the timing for each grade. Contributing on the same another parent acknowledged use of radio and TVs despite not all every learner can benefit from these facilities. However, there are still some important matters to consider they also need a writing frame and braille paper to use at home. Because sometimes the teacher sends the work which needs to listen to and able to written them down. This finding is in line with Fairlie, and Robinson (2013), who stated in his study that visually-impaired students can gain access to many learning materials through special assistive technology that allow them to take notes, read and answer examination questions

5.2.4 Not learning at home during closure of school

On the hand children were not learning due to lack of any form of technology facility to use for virtual learning. It was narrated that some parent lack of knowledge of ICT and Assistive Technology for learner with visual impairment and lack of resources to secure them, their children had no learning from school and using any platform offering virtual learning. Commenting on the same, one parent had this to say some of the families are coming from poor backgrounds of which these things are expensive and are not even accessible gadgets for ordinary parent like me to afford to buy for my child to be using for virtual learning at home.

The findings show that the majority of the respondents accessed learning material through various mobile devices, with mobile phones being the primary device used for virtual learning. The WhatsApp platform on the phone was the most used software by learners during virtual learning. The availability of mobile phones helped online learning succeed because most learners with visual impairment used their mobile phones in this context. Although these virtual learning platforms are available, the availability of resources could be the hindrance why some learners or teachers could not utilize them virtual learning at home during covid-19 school lockdown. Bulman and Fairlie (2016) support the view that assistive technologies are powerful tools for fostering the learning of the visually-impaired students worldwide through simplified access and retrieval information, contacting friends and sharing of information as sighted people do. ICT plays a crucial role in fostering the inclusion of the visually-impaired especially in learning activities

5.2.5 Respond to alternative mode of learning

When a follow up question was asked on how child with visual impairment respond to alternative mode of learning in the home environment. From the responses gotten participants theme that emerged from the findings indicated that it is enjoyable and exciting for learners with visual impairment to learn using online. At the beginning, it was difficult for them, but with time got used. To some children with visual impairment, it is their first time to utilize these platforms and they had difficulty accessing them. Although some could not afford buying gadgets to use to access virtual learning. Reacting to the question, a male learner said learning using a computer when connected to internet its exciting and enjoyable, you can even interact with the teacher and other learners when they are connected also. Sometimes when using

mum's phone my teachers used to ask question on WhatsApp. It's like you are just chatting with the teacher while learning using a phone.

On the other hand, to some children, they thought that this crisis is temporary and they had preferred to go on vacation rather than to learn or to study, but they were also those who are eager to learn and stay positive that this crisis would not last long. There was nothing progressive on my school. For them during the period of covid-19 school lockdown were doing nothing and don't have a phone or a computer to be going online, for some it was just another holiday doing nothing at home.

The findings generally showed that some children with visual impairment had access to a phone or computer where WhatsApp, zoom were mostly used to access learning during this covid-19 school closure and the inability by others to have ICT gadgets made it difficult to access learning while in the home environment

5.3 The virtual learning needs of person with visual impairment in a home environment

It should be recalled that another objective of this study was to establish virtual learning needs of person with visual impairment in a home environment. One of the questions participants were asked was to describe their experience with the Virtual learning needs and technical support a child with visual impairment require for using virtual learning environment at home to access lessons or material for learning. The findings showed various themes that emerged from this objective. Through the process of analyzing the themes that emerged from this research study, child with visual impairment require computers with JAWS, smart phones with speech reader and readily available internet facility for using virtual learning environment at home. This finding is consistent with those of Ruchi, Armstrong and Murray (2013), who asserts that students with visual impairment need tools to enable them to use computers with careen reader and internet connectivity. Screen readers are used to translate text to audio for those students who are totally blind, and screen magnifiers enlarge text and objects on the screen display for those students who have a small amount of usable vision. While others need radios and TVs so that they can benefit and listen to those lesson provided on those platforms by the ministry of general education.

5.3.1.1 Computer with JAWS

The theme that emerged from the findings on virtual learning needs for person with visual impairment was computers with JAWS. JAWS, Job Access With Speech, is the world's most popular screen reader. JAWS will assist users who are blind or low-vision to use a Windows computer. JAWS has a variety of features, including Braille support, multi-lingual speech synthesis, and multi-screen support (Armstrong, Murray and Permvattana, 2010). Also, one female parent said children require ICT and assistive technology such as computers fitted with software's such as JAWS. They help visually impaired users to read and select text or move to different elements on the page with it. The findings agreed with Lucky and Achebe (2012) who listed the most important ICT facilities that are beneficial in learning for the visually-impaired as the Computer, Video conferencing, the Internet and the World Wide Web (WWW).

The head teacher also indicates the school has not fully engaged in virtual learning but we have a computer lab for them in school. But teachers were encouraged to engage learners during Covid-19 school closure within their own means. That is by using their computers and smart phone whenever they have bundles to send some work to their learners in order to keep them busy during this time they are way from school due to Covid-19. As we believe some parents have got computers and smart phone. The children just need a computer instilled with jaws. This finding was in agreeable with the study of Gronlund et al. (2010) and Borg (2011) who supported the view that assistive technologies are powerful tools for fostering the learning of the students with visual impairment worldwide through simplified access and retrieval information, contacting friends and sharing of information as sighted people do.

5.3.1.2 Smart phone with speech reader

Another theme that emerged from the findings on the virtual learning needs of person with visual impairment in a home environment was having Smart phone with speech reader. The findings were also consistent with Asabere (2013), who revealed mobile devices as a primary information access tool necessitates an increased focus on the potential role of mobile devices in enhancing access to learning material. Parents need a phone with speech reader then a child with visual impairment can access virtual learning with a teacher from school while am home. In contribution the head teacher indicated that looking on what learners with visual impairment need in order to access virtual learning at home. Most of our parents have phones, they just need a smart phone with a speech read a software they can just download and install on the

phone. For the issue of bundles, we can ask or lobby to the government to introduce free internet to all learners with visual impairment during this period of Covid-19. For us children with visual impairment to learn on the internet, need a computer or a smart phone installed speech reader on it. Bates and Sangra (2011) revealed widespread use of mobile devices to access learning materials demonstrates the veracity the future of Africa is mobile-centric.

5.3.1.3 Access to internet facility

Another theme that emerged from the findings was the virtual learning needs of person with visual impairment is access to internet facility. Children need readily available internet facility in the home environment. So, children in home they don't have access to a computer or an internet connection. Having internet connectivity can allows the child to be holding a video conference with teacher. Contributing on the same one child from focus group discussion said they need internet connective or money to buy data buddle to use to connect to internet. Indeed, the internet provides a wide range of learning because of its multiple-functional online environment and the resources it provides. In this regard, Kalpana and Peese (2012), asserts that the use of the internet's cloud-based solutions such as content and applications include assistive technologies and, in fact, the internet presents the possibility of overcoming issues of affordability and availability. Research found that with internet connectivity or having bundles on phone, teachers can also make use of the internet by proving the students with extra study material and resources such as interactive lessons, educational quiz as well as tutorials. Teachers can record their lesson and provide it to the students for revisions which is better than reading from notes.

5.3.1.4 Having radio or TV

Another theme that emerged from the findings was having a radio or TV. The national broadcast ZNBC televise pre-record lesson which learner with visual impairment can listen to. Radio and TV programmes help the learners get the direction about how the subject should be dealt with and also explanations of the difficult concepts in the courses. In support one parent indicated that radios and TVs, do not use internet they can be accessible anywhere. So, parent should aware that there are lessons being televised on TV and radio which our children can listen to in the comfort of their homes. The findings above are in tandem with Bates, (2016) study, which indicated that eeducational radio and television can support the millions of children who lack access to the internet or have low digital literacy. The effectiveness of these

approaches is increased when programming encourages child and caregiver interaction. This can be enabled by SMS and other messaging tools.

Clearly, from the above themes, namely having computer with JAWS, smart phones with speech reader, available internet connectivity and radio or TV have implications on the teaching of visual impaired learners using virtual learning in a home environment.

5.3.2. Benefits of virtual learning to learners with visual impairment

When a question was asked on how virtual learning has benefited the children with visual impairment. One of the themes that emerged was no transportation of going to a learning instituting. Online learning made their lives easier because there were no travel plans to make or commuting hassles to manage. Findings showed that among benefit of online classes is the fact learners with visual impairment no longer have to worry about transportation to and from an outside location. Instead, their classroom comes to them in their own home. This was evidenced by IFS (2020), who noticed that computer and an internet connection can take classes without actually having to go to a classroom. For visually impaired students, this removes all the difficulties of getting to school and into their classrooms. With adaptive technologies like voice-to-text software, audio recordings, screen magnifiers and braille keyboards, visually impaired students can realize their full potential. By having a computer or smart device, he or she would have access to online resources. If transportation was prohibiting them from taking on-site classes, this is a great opportunity for them to look into online classes. Parent indicated that during this time of covid-19, virtual learning has helped my child to stay home where it's a bit safe and keep others safe and avoid crowded places like in school and buses when going to school. Also, learner said narrated that they were able to interact and it is motivating. It was also seen to be an important element that facilitates the learning subject material while at home. Children were able to contribute their views and experience in the subject matter and at the end it enriches their learning while at home

In addition, the head teacher indicated that COVID-19 pandemic had taught them the importance of wearing masks and maintaining social distance as a way of protecting public health. With virtual learning, children can stay home when sick without missing out on too many lessons. Not only is this a more comfortable way to learn when they're under the weather, but it also shows the teacher that you value the wellbeing of the entire

class. That's why as a school we are striving to have permanent connectivity of internet since we have computers for visual impaired in place.

Another vital theme that emerged was continuity learning. Continuity of learning is the continuation of education in the event of a prolonged school closure due to Covid-19. In support, one child said it made them to continue learning while at home during the school closure due to escalating covid-19 cases. The communication with teacher made children with visual impairment not to remain behind completely, otherwise some they were kept busy during this time, teacher send a lot of work for them to read and write. Another vital theme that emerged was access to learning materials online. On access to learning materials as a benefit of virtual learning. Yet another theme that emerged was learners learn at their own pace. This confirm assertions of Arkorful and Abaidoo, (2014) that, the use of e-Learning allows self-pacing where each student study at his or her own pace whether slow or quick. It therefore increases satisfaction and decreases stress. From the study, it is clear that in order for learners with visual impairment to experience virtual learning they need a computer or a smart phone with speech reader while connected to the internet should be available and some a radio or a television is ideal to access lessons while at home.

5.4 The determinants of accessibility of virtual learning in a home environment

The other objective was trying to asked participants on the determinants of accessibility of virtual learning in a home environment. They were asked on to describe their positive experiences on accessibility of virtual learning in a home environment for children with visual impairment. The findings showed various themes that emerged from this objective.

5.4.1 Determinants of accessibility of virtual learning in a home

The findings showed various themes that emerged from this objective. It was found that accessibility of virtual learning in a home environment depend on internet connection and having rightful gadgets which are user-friendly to individual with visual impairment. It was found that some families may have access to technology like computer without internet, smart phones, TV, radios and DVD player. Videos can be shared with families in DVD format or on a flash drive if possible. Some online content can also be accessed "offline" on a computer or tablet (Jacko, 2011).

5.4.1.1 Rightful gadgets

The theme that emerged from the findings is having rightful gadgets. That is having a computer or smart phone which user-friendly. Parent noted that having assistive technology like smart phone, TV, computer they help a lot since the child does not need to move to a far place to learn. A child would learn while at home by using the type of ICT facility someone has. Contributing to the same subject another parent said the positive experience of accessing virtual learning in a home is that the child will not miss out on learning. The child is able to access education within the comfort of the home environment by using a phone. This reduces the time spent on going to and from school. One of the children during focus group discussion said it was helpful since he was able to learn at home has the father even bought a computer for him to be using. Technology is critical in implementing and adopting virtual learning. In support of these findings, Romney and Celeste (2015) said all technological factors should be taken into consideration during the implementation process. For example, if the home environment has the necessary hardware and software for adopting virtual learning system; but the home environment lacks the technical skills that are necessary to use those hardware and software, the result might be failure.

5.4.1.2 Internet connectivity

Another great theme that emerged from the findings when participants were asked to describe their positive experiences on accessibility of virtual learning in a home environment for children with visual impairment. Internet connectivity came out has an emerging theme. These findings were in line with those of Mahyoob (2020) who argued that some learners faced internet connectivity problems, accessing classes, and downloading courses' materials problems. For everyone to access virtual learning content you need to be connect to internet. One needs to have data bundles (Muwanguzi and Lin, 2010). In support the, head teacher indicated that there is need to have internet connection on a computer or smart phone, which is not easy for most of the parents again. But teachers were encouraged to find means to continue interacting with learners as they are home by sending work to children through WhatsApp on phones and emails. Those who are teaching examination class were even using zoom to teach the learners who have access to zoom through their parents' phones.

5.4.1.3 Socio-economic background

To those children coming from well to do families noted that virtual learning is convenience as it enables a person to experience less trouble accomplishing a task, or possibly a lighter schedule or workload. On the other hand, those child with visual impairment from low socio-economic background never accessed virtual learning during covid-19 school closure. This is in line with the results of Agulanna and Nwachukwu (2009) who reveal that parents who have high socio-economic status motivate and encourage their children to seek academic success through provision of gadgets for virtual learning. One of the parents commented that parent respond to the needs of their children according to their financial capacity. Some of our fellow parents were able to buy what was needed for their child with visual impairment to access online learning, but some of us, money is hard to find, you can see only have a small phone, some can manage to buy a smart phone. But the wish was to have a computer or tablet for a child with visual impairment to be using at home. The ICT facilities available at home are not sufficient to enable effective learning. This limits the flexibility of learning.

5.4.2 Challenges faced to accessing virtual learning at home

As beneficial the virtual learning in a home environment to learners with visual impairment during the covid-19 pandemic, there were still some noticeable challenges, it is so bad to the extent that ICT seem not to be fulfilling the purpose of existence among children with visual impairment. When parents were asked to indicate the challenges their visually-impaired child faced when accessing and using virtual learning facilities in learning in a home environment. The findings showed various themes that emerged from this objective. It was found that most of the children with visual impairment had no ICT facilities of their own, faced issues to do with internet speed, online access due to poor network, high cost of data; high cost of ICT facilities. This was in line with Pauline and Antoney Raj (2018), who revealed that poor access to ICTs facilities could hamper the optimal learning of the visually-impaired students, hence deprive them of an opportunity of realising their full potential. This is also in agreement with Henaku (2020), study that students experience internet connectivity problems, financial difficulty due to the high cost of internet bundle in the use of virtual platforms for teaching and learning. Very few among students, were able to afford the procurement of data to stay connected online, coupled with the fact that people were unable to move freely during covid-19 pandemic lockdown in search of daily foods talk less of having more funds on them to procure data to actively stay online and have easy access to online teaching-learning process.

5.4.2.1 Low socio-economic background

As most of the parent are coming from a low background it difficult to have enough recourses to buy ICT facilities for child with visual impairment. There are also some other issues that the learners faced; such as, the lack of digital skills in using a computer, the need for all online learning equipment. This was as result of high cost of ICT facilities and parents lack resources to purchase them. In support of this view, Ilonga, et al. (2020) noted that the cost of ICTs facilities such as laptops and other assistive technologies required to enable visually-impaired students' effective learning are too expensive for many students from poor backgrounds without gainful employment to afford them. Some of the views given by the participants for example, parent said it is very difficult to improve on the learning of my child through virtual learning as most of the parent with these children are vulnerable, and they cannot manage to buy these equipment. Also, to some parents saw no positive experience which they have experienced the reason being government and the parents are not working together, unless when they start doing that, that is when we would see the positive experience that would show something positive starts coming out, because in the first place the government should help parent to purchase needed ICT facilities for virtual learning.

5.4.2.2 Poor Internet connectivity

Another great theme that emerged from the findings with regard to challenges is poor internet connectivity. When the same question was asked to children with visual impairment during focus group discuss, children faced issues to do with internet speed, online access due to poor network, high cost of data. From the findings it showed that problem faced ranges poor internet connection, lack of internet buddle because of not having enough money to buy airtime. Some parents are not working to money to buy data bundle or buy a device for accessing internet and internet is sometimes so slow that you end up leaving the work you were doing. This was in line with Ilonga,et al (2020) who reported that poor internet connectivity continues to be detrimental to e-learning efforts in Namibia. Contributing to the same subject the head teacher indicated that the major challenge is that of internet connectivity, the internet is not reliable. A number of parents reported experiencing challenges with data costs, which impeded their ability to access the university virtual -learning platform. This was compounded by the fact that sometimes the virtual learning system loads too slow, leading to some students aborting their attempts to use it. The issue of costs has been identified as a major factor impeding successful e-learning implementation in developing countries (Kibuku et al., 2020). As earlier

alluded these learners are coming from the vulnerable households, where parents cannot afford to buy these things. Poor Internet connection was evident from respondents, thus producing poor interactions among the students with the teacher. Mahmud (2010) points out that because of bandwidth and connectivity limitations downloading content is slow and creates frustration among students in learning environment.

5.4.2.3 Unconducive home environment

Another great theme that emerged from the findings with regard to challenges in teaching using virtual learning among learners with visual impairment is unconducive home environment. The challenges faced by children with visual impairment in a home environment were not only technology related, but also social factors had an impact on how they experienced virtual learning. Some respondents indicated that their home environments where they stay is not conducive for learning. In support of this view, children narrated that some of them stay in noisy places, not finding a quiet place. It difficult to find a quiet place when it come for children with visual impairment to study while in the home environment. The results of this study are in line with Aboagye, et al (2020), indicated that their home environments were not conducive for learning. It is therefore unsurprising that some home conditions may not be conducive for learning. Another them which emerged was limited access to peer support. Peer support has been paramount to the visually impaired. However, during online studies where students stay apart, it is difficult for students with visual impairment to access the support of their sighted peers which affect their use of virtual learning platforms. Visually-impaired students on the other hand were separated from their sighted peers who serve as note takers, and provide other support services (Global Voices, 2020).

5.4.2.4 Limited access to peer support.

Another them which emerged was limited access to peer support. Peer support has been paramount to the visually impaired. However, during online studies where students stay apart, it is difficult for students with visual impairment to access the support of their sighted peers which affect their use of virtual learning platforms. Peer support is very important in every academic endeavour but we students with visual impairment lost that opportunity during the virtual learning.

Generally, the findings show that this children with visual impairment they lacked the experience and confidence to learn using virtual learning. Many of them really could not access

virtual learning in a home environment due to lack of computer or phone with bundles to go online. Therefore, some visually impaired learners faced a challenge in accessing virtual learning in a home environment as most of them come from vulnerable homes.

5.5 What are the alternative interventions in use on virtual learning for person with visual impairment?

The participants were asked on the support mechanisms that should be put place to support the development and delivery of virtual learning environment for learners with visual impairment. The findings showed various themes that emerged from this objective.

5.5.1.1 Social Support

Through the process of analysing the themes that emerged from this research study, parents indicated that they need social support from well-wisher like donor community and government to support them with ICT gadgets specifically designed for children with visual impairment. They indicated that if IPad that have speech reader if they can be donated to these children can be of help to them. Other indicated to access to free internet, braille paper, supply of books in braille and in large print and provision on writing flame and stylus to use at home can be provided. Parent's wish is for Donors to come on board to give them computer or smart phones that can be used at home by our children with visual impairment. To buy more learning aids which they can be using at home to enhance accessibility and usage of virtual learning. In support of this view, one male parent-respondent stated that they need provision of internet services to learners with visual impairment and with ITC gadgets instilled with speech readers or JAWS. This finding is also in line with IFS (2020), who indicated that there is need for a donor who can empower the parents to children with visual impairments in terms of providing computers and smart phones for their children with visual impairment to use for online learning at home. In support, the head teacher proposed the need for donor who can provide these children with computer, iPad or phones with speech reader and free internet as some of us we can afford them. Also books in braille and in large print of those with low vision. Also need a Perkins brailler since using a writing flame becomes tedious, writing is also important we also need braille paper. Although the moment the support is not yet made available. Hence, the need for support is very inevitable. This finding is consistent with those of Chopra et al (2019) who asserts that there should be successful collaboration between the learning institutions and

different stakeholders sharing of responsibilities to foster education excellence for the students with visual impairment.

5.5.1.2 Financial support

Technology investments are not one-time expenses. Once a vision for the use of technology is in place, district superintendents and school leaders should examine existing budgets to identify areas in which spending can be reduced or eliminated to pay for learning technologies. They also should consider all possibilities for creative funding of these programs. Leaders should consider technology an ongoing, line-item expense from the very beginning of planning technology implementation. Another theme that emerged from the findings was the need of financial support. The findings showed that parents cannot provide the needed resources for virtual learning to their children on their own, they need help from cooperate world if they had to buy the needed ICT facilities for learner with visual impairment. Some of the views given by the participants included the following as indicated in transcribed verbatim. Some parents are not working, what they were just asking for people who can help me with money to buy what is required for children with visual impairment to be learning online. Contributing to the same subject; one child during focus group discussion had this to say need money for buying of computer or smart phone to use, with support of buying of bundles. Also, the head teacher commented that what these children with visual impairment don't havemoney, to use toward buying even a smart phone to use to access virtual learning. The findings agreed with Green (2020) who suggested that ggovernment should take some of their education budget and send money directly to parents to help with the switch to online learning. In bridging the virtual gap for the visually impaired there is the need to provide assistive technologies such as audio-video tape, CD-ROM and making computer and web interfaces more accessible (Amaniampong and Nyavor, 2021). From the researcher's point of view, parent need much support from well-wishers or donors who can in supply them with ICT and assistive technology for children with visual impairment which they can be using in the home environment.

5.5.2 Solution to improve virtual learning

In an attempt to further establish a lasting solution to virtual learning among individual with visual impairment, participants were asked on what they think should be done to improve the delivery of education through virtual learning for learners with visual impairment. From the

results when it comes to online learning, it demands improved utilizing of technology is absolutely crucial for it to succeed.

5.5.2.1 Conferencing

Some of the best ways teachers can use technology to help create great learning environments for their students include conferencing. Parents suggested to teachers to be utilizing a variety of technology options. Teacher can start using video and audio-conferencing systems using a smart phone, which is believed parents can afford phones. The findings stated that teachers should continue teaching using conferencing. The findings agreed with Romney and Celeste (2015) revealed that conferencing can be used to support interactive learning or student-centred teaching and learning in a team-oriented, virtual environment. It was bringing the class together as he or she would teach children visual impairment at once by audio call and he or she can explain concepts in a way that learners can understand just online while at home. Aguayo et al. (2017) stated that video conferencing boosts productivity, saves time, reduces travel expenses, and overall promotes collaboration. The advantage of video conferencing is the ability to facilitate all of those benefits without requiring constant travel for face-to-face communication.

5.5.2.2 Virtual Resource Centres

Some parents proposed that teachers should open up virtual resources Centre for learners to log on and chat or download work for themselves. Findings resonated well with Bulman and Fairlie (2016), who revealed that a website or blog could serve as the main information center for a school or classroom. Educators could use websites or blogs to disseminate assignments and assessments to students, as well as to facilitate discussions among students. Bate and Sangrà (2011) revealed that virtual resources Centre provide an opportunity to integrate the learning that is done online and, in the classroom, so that students can see clear connections between what they are doing in both environments. Introducing an online activity in class and then providing feedback to the activity in class after the activity is completed can help “close the loop” of learning for students. Chat channels can allow students to discuss things with their online class and have easy ways to connect even when they are far apart. In support of the findings, one female parent engaged teacher to open up work bank in audio and video formant on the internet were the teacher can be positing work for the children and children can be accessing information or school work direct from there. This even found to be the future

prospects for the school ass the head teacher indicated that they are planning to open the website, where teacher can be uploading the work both in text and audio according to grades, were children be downloading to read while at home. Virtual Learning Resources Center can index thousands of the best academic information websites, selected by teachers and library professionals worldwide, in order to provide to students and teachers current, valid information for school syllabus. These findings are in line with Eligi and Mwantimwa (2017) indicate that an effective and sustainable access to appropriate and special ICT resources can lead to effective use of education information, hence generate satisfaction by both the learners and the educators and foster sharing of knowledge with fellow students in addition to helping them to accomplish academic tasks.

5.5.2.3 Parental involvement

Further, another vital theme that emerged during the interview was parental involvement. It was cited to play a huge role during this period in the education of children's school success. It's extremely valuable to teachers to communicate with parents about how they anticipate the lockdown will go so that parents can help and ensure their children have the equipment, setup, and technological skills they will need to succeed. Working with parents and talking to them often can help them feel successful as they help their learner navigate the lockdown due to covid-19. It was observed that it a highly time teachers and us parents for these children with visual impairment need to work together because some of the things (ICT and assistive technology) needed for children with visual impairment to be using when learning online parents don't know them, so the teacher should orient them on what they should have or buy for their children to continue learning while at home. The findings were agreeable with Mahyoob (2020), who said the promotion of local partnerships by each community is also very important. The concept and praxis of networking, sharing experiences and knowledge is fundamental for continual updating in the field of virtual learning and assistive technology. This concurs Wagner et al. (2008) who espouse that e-Learning makes available extra prospects for interactivity between students and teachers during content delivery.

When a follow up question was asked if teachers visit these children to strength the collaboration and making sure the children are doing the work being sent by the teacher. Parents confirmed that some teachers opt to visit, and have time with learners to see what they have been doing with work they send. In support one female parent said that at school where child goes teachers come for home-based learning. The teacher visits home of children and teach

them individually from home. Although it is not that much again because teacher don't visit regularly.

5.5.2.4 Improvement in Lesson Content presentation on TV and Radio

Another theme that was cited is argent need on improve on lesson content presentation being aired on ZNBC. There is a lot of irregularities to how lesson a presented to make learners with visual impairment understand. From the findings there is need to sensitize the importance of virtual or online learning, as we in the covid-19 era where covid-19 is rampant (Alturise, 2020). The government to sensitize, deploy teachers with visual impairment who can teach via online on TV 3 and radios and the rest those things that are accessible even in deep rural areas because when you talk of a radio, a radio can be accessible as far as typical remote area. So, when the government has got that, they introduce programs that can also suit these learners with visual impairment then we shall appreciate and this country will go far in making education accessible to learners with visual impairment.

In addition, findings indicated that government should make these things such as the radios, TVs, phones accessible to each and every individual by the virtual of doing that maybe removing taxes so that those parents who are poor can afford to buy them to assist learners with visual impairment. Also, there is need improve on content of lesson by teachers who teaches on TV. In that part it would be appreciated and would show that we are moving in the right direction for our children with visual impairment. The results of this study are in line with Bates (2016), who revealed that the value of educational broadcasts through television and radio also goes beyond the needs of students alone. In some countries, these programmes are conceived to provide intergenerational learning, including in local languages.

5.5.2.5 Low prices on ICT equipment for persons with visual impairment

One of the themes that emerged under this objective was the issue of lowing prices on ICT equipment for the visually impaired. The ICT equipment for children with visual impairment to use for virtual learning are expensive. Contributing on what should be done to improve the delivery of education through virtual learning for learners with visual impairment; the head teacher indicated the need to encourage the procurement of ICT equipment for learners with visual impairments at discount price. Also, there is need of partnership with internet service providers to provide internet services to learners with visual impairment. Engage teachers who

have need trained in handling learners with visual impairment with ICT and raise an awareness on parents to buy smart phones and bundles for their children with visual impairment to be accessing virtual learning

Generally, the findings show that if learners with visual impairment are introduced to virtual learning as a way of delivering lessons would very beneficial because leaners will be able to learn even at home and will not miss out especially in a situation of pandemics like covid-19. What is lacking these children with visual impairment majority of them are coming from families with low socio-economic status who can't afford to buy ICT and assistive technology to use for virtual learning at home.

5.6 Summary

This chapter discussed the findings of the study and revealed some parent were familiar with computer and some smart phone gadgets which has to be installed with screen reader called JAWS which provides text-to-speech and braille output. Computers or smart phone enables to access the internet and their online learning which had screen readers, or uses a screen magnifier which has also WhatsApp, Facebook messenger, zoom, google meet/ classroom or email on it at home. While others need radios and TVs so that they can benefit and listen to those lesson provided on those platforms by the ministry of general education. Also, it was found that accessibility of virtual learning in a home environment depend on internet connection and having rightful gadgets which are user-friendly to individual with visual impairment. The study found that children with visual impairment had no ICT facilities of their own, faced issues to do with internet speed, online access due to poor network, high cost of data; high cost of ICT facilities. The study showed that they need support from well-wisher like donor community and government to support them with ICT gadgets specifically designed for children with visual impairment and encouraged the utilizing a variety of technology options, open up virtual resources Centre for learners to log on and chat or download work for themselves. There is need for a donor who can empower the parents to children with visual impairments in terms of providing computers and smart phones with internet connectivity for their children with visual impairment to use for online learning at home. The next chapter provide a conclusion and recommendation of the study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Overview

This chapter concludes the study and also makes recommendations and suggests areas of further research.

6.2 Conclusion

Based on the findings and in line with the objectives; the first objective described forms of teaching and learning of virtual learning being utilised in a home environment for persons with visual impairment. The study found that computers or smart phone that enables them to access the internet and their online learning which had screen readers, or uses a screen magnifier which has also been installed with WhatsApp, zoom, google meet/ classroom or email. Also, the use of radio and television. Accessibility to virtual learning was determined by the type of learning platform someone as in a home environment. The second object established virtual learning needs of person with visual impairment in a home environment. The finding revealed that learners with visual impairment require computers with JAWS, smart phones with speech reader and readily available internet facility for using virtual learning environment at home. While others need radios and TVs so that they can benefit and listen to those lesson provided on those platforms by the ministry of general education.

The third objective explored the determinants of accessibility of virtual learning in a home environment. The study found accessibility of virtual learning in a home environment depend on internet connection and having rightful gadgets which are user-friendly to individual with visual impairment as well as low socio-economic background as it determines the purchasing power. Children lack of computer or phone with bundles to go online. Most of the parents are coming from a low background it difficult to have enough recourses to buy ICT facilities for child with visual impairment. With regard to other challenges is poor internet connectivity, unconducive home environment. The fourth and last objective tried to explore the alternative interventions in use on virtual learning for person with visual impairment. The finding revealed that parents need social support and financial support from well-wisher like donor community and government to support them with ICT gadgets specifically designed for children with visual impairment. Learners with visual impairment need internet services and with ITC

gadgets installed with speech readers or JAWS. In an attempt to further establish a lasting solution to virtual learning among individual with visual impairment. Teachers can start using video and audio-conferencing teaching, open up virtual resource centres for learners to log on and chat or download work, to strength the collaboration between teachers and parents and of lowering prices on ICT equipment for the persons with visual impairment.

6.3 Recommendations

Based on the findings, and in line with the study objectives, the following recommendation were made:

i. There is need of raising an awareness on parents to know the form of ICT and assistive technology facilities for the visually impaired children can use to access virtual learning at home.
ii. The parent should shoulder their responsibilities of providing appropriate state-of-the-art ICT-based facilities like computer, smart phones and access to internet connectivity to enable the children with visual impairment access and use virtual learning at home.
iii. Teachers need support to incorporate technology effectively into their teaching practices and methods to help learners overcome some of the difficulties that are associated with this virtual learning for children with visual impairment in a home environment.
iv. There should be successful collaboration between the different stakeholders and parents sharing of responsibilities to foster education excellence for the learners with visual impairment. For example, collaboration between the school and the parent in planning for the learners with visual impairment to receive great benefits from ICT-based assistive tools in learning activities while at home.
v. There is also need for governmental and non-governmental organizations as well as the general society to put their resources together in order to provide a positive learning environment for the learners with visual impairment to have access to assistive ICT-based technologies that enhance the quality of their virtual learning opportunities.

6.4 Recommendation for Further Research

In the course of this study, a variety of additional questions arose that could be the impetus for future investigations. Below are suggested research ideas the researcher feels would be of value to investigate.

i. Research should be undertaken to understand the teachers' views and experiences towards virtual teaching of learners with visual impairment in a home environment during school closure.
ii. In relation to this study, it is suggested that the study should be replicated on a national scale, and that it should include a large sample of respondents focus on other disabilities like hearing impairment, intellectual disability, autism, and the deaf blind to have a national picture and elevate the generalisability of findings.
iii. Furthermore, there is a need for research on the critical success factors for mobile learning, due to the widespread use of mobile devices in accessing virtual learning resources.

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APPENDICES

Appendix I: Informed Consent Form

I, _____ (participant name), confirm that the person asking my consent to take part in this research entitled "*Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment from Special Schools in Lusaka, Zambia"* has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I agree to the recording of the interview data/post teaching discussion.

I have received a signed copy of the informed consent agreement.

To be completed by participants:

I, **……**agree to participate in this study. I understand that the information collected during this study will be used for educational purposes, and I can withdraw from the study at any time without any penalty. By signing this document, I affirm that I understand the intent of this study.

Signed: ……

Date: ……

Appendix II: Introduction Letter

UNIVERSITY OF ZAMBIA

Dear participants

I am a postgraduate student at the University of Zambia pursuing a Master of Education Degree in Special Education. I am conducting a research entitled *Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment from Special Schools in Lusaka, Zambia.* Kindly feel free, open and honest in your responses the data you supply will only be used for academic purposes and the information that you provide will not be divulged to anyone. Your participation in the study will be greatly appreciated. Participation in the survey is voluntarily. The information collected will be treated with confidentiality and anonymity is guaranteed. However, should you feel at any point of the study like during interview that you cannot continue, you are free to withdraw?

I thank you in advance for your effort and cooperation.

Esnart Mwanza

Appendix III: Interview Guide for Parents

1. Gender of the participants
2. Do you have child with visual impairment at this school?
3. How often do you interact with your child in terms of helping them with school work?
4. Are you familiar with ICT and Assistive Technology for learner with visual impairment?
5. The kinds of technology facilities are being accessed to support learning among the visually-impaired at home
6. Describe your experience with the Virtual learning needs and technical support a child with visual impairment require for using virtual learning environment at home to access lessons or material for learning
7. Describe any positive experiences on accessibility of virtual learning in a home environment for your with visual impairment
8. Indicate the challenges your visually-impaired child faced when accessing and using virtual learning facilities in learning in a home environment.
9. What support mechanisms are in place to support the development and delivery of virtual learning environment for learners with visual impairment?
10. What do you think should be done to improve the delivery of education through virtual learning for learners with visual impairment?

Appendix IV: Interview Guide for Head Teachers

1. Gender of respondent
   a. Male ( ) Female ( )
2. How long have you been working with children with visual impairment?
3. Do you have learners with visual impairment at this school?
4. Are you familiar with ICT and Assistive Technology for learner with visual impairment?

5. The kinds of technology facilities are being accessed to support learning among the visually-impaired at home
6. Describe your experience with the Virtual learning needs and technical support learners with visual impairment require for using virtual learning environment at home to access lessons or material for learning
7. Indicate the challenges your learners with visual impairment face when accessing and using virtual learning facilities in learning in a home environment.
8. Describe any positive experiences on accessibility of virtual learning in a home environment for your learners with visual impairment
9. What support mechanisms are in place to support the development and delivery of virtual learning environment for learners with visual impairment?
10. What do you think should be done to improve the delivery of education through virtual learning for learners with visual impairment?

Appendix V: Focus Group Discussion Guide for Pupils with Visual Impairment

1. How often were you interacting with your parents and teachers in terms of helping you with school work when you are at home?
2. Are you familiar with ICT and Assistive Technology for learner with visual impairment?
3. The kinds of technology facilities do use to support your learning while at home
4. What do you need in order to have access to technologies and able to help you to learn while at home
5. Did the technologies used enhanced your learning in the home environment? If so, how...?
6. How is your experience with the technical support you received while using the virtual learning environment at home?
7. What challenges did you face when accessing and using virtual learning facilities in home environment?
8. What support do you receive in support for virtual learning in a home environment?
9. What do you think should be done to improve the delivery of education through virtual learning for learners with visual impairment?

THE UNIVERSITY OF ZAMBIA

P.O. Box 32379, LUSAKA - ZAMBIA

RECEIPT No. 1786716

DATE 23-08-2021

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HSSREC FORM 1a

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

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APPLICATION FOR ETHICAL APPROVAL FOR PROPOSED RESEARCH

INVOLVING HUMAN PARTICIPANTS

1. **TITLE OF STUDY**:

Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment at UTH Special School in Lusaka, Zambia.

2. Principal Investigator:

Name: Esnart Mwanza Qualifications: Bachelor of Education in Special Education

Present Appointment/Affiliations: Master Student- University of Zambia

3a. **OTHER INVESTIGATORS**:

Name: N/A Qualifications: N/A

Present Appointment/Affiliations: N/A

Name: N/A Qualifications: N/A

Present Appointment/Affiliations: N/A

(Other names to be included on a separate page)

3b. **SUPERVISORS**: **FOR STUDENTS ONLY**

Name: Dr Francis Simui Qualifications: PHD

Present Appointment/Affiliations: Researcher and Lecturer- University of Zambia

Name: N/A

Present Appointment/Affiliations: N/A

Signature: N/A

3c. Co-Supervisor/Mentor in Zambia (This section is for all researchers outside Zambia)

Name: N/A Qualifications: N/A

Present Appointments/Affiliations: N/A

Name: N/A Qualifications: N/A

Present Appointments/Affiliations: N/A

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4. SUMMARY OF PROPOSED RESEARCH

Researcher: Esnart Mwanza- 2021 Computer number 19000866……. Supervisor: Dr. Simui F.
Programme: M.Ed.Sp.Ed.
Title: Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment at UTH Special School in Lusaka, Zambia.

INTRODUCTION. Background: A study by Hill, (2014) revealed that, a child's home environment has significant effect on learning and school performance since it provides foundation for learning. Despite this facts, accessibility of virtual learning platforms for person with visual impairment in the home environment has largely been underexplored in the scholarly literature. It is imperative to conduct this study to fill the information gap mentioned above.

Statement of the Problem: The COVID-19 pandemic swept the world more quickly than many expected, leaving education systems unprepared for how to implement virtual and at-home learning (Affouneh, Salha and Khlaif, 2020). Thurber and Bandy (2018) posits that home environment is as important as what goes on in the school. Little seems to be known about the accessibility of virtual learning platform of the persons with visual impairment in a home environment at UTH special school catering for learners with visual impairment.

Purpose of the Study: The purpose of the study is to explore the accessibility of virtual learning platforms for person with visual impairment in the home environment.

Research objectives: To describe forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment. To establish virtual learning needs of person with visual impairment in a home environment. To explore the determinants of accessibility if virtual learning in a home environment and to explore the alternative interventions in use on virtual learning for person with visual impairment.

Research Questions: What forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment, what are the virtual learning needs of person with visual impairment in a home environment? what are the determinants of accessibility of virtual learning in a home environment? and what are the alternative interventions in use on virtual learning for person with visual impairment?

Significance of the Study: The information that will be gathered in this study might be vital to policy makers, stake holders, donors, service providers and administrators, civil society organizations and the general public in the provision of intervention strategies to address the plight of students with visual impairment conditions in their accessing to learning platform even when at home.

Theoretical Framework: This study will be inspired by theoretical insights from the unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh and others in "User acceptance of information technology: Toward a unified view".

LITERATURE REVIEW, Learners with visual Impairment look at virtual-learning as an alternative for their educational development. The student needs a desktop computer, laptop, or good tablet. Also, Tedre et al. (2010) presented the determinants on the provision and accessibility of virtual learning in a home environment on virtual learning implementation. The aspects were: staff training, equipment, funding, pedagogical issues, networks and system administration. Goode (2010) suggested that virtual learning in a home environment for person with visual impairment include creating virtual home classroom, accessible learning materials, a remote computer laboratory, and delivery of the learning materials by vision impaired instructors. Armstrong, Murray and Permvattana (2010) revealed that in order to improve on virtual learning we need positive attitudes of all stakeholders as crucial, if the potential of virtual learning in education for people with disabilities is to be achieved in particular those with visual impairment. It also calls for the need for awareness raising regarding the potential of virtual learning in education of different learners with disabilities and special needs.

METHODOLOGY; Research design, the study will adopt a case study approach or exploratory. Besides, this study will be grounded on the interpretive paradigm **Study population**, the target population will be head teachers, parents for, and learners with visual impairment. **Study sample**, the sample will comprise of one Head teacher, seven parents and seven learners with visual impairment. **Sampling techniques**, Homogeneous purposive sampling will be used will be used on head teachers, parents for, and learners with visual impairment. **Data collection instruments,** interview guide on head teacher and parents, and focus group discussions guide will be used on learners with VI. **Data collection procedure**, face to face interview will be conducted with head teachers and parents, and focus group discussions will conducted with pupils by the researcher on their virtual learning experience. **Data Analysis**, Qualitative data from semi-structured interviews and focus group discussion the researcher will analyze the thematically. These techniques allow for narration of themes which will be coded, where possible, verbalisms will be used to indicate actual voices of the participants. **Ethical Consideration**: A clearance letter will be obtained from the ethics committee of the University of Zambia. The respondents and the information collected will be treated with respect and confidential respectively.

(Use not more than one additional A4 sheet if necessary)

5. **ARE THE PARTICIPANTS DEPENDENT ON ANY OF THE INVESTIGATORS**

As students: Yes ☐ No ☐ As employees: Yes ☐ No ☐

As patients: Yes ☐ No ☐ In other ways: Yes ☐ No ☐

If 'Yes' to any of the above, give details

---

6. **POSSIBLE BENEFITS TO PARTICIPANTS**: The study is likely to contribute to the existing body of knowledge of the accessibility to virtual learning for learners with visual impairment in a home environment. The information from this study intended to help teachers, parents and other educational stake-holders to improve the provision of virtual learning for learners with visual impairment in schools.

---

7. **POSSIBLE RISKS TO PARTICIPANTS: N/A**

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8. **POSSIBLE BENEFITS TO THE COMMUNITY:** The findings of the study may provide an insight on the practices of virtual learning through the experiences of learners with visual impairment. The findings of the study may further add value to the existing body of knowledge on the experiences of virtual learning of learners with visual impairment.

9. **BUDGET**

(a) Financial support (requested or granted): Yes ☐ No ☐

SPONSOR

(b) Are there costs which will be carried by other institutions Yes ☐ No ☐

(c) Are there costs which will be carried by the participants Yes ☐ No ☐

involved (e.g., travel, accommodation, meals, treatment)?

If 'Yes' to any of the above, give details:

---

10. SUBMISSION (Please take note of UNZAREC Forms1a and 1b**)**

For Normal Review at regular monthly meetings**,** attachments

should include (**Tick to show that you have provided these**):

(i) 4 copies of Full Protocol Yes ☐ No ☐

(ii) 9 copies of Summary of Protocol. Yes ☐ No ☐

(iii) 4 copies of Questionnaire and/or interview schedules Yes ☐ No ☐

(iv) 4 copies of Information Sheet Yes ☐ No ☐

(v) 4 copies of Consent Form Yes ☐ No ☐

(vi) 4 copies of letter approving of or giving ethical

clearance to the project proposal if it is a sponsored Yes ☐ No ☐

research related to another University

(vii) 4 copies of Budget Yes ☐ No ☐

(viii) 4 copies of Time Line Yes ☐ No ☐

B. For Expedited Review, attachments should include (**Tick to show that you have provided these**):

4 copies of Full Protocol (to include the following): Yes ☐ No ☐

(ii) 9 Summary of Protocol Yes ☐ No ☐

(i) 4 Questionnaire and/or interview schedules Yes ☐ No ☐

(ii) 4 Information Sheet Yes ☐ No ☐

(iii) 4 Consent Form Yes ☐ No ☐

4 Letter approving the project proposal if

it is a sponsored rese[illegible]elated to another University Yes ☐ No ☐

4 Budget Yes ☐ No ☐

(viii) 4 Time Line Yes ☐ No ☐

11. DECLARATION

I Mwanza Esnart apply to the Humanities and Social Sciences Research Ethics Committee of the University of Zambia apply for ethical approval of the above research proposal involving human participants, as conforming with recognized ethical standards and as not impinging on the rights of the individuals.

Signed: …… Date: ……...

PRINCIPAL INVESTIGATOR

Contact Address: Lusaka District Education Board, P.O Box 50297, Lusaka

Local Contact Address: Lusaka District Education Board Office.

Telephone No: Nil Fax No: Nil

Cell phone No: +260 977113288 E-mail address: esnartmwanza13@gmail.com

Full name and address of Local Co-Supervisor/Member (if applicable):

Signed: Date:

Full name and address of Head of Department or Head of relevant Organization:

Signed: Date:

Full name of Assistant Dean Postgraduate[1]

Signed: Date:

[1] The Assistant dean should provide a confirmatory letter that the candidate made a proposal presentation to the school/department.

HSSREC FORM 1b

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

Telephone: +260-211-290258/293937 P O Box 32379

Fax: +260-211-290258/293937 Lusaka, Zambia

E-mail drgs@unza.zm

PARTICIPANTS INFORMANTION SHEET

Informed consent for participants who have been selected in a research

TITLE: **Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment at UTH Special School in Lusaka, Zambia.**

Name of principal Investigator: Mwanza, Esnart

Name of the Organization: The University of Zambia

Name of the Sponsor: Nil

This informed form has two parts:

- **Information sheet (to share information about the study with you)**
- **Certificate of consent (for signatures if you choose to participate)**
- **You will be given a copy of the full informed consent form**

Part one: Information sheet

Introduction

I am Mwanza, Esnart a master's student at the University of Zambia. I am doing a research titled **'Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in the Home Environment at UTH Special School in Lusaka, Zambia'.** You will be given information concerning the study t vill be carrying out. The consent may contain some words that you may not understand. Kindly ask me to stop as we go through the information and I will take time to explain. Where you want clarity, you can ask me or any other researcher that you know so as to have a clear understanding.

Purpose of the research

The purpose of this study is to explore the accessibility of virtual learning platforms for persons with visual impairment in the home environment.

Type of Research Intervention

This research will involve you answering question. This will help the researcher to establish your feelings, opinions and facts about the accessibility of virtual learning platforms for persons with visual impairment in the home environment.

Voluntary participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. You may change your mind later and stop participating even if you agreed earlier because it is your right to do so.

Procedures

I invite you to take part in this research study. I am requesting you to help provide information about you lived experiences in the accessibility of virtual learning platforms for persons with virtual impairment in aa the home environment. I believe that you can help provide necessary information needed in this research. You will provide this information by answering question the researcher will be asking.

Duration

The research will take place for the period of two weeks. During this time, I will visit your school to collect data that I am looking for.

Use of Information

The information that will be obtained from the research will be used for academic purposes only and is likely to help learners, teachers and parents to effectively implement accessibility of virtual learning platforms for persons with visual impairment in the home environment.

Risks

There are no risks that you will be exposed to due to your participation in this study. Your safety is guaranteed.

Benefits

There are no direct benefits to you, but your participation is likely to help find ways of bringing quality accessibility to virtual platforms for persons with visual impairment in the home environment. The findings may provide an insight on the experiences on accessibility of virtual learning platforms for persons with visual impairment in the home environment.

Reimbursements

You will not be provided with any incentive to take part in the research and no monitory benefits should be expected by participants.

Confidentiality

The information that will be collected in this research study will be kept private. No information that links you to be identified will be availed to anyone where possible letters will be used instead of names.

Sharing the Results

Nothing that will tell me today will be shared with anybody outside the research ream and the findings of this study shall be shared with you through publications or upon request.

Right to Refuse or Withdraw

Participation in this research is voluntary and no one will be forced to participate. Participants have the right to decide not to be part of this study. Participants who decide to take part in this study have the right to withdraw from the study anytime if they wish and that will not attract any consequences.

Questions to elucidate understanding: Do

You know that you do not have to take part in this study? You can say no if you wish to? Do you know that you can ask me question later if you wish to? Do you know that I have given the contact details of the person who can give you more information about the study? You can ask me questions about any part of the research study if you wish to? Do you have any questions?

WHOM TO CONTACT

This proposal has been reviewed and approved bv HSSREC which is a committee whose task it is to make sure that research participa[illegible]otected from harm. If you wish to find out more about IRB contact

1. **Dr Ilubala Ziwa chairperson, Humanities and Social Sciences Research Ethics Committee, University of Zambia, P. O. Box 32379, Lusaka.**
2. **Professor. Henry M. Sichingabula Director, Directorate of Research and Graduate Studies, University of Zambia, P. O. Box 32379, Lusaka.**

"Approval to conduct this research has been provided by the University of Zambia, in accordance with its ethics review and approval procedures. Any person considering participating in this research study or agreeing to participate may raise any question or issues with the researchers at any time."

In addition, if you are/ or any person is not satisfied with the responses of researchers may raise ethics issues or concerns, and may make any complaints about this research study by contacting the HSSREC on the address stated above. All research participants are entitled to retain a copy of any participant information from and/or participant concert form relating to this research study.

Part II: **Certificate of Informed Consent**

Dear participants

I am a postgraduate student at the University of Zambia pursuing a Master of Education Degree in Special Education. I am conducting a research entitled *Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment from Special Schools in Lusaka, Zambia.* Kindly feel free, open and honest in your responses the data you supply will only be used for academic purposes and the information that you provide will not be divulged to anyone. Your participation in the study will be greatly appreciated. Participation in the survey is voluntarily. The information collected will be treated with confidentiality and anonymity is guaranteed. However, should you feel at any point of the study like during interview that you cannot continue, you are free to withdraw?

I thank you in advance for your effort and cooperation.

Esnart Mwanza

The focus of my study is to explore the accessibility of virtual learning platforms for persons with visual impairment in the home environment at UTH special school, Lusaka, Zambia.

The data that shall be collected from this research will be treated with confidentiality and will only be used for the academic purpose of this study. During the course of this study, you will be free to withdraw from it if you feel like doing so.

Finally, you are requested to sign this form to indicate that you have willingly agreed to participate in this course.

I have read and understood this document, I therefore agree to participate in this study.

Signature: …… ……..

Title: …….

Statement by research/ person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participants understand.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has been coerced into giving consent has been given freely and voluntarily.

A copy of this Informed consent Form has been provided to the participant.

Print name of the researcher/ person taking the consent

……..

Signature of researcher/ person taking the consent

…….

Date…….

Day/ Month/ Year

CONTACT FOR QUESTIONS

Principal Investigator

Names: **Mwanza, Esnart**

Cell: +260 977113288

Email: esnartmwanza13@gmail.com

Physical Address: **Kamwala South**

Postal Address: **Lusaka District Education Board,**

P. O. Box 50297, Lusaka.

Researcher: Esnart Mwanza. Computer number 19000866. Supervisor: Dr. Simui F. Programme: M.Ed.Sp.Ed.
Title: Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment at UTH Special School in Lusaka, Zambia.
INTRODUCTION. Background: A study by Hill, (2014) revealed that, a child's home environment has significant effect on learning and school performance since it provides foundation for learning. Despite this facts, accessibility of virtual learning platforms for person with visual impairment in the home environment has largely been underexplored in the scholarly literature. It is imperative to conduct this study to fill the information gap mentioned above.
Statement of the Problem: The COVID-19 pandemic swept the world more quickly than many expected, leaving education systems unprepared for how to implement virtual and at-home learning (Affouneh, Salha and Khlaif, 2020). Thurber and Bandy (2018) posits that home environment is as important as what goes on in the school. Little seems to be known about the accessibility of virtual learning platform of the persons with visual impairment in a home environment at UTH special school catering for learners with visual impairment.
Purpose of the Study: The purpose of the study is to explore the accessibility of virtual learning platforms for person with visual impairment in the home environment.

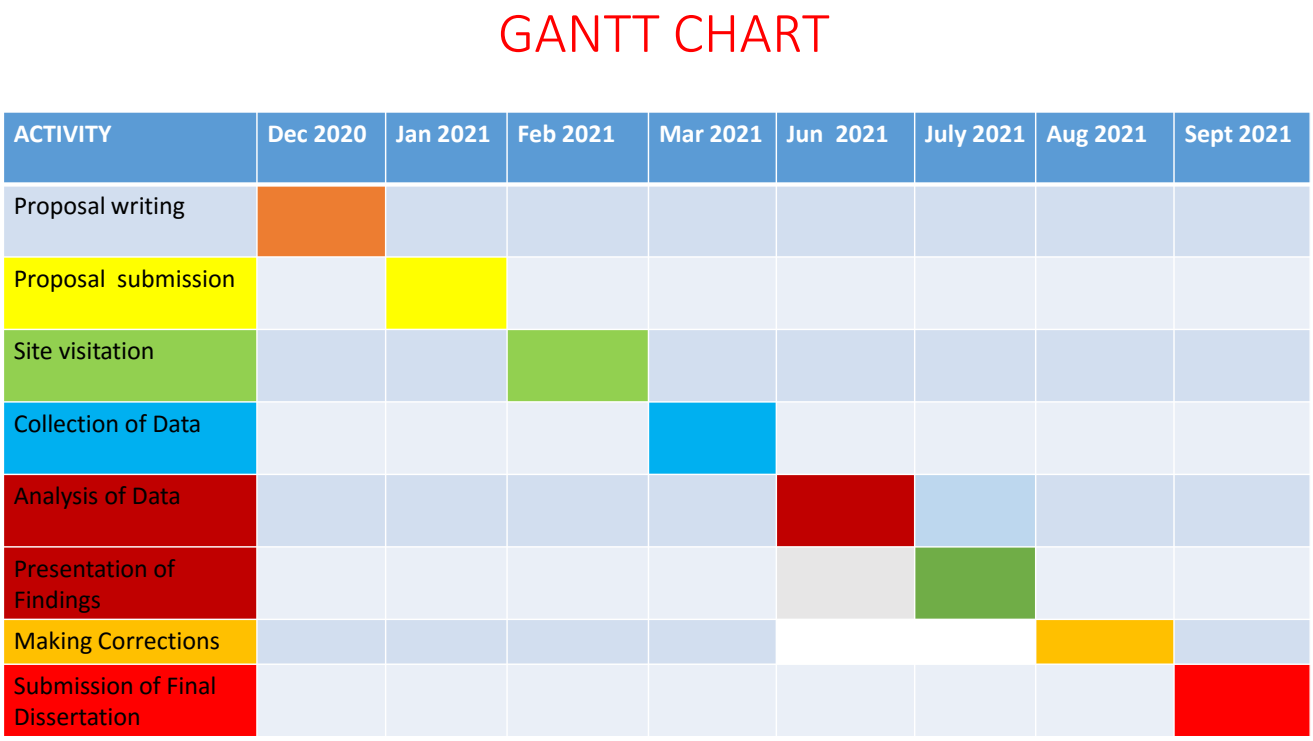
Research objectives: To describe forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment. To establish virtual learning needs of person with visual impairment in a home environment. To explore the determinants of accessibility if virtual learning in a home environment and to explore the alternative interventions in use on virtual learning for person with visual impairment.

Research Questions: What forms of teaching and learning of virtual learning being utilised in a home environment for person with visual impairment, what are the virtual learning needs of person with visual impairment in a home environment? what are the determinants of accessibility of virtual learning in a home environment? and what are the alternative interventions in use on virtual learning for person with visual impairment?
Significance of the Study: The information that will be gathered in this study might be vital to policy makers, stake holders, donors, service providers and administrators, civil society organizations and the general public in the provision of intervention strategies to address the plight of students with visual impairment conditions in their accessing to learning platform even when at home.
Theoretical Framework: This study will be inspired by theoretical insights from the unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh and others in "User acceptance of information technology: Toward a unified view".
LITERATURE REVIEW, Learners with visual Impairment look at virtual-learning as an alternative for their educational development. The student needs a desktop computer, laptop, or good tablet. Also, Tedre et al. (2010) presented the determinants on the provision and accessibility of virtual learning in a home environment on virtual learning implementation. The aspects were: staff training, equipment, funding, pedagogical issues, networks and system administration. Goode (2010) suggested that virtual learning in a home environment for person with visual impairment include creating virtual home classroom, accessible learning materials, a remote computer laboratory, and delivery of the learning materials by vision impaired instructors. Armstrong, Murray and Permvattana (2010) revealed that in order to improve on virtual learning we need positive attitudes of all stakeholders as crucial, if the potential of virtual learning in education for people with disabilities is to be achieved in particular those with visual impairment. It also calls for the need for awareness raising regarding the potential of virtual learning in education of different learners with disabilities and special needs.

METHODOLOGY; Research design, the study will adopt a case study approach or exploratory. Besides, this study will be grounded on the interpretive paradigm **Study population**, the target population will be head teachers, parents for, and learners with visual impairment. **Study sample**, the sample will comprise of one Head teacher, seven parents and seven learners with visual impairment. **Sampling techniques**, Homogeneous purposive sampling will be used will be used on head teachers, parents for, and learners with visual impairment. **Data collection instruments,** interview guide on head teacher and parents, and focus group discussions guide will be used on learners with VI. **Data collection procedure**, face to face interview will be conducted with head teachers and parents, and focus group discussions will conducted with pupils by the researcher on their virtual learning experience. **Data Analysis**, Qualitative data from semi-structured interviews and focus group discussion the researcher will analyze the thematically. These techniques allow for narration of themes which will be coded, where possible, verbalisms will be used to indicate actual voices of the participants. **Ethical Consideration**: A clearance letter will be obtained from the ethics committee of the University of Zambia. The respondents and the information collected will be treated with respect and confidential respectively.

Appendix V: Gantt chart

It is the duty of the researcher to plan the time line of his or her research in order to avoid unnecessary wastage of time and coordinate the activities of the research effectively. The gantt chart below shows the timeline of the whole research project.



Appendix VI: Research Budget

Every research proposal preparation and report writing requires some finances in order to be conducted successfully. The table below shows the proposed budget for the whole research project.

Item	**Quantity**	**Unit Price**	**Total Cost**
Research proposal costs			
1.Reams of paper	04	K 80.00	K 320.00
2.Typing and printing of a proposal	01	K 1000.00	K 1000.00
3.Binding of proposal	02	K 50.00	K 100.00
4.Pens	10	K5.00	K 50.00
5. Transport		K50.00	K1000.00
6. Contingencies			K500
SUB TOTAL			**K2,970.00**
Data collection and report writing costs			
4.Typing and printing of a dissertation	04	K 5.00	K 2,000.00
Spiral Binding	04	K50.00	K200.00
Transport		K 50.00	K 500.00
Air time		K 20.00	K 200.00
Contingencies	-	-	K 500.00
Bond biding	05	K200.00	K1000.00
SUB TOTAL			***K 4,200.00***
GRAND TOTAL			**K 7,170.00**

THE UNIVERSITY OF ZAMBIA
DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Great East Road Campus | P.O. Box 32379 | Lusaka10101 | Tel: +260-211-290 258/291 777 **Fax**: (+260)-211-290 258/253 952 | E-**mail**: director.drgs@unza.zm | Website: www.unza.zm

APPROVAL OF STUDY

11th November, 2021

REF NO. HSSREC-2021-OCT-008

Esnart Mwanza

The University of Zambia

School of Education

P.O. Box 32379

LUSAKA

Dear Ms. Mwanza,

RE: "VIRTUAL LEARNING FOR PERSONS WITH VISUAL IMPAIRMENT: AN EXPLANATION OF LEARNING PLATFORM IN A HOME ENVIRONMENT AT UTH SPECIAL SCHOOL IN LUSAKA, ZAMBIA"

Reference is made to your submission of the protocol captioned above. The HSSREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

REVIEW TYPE	ORDINARY REVIEW	APPROVAL NO. HSSREC-2021-OCT-008
Approval and Expiry Date	Approval Date: 11th November, 2021	Expiry Date: 10th November, 2022
Protocol Version and Date	Version - Nil.	10th November, 2022
Information Sheet, Consent Forms and Dates	English.	To be provided
Consent form ID and Date	Version - Nil	To be provided
Recruitment Materials	Nil	Nil
Other Study Documents	Questionnaire.	
Number of Participants Approved for Study		

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to HSSREC within 5 days.
- All protocol modifications must be approved by HSSREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to HSSREC within 5 working days.
- All recruitment materials must be approved by HSSREC prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. HSSREC will only approve a study for a period of 12 months.
- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to HSSREC.
- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by HSSREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will

be labelled “late submissions” and will incur a penalty fee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.

- Every 6 (six) months a progress report form supplied by The University of Zambia Humanities and Social Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.

- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO), both HSSREC and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.
- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.

- Filing a closing report (rather than just letting your approval lapse) is important as it assists HSSREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.

- A reprint of this letter shall be done at a fee.

- All protocol modifications must be approved by HSSREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except where noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by HSSREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of HSSREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,

Dr. J.I. Ziwa

DR. J. I. Ziwa

ACTING CHAIRPERSON
THE UNIVERSITY OF ZAMBIA HUMANITIES AND
SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE - IRB

cc: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies

THE UNIVERSITY OF ZAMBIA
INSTITUTE OF DISTANCE EDUCATION

The Assistant Director - PG
Institute of Distance Education
University of Zambia
P. O. Box 32379
Lusaka

24th November, 2021

RE: LETTER OF COMPLETION - ESNART MWANZA

I am very pleased to confirm that Esnart Mwanza has finally completed her research whose work I supervised until completion. The dissertation was entitled: 'VIRTUAL LEARNING FOR PERSONS WITH VISUAL IMPAIRMENT: AN EXPLORATION OF LEARNING PLATFORM IN A HOME ENVIRONMENT

FROM UTH SPECIAL SCHOOL IN LUSAKA, ZAMBIA.' This dissertation is in partial fulfilment of the requirements for the award of the Master of Education in Special Education of the University of Zambia. In addition, her research article entitled 'Virtual Learning for Persons with Visual Impairment: An Exploration of Learning Platform in a Home Environment from UTH Special

School in Lusaka, Zambia', has been accepted for publication in the *European Journal of Education and Pedagogy*.

I therefore recommend her to you for any possible support to aid her submit her dissertation successfully.

Best Regards

Francis Simui,PhD

Senior Lecturer / Head of Programmes Development & Production

Institute of Distance Education

University of Zambia

cc. Esnart Mwanza