

UNIVERSITY OF EDUCATION, WINNEBA

**ACCESS TO E-LEARNING RESOURCES AMONG PRE-SERVICE
TEACHERS WITH VISUAL IMPAIRMENT IN COLLEGES OF
EDUCATION, GHANA**



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**ACCESS TO E-LEARNING RESOURCES AMONG PRE-SERVICE
TEACHERS WITH VISUAL IMPAIRMENT IN COLLEGES OF
EDUCATION, GHANA**



**A thesis in the Department of Special Education
Faculty of Education Studies, submitted to the School
of Graduate Studies in partial fulfilment
of the requirements for award of a degree of
Master of Philosophy
(Special Education)
in the University of Education, Winneba.**

MAY, 2021

DECLARATION

Student's Declaration

I, Rose Offei, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

Signature.....

Date.....

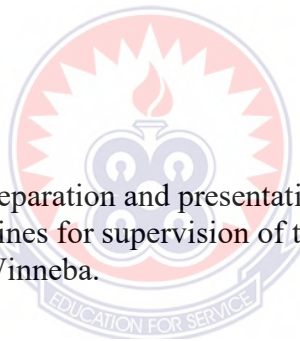
Supervisor's Declaration

I hereby declare that the preparation and presentation of the work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

Name: Dr Adam Awini

Signature.....

Date.....



DEDICATION

To my son, Emmanuel Offei, and daughter, Esther Boateng Akrofi



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ABBREVIATIONS

ICT	Information and Communication Technology
IE	Inclusive Education
OPAC	Online Public Access Catalogues
PC	Personal Computer
PVIs	Persons with Visual Impairment
TAM	Technology Acceptance Model
Wi-Fi	Wireless Fidelity



ABSTRACT

This study examined the accessibility of e-learning resources among pre-service teachers with visual impairment at the Presbyterian College of Education and Wesley College of Education in the Akuapem North and Old Tafo Municipal Assemblies in the Eastern and Ashanti Regions of Ghana, respectively. Using a qualitative approach to inquiry with a case study research design, the study employed a semi-structured interview and focus group discussion guide to elicit data from 13 respondents from these two study areas. The data were analysed using themes that emerged from the data. The findings of the study revealed high availability of e-learning resources such as laptops, projectors, tablets and many more. However, the study revealed that e-learning resources were inaccessible to some of the students or that they had difficulties in accessing them. It was recommended that the management of these two Colleges should, through their heads of Information Communication Technology, communicate to students the timelines for the closure of e-learning facilities during maintenance sessions. The government, through the Ministry of Education, should equip e-learning facilities with specially designed modern software and devices, as well as the technical units with tools needed to fix faults that are reported to facilitate e-learning.



CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Educational processes have undergone many changes during the last century. From print learning materials mailed to students' homes, to educational radio broadcasts, to educational television programming, to recent forays in interactive e-learning, online learning, and remote learning. The rapid development coupled with widespread adoption of technology has fundamentally changed almost every aspect of life. Thus, the increased involvement of technology in all aspects of our life places educational institutions under pressure to include these aspects at the heart of their learning. Ballard (2000) opined that technology is reshaping today's school systems and educational institutions by offering students new ways of seeing and learning; giving teachers new ways of teaching and imparting knowledge; and administrators' new ways of organizing educational system. For example, Information and Communication Technology (ICT) has become key tools in educational methodology and curriculum delivery globally. ICT has been identified as an indispensable tool for the development of quality teaching and learning in the education system. ICT is fundamental for the preparation of students in meeting the innovations in the global arena (Ololube, 2006). The application of ICT in higher institutions is more critical today than ever before since its growing power and capabilities are triggering a change in learning environments in education (Pajo & Wallace, 2001). The use of ICT offers powerful learning (de Corte et al., 2003; Volman & Van Eck, 2001) environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self-directed, and constructive way (de Corte et al.,

2003; Volman & Van Eck, 2001). At present, ICT is considered as an important means of promoting new methods of instruction. For example, in education, ICTs have changed the way of accessing and utilising learning, teaching and research resources. From this, it is obvious that the rapid proliferation in the use of the ICT and its facilities like internet has facilitated the creation and use of these e-learning resources.

The term e-learning resources or electronic resources is seen by Sharma (2009) as library's information materials that are in electronic form, which include electronic books (e-books), electronic newspapers (e-newspapers), electronic journals (e-journals), as well as internet resources. According to the International Federation of Library Associations and Institutions (IFLAI, 2012), e-resources are materials that need access either remotely (via the internet using a personal computer or mainframe or handheld mobile device) or locally. E-resources also consist of databases, magazines, archives, theses, conference papers, government papers, scripts, and monographs in an electronic form (Deng, 2010). E-learning resources are predominantly vision-centric, incorporating images, animation, and interactive media and as a result, students with low or acute vision impairment do not have equal opportunity in using them (Armstrong, 2009).

E-learning resources, such as e-journals and online databases, now have an edge over the traditional print-based media as they are most likely to contain current information, offer advanced search capabilities, greater flexibility in storage and enable access of information without time and location constraints (Mawere & Sai, 2018). The reasons for the rapid growth and wide acceptance of e-learning resources today could be attributed to the advancement of coupled with high cost of printed materials, growing numbers of publications among the academics and research

institutes, the growth in enrolment of distance learners, and the recent shift in the pedagogy of teaching which places more emphasis on learner-centered approach to teaching and learning deliveries, among others (Rao & Krishnan, 2014).

The provision and use of e-learning resources is crucial to the successful teaching, learning, and research activities in today's higher institutions (Rao & Krishnan, 2014). Accordingly, the importance of e-learning resources to university libraries and students cannot be over-emphasised. E-learning resources and databases are invaluable tools for studying, learning, and researching. Electronic resources, in most universities, are integral part of the electronic library and stand as vital academic resources that support teaching, learning and research activities (Zhang & Liu, 2011). E-learning resources are nowadays widely used in higher education as a means for supporting learning on academic programmes. The emergence of electronic resources has tremendously transformed the handling and management of information in academic environments and university libraries in particular (Ani & Edem, 2012). In recent times, electronic resources have been identified as the major sources for information dissemination in the universities, especially for researchers (Lefuma, 2017).

Globally, access to and utilization of electronic resources among students who are visually impaired play important roles in their learning and practice. Electronic resources are invaluable research tools for students with visual impairment in higher institution of learning (Hadagali et al., 2012). It offers students with visual impairment the chance to access relevant and current information from different subject areas. Electronic resources provide accurate and timely information, especially for students who have vision, and they depend greatly on electronic resources for information to advance research and collaboration with other researchers

around the world for intellectual growth (Ukpebor, 2012). Students with visual impairment search online resources to look for information, explore learning topics or for general inquiry (Conole, 2008; Sedek, Mahmud et al., 2012; Thompson, 2013). This may include watching educational videos and video lectures, reading e-books, online articles, slides, online text and documents, and blogs, and listening to podcasts, etc. It enables them to gain access to both text-based and audio-visual materials online anywhere anytime, and also exposes them to vital educational resources which they can utilize to improve their classroom teaching during teaching practice (Rao & Krishnan, 2014).

Despite the availability of a number of e-learning resources and modern sophisticated assistive devices that provide alternative formats to support the learning of students who are visually impaired, there are numerous challenges when it comes to accessing and using e-learning resources in higher education. They have challenges in accessing and using e-learning resources (Armstrong et al., 2010), and experienced limited availability of specialised disabled-friendly hardware and software resources (Ndiujye, 2009; Ndumbaro, 2009; Wycliffe & Nyambura [n.d.]). Gronlund et al. (2010) found that access to special materials for education of students with visual impairment also are insufficient. This, in turn, may affect the accessing and using of e-learning resources. Students with visual impairment are disadvantaged due to inaccessible learning materials or instructional media which have not been tailored to their specific needs (Anderson, 2006; Hitchcock & Stahl, 2003). Thus, the design and usability of instructional technologies are issues for students with visual impairment. The equipment used as assistive technology for learning in schools for the visually impaired are expensive to procure and maintain (Azeta et al., 2009)

In Ghana, education is provided to all students, irrespective of their disabilities. On this account, successive governments have tried to make significant achievements in socio-economic development through the integration of ICTs in their respective national development policies. They have committed to ensuring nationwide ICT and Internet accessibility to all of its citizens, regardless of their status or disabilities. Accordingly, ICT availability, accessibility, and usage are essential to everyone. Thus, e-resources accessibility and usage must not discriminate based upon the physical capabilities of students. Students who are visually impaired cannot be left behind in the transition into such an information-based society. In fact, ICT can have a more significant impact on persons with visual impairment (PVI) with respect to education, employment, and other aspects of their daily lives.

The use of technology in education plays a vital role by enabling flexible curriculum development and assisting students with visual impairments to participate as equal as sighted students in learning experiences. Owing to this, Ghana, in 1992 adopted the „Global Education for All“ policy as a constitutional provision (Article 38, Section 2 of the 1992 Constitution). Also, at a 1993 conference on developing education for students who are visually impaired, emphasis was placed on the inclusion of students with visual impairments (VI) in schools in Ghana. This made Inclusive Education (IE) an interventional programme for students with visual impairments, however, it appears that much attention and support has not been given to assist them to perform academically, especially with e-learning resources.

In Ghana, there is an increasing number of students who are visually impaired in public tertiary education, especially, Colleges of Education. These students attend mainstream lectures (inclusive education) and are examined in the same subject content with their peers. Currently, there are three Colleges of Education in Ghana

which train pre-service teachers with visual impairments, namely: Presbyterian College of Education (PCE), Akropong-Akuapem, Wesley College of Education (WESCOE), Kumasi, and Nusrat Jahan Ahmadiyya College of Education, Wa. These students need to be supported with ICT facilities and e-learning resources to enhance their learning. However, personal observation from the Colleges of Education shows that e-learning websites are not designed to suit the needs of students who are visually impaired. Also, pre-service teachers with visual impairments are exempted from ICT lessons, which is a core subject for their sighted colleagues. The ICT lessons are designed to equip students with the basic rudiments in accessing and using e-learning resources. This, however, has created a gap in practice during the COVID-19 era where institutions had no option than to resort to e-learning.

The focus of this research, therefore, was to investigate the extent to which e-learning resources were accessible to this category of pre-service teachers.

1.2 Statement of the Problem

Pre-service teachers who are visually impaired need to be consciously supported with adaptive technology to equip them to function as close as possible to their sighted peers. E-learning resources are helpful for students with visual impairments since they facilitate independence in learning and access to areas of the curriculum from which students may previously have been excluded (Anderson, 2006; Nisbet & Wilson, 2002).

Several empirical studies have been conducted on e-learning resources availability, accessibility, and usability among students with visual impairments, however, these studies focused on students with visual impairments in developed countries (Brecht, 2012; Crawford & Clink, 2004; De Vicente et al., 2004; Rolinson et al., 1995) and East African countries (Manda, 2005; Ojedokun & Owolabi, 2003;

Okello-Obura, 2010), but much is not known within West-African countries, and Ghana in particular. Previous studies have yielded some insight, but also revealed areas in need of further studies to better provide services and outcomes for individuals who are blind or have visual impairments. Again, findings from such studies cannot be generalized to Ghana's context due to differences in the geographic, socioeconomic, and educational systems in these countries. Also, the availability, accessibility, and utilisation of e-resources and other ICT facilities and the challenges experienced in those countries are not like those experienced by pre-service teachers with visual impairments in Ghana.

In Ghana, studies have been conducted on availability, accessibility, utilisation, and challenges in accessing e-learning resources (Akussah et al., 2015; Boakye, 2017; Boakye & Ndeogo, 2018; Borteye & Dadzie, 2015; Dadzie & Van der Walt, 2015; Kwafoa et al., 2014). The problem, however, is that these studies focused on faculty members and administrators, postgraduates, undergraduates, and students in theological universities, but neglected people with visual impairments in Colleges of Education in Ghana. Also, problems faced by students who are visually impaired are different from those experienced by sighted students. Additionally, methodologically, all the studies conducted either in Ghana or outside Ghana used quantitative approach which lacks in-depth knowledge of the problem.

With the researcher being a resource person for students with visual impairments at PCE-Akropong, she observed that the two colleges chosen as study areas do not offer courses in ICT for the students who are visually impaired (VIS) and in this regard those who had knowledge of ICT had learnt it on their own outside the school or sought assistance from their sighted friends in school which warrant a study of this nature. These are gaps in both knowledge and practice that this study seeks to

fill by examining the accessibility of e-learning resources among pre-service teachers with visual impairment in Colleges of Education in Ghana, using qualitative approach to research.

1.3 Purpose of the Study

The main purpose of the study was to examine the accessibility of e-learning resources among pre-service teachers with visual impairments in selected Colleges of Education in Ghana. Specifically, the study was guided by the following objectives.

1.4 Research Objectives

1. To identify the types of e-learning resources available to pre-service teachers with visual impairments in these colleges of education.
2. To determine the accessibility of e-learning resources for pre-service teachers with visual impairments in these colleges of education.
3. To examine the challenges encountered by pre-service teachers with visual impairments while accessing and using the e-learning resources in these colleges of Education.
4. To find out the environmental adaptations made for pre-service teachers with visual impairments while accessing the e-learning resources in these colleges of education.

1.5 Research Questions

The following research questions were formulated to guide the study:

1. What are the types of e-learning resources available for pre-service teachers with visual impairments in the two colleges of education?
2. How accessible are e-learning resources for pre-service teachers with visual impairments in the two colleges of education?

3. What are the challenges faced by pre-service teachers with visual impairments while accessing and using e-learning resources in the two colleges of education?
4. What environmental adaptations are made for pre-service teachers with visual impairments while accessing the e-learning resources in the two colleges of education?

1.6 Significance of the Study

The result of this study would help to reveal the extent to which e-learning resources are available and accessible to pre-service teachers with visual impairments in the two colleges of education in Ghana. Resource persons for these individuals at the colleges of education and other institutions with similar situation would be informed to improve on their services. Additionally, the study would reveal the types of e-learning resources available. This would help pre-service teachers with visual impairments to make informed choices of e-learning resources to meet their unique needs. This is because, while some are partially sighted, others are totally blind. Thus, the degree of impairment differs from person to person.

Since colleges of education in Ghana are now tertiary institutions and, for that matter, research-based, the result would help bridge the gap between pre-service teachers who are visually impaired and their sighted colleagues due to their exemption from the study of ICT. The result of the study will also enable relevant stakeholders like the Ministry of Education to provide e-learning resources to colleges of education that train pre-service teachers who are visually impaired, should there not be any. Also, the findings of this study will make provision for in-service training for service providers to equip them to provide quality service to pre-service teachers with visual impairment.

1.7 Delimitation of the Study

The study focused on two Colleges of Education that train teachers with visual impairments in Ghana, namely, WESCOE, Kumasi, and PCE, Akropong-Akuapem, even though, there are three colleges of which Nusrat Jahan Ahmadiyya College of Education is include. The study was delimited to two study areas, namely, WESCOE and PCE because of the great difficulties encountered in eliciting data from the Nusrat Jahan Ahmadiyya College of Education in the Upper West Region of Ghana.

In terms of content, the study focused on types of e-learning resources, availability of e-learning resources, accessibility of e-learning resources, benefits of e-learning resources, challenges of e-learning resources and environmental adaptations made for pre-service teachers with visual impairments while accessing and using e-learning resources in the two Colleges of Education. The case study format of the study was another delimitation. This format was used to collect and report interview data related to how students with visual impairments access e-learning resources for effective learning.

1.8 Limitations of the Study

Generally, the research was carried out successfully. However, the researcher encountered some challenges that are worth mentioning:

- Only one-year group of the respondents were on campus who were even preparing for their end of semester exam due to the coronavirus pandemic. To reduce the inconvenience, the researcher scheduled with respondents in the various study sites and these lasted three weeks to complete the interviewing of the second-year groups. The first-year group were interviewed virtually through phone calls.

- Most of the respondents made it known to the researcher that several research conducted in the study areas had not yielded any fruitful results and that they were reluctant to participate in the study. As a way of resolving this challenge, the researcher discussed with the respondents that there are frantic efforts being made to publish the findings in various outlets and forward copies of the work to the appropriate quarters for the necessary action to be taken on them.
- This study would have been further improved if the ages of the respondents were captured to see which age range was affected by visual impairments from the two colleges of education used as study sites.

1.9 Operational Definition of Terms

Availability: In this study, availability means that which is available. In essence, the quality of being available. Electronic information resources cannot be accessible if they are not available. Thus, availability precedes access and access precedes use.

Accessibility: In this study, accessibility means the ability to locate, gain entry and use a resource that is physically or electronically provided to obtain specific and accurate information. The extent to which an individual or a group can acquire and use tools or something freely or at an affordable cost (UNESCO, 2004)

Utilization: In this study, utilization of a resource is the act of exploiting a resource to satisfy an information. For information resources to be effectively used by students, they have to be accessible.

E-learning: Learning conducted via electronic media, typically, using internet and an electronic device

Visual impairment. It is an impairment in vision. Conditions of the eye or visual system that result in less than normal vision are visual impairments. This includes both partial sight and blindness (Barraga & Erin, 1992).

1.10 Organization of the Study

The study is divided into five chapters. Chapter one which is the introduction comprised the background to the study, statement of the problem, purpose of the study, research questions, significance of the study and delimitation of the study. Chapter two deals with review of literature related to the study. Chapter three outlines the research methods that were adopted for the study which includes profile of the study site, the research design, population, sample size, sampling procedure, research instruments, data collection procedures and data processing and analysis. Chapter Four deals with results and discussion. The last chapter, which is the fifth chapter, summarizes the findings, draws conclusions, makes recommendations, and suggests areas for further studies.



CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviews, examines, organizes, and presents relevant literature on the following regarding ICT and e-Learning for pre-service teachers with visual impairments in higher education: (a) Availability, (b) Accessibility, and (c) Use. The chapter was divided into three sections. The first section presents theoretical underpinnings of the study, the second section provides the conceptual review of the topic, and the third section presents empirical findings that are relevant to the research questions.

2.1 Theoretical Framework

The theoretical framework for this study was based on the Technology Acceptance Model (TAM) of Davis (1986), which emphasized the use of Theory of Reasoned Action (TRA). Theory of Reasoned Action, according to Davis, assumed that attitude of a person towards a system is controlled by his/her belief of that system. The TAM is an adaptation of the theory of reasoned action (Fishbein & Ajzen, 1975), which is specifically tailored for modelling user acceptance of information systems. According to the TRA, it is beliefs that influence attitudes, which lead to intentions, which then generate behaviour. The TAM adopted this belief-attitude-intention-behaviour relationship to model users' acceptance of IT (Bernadette, 1996; Di Benedetto, Calantone, & Zhang, 2003; Riemenschneider & McKinney, 2001). Similarly, TAM also deals with the acceptability of an information system (Adeyemo, Adedaja, & Adelore, 2013) and how it can be applied to determine levels of acceptability of the system. The purpose of TAM is to predict user

acceptance of technology by using two technology related factors, namely, Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Furthermore, TAM model assumes that level of acceptability or actual use (AU) is mainly determined by two factors, namely, Perceived Usefulness; and Perceived Ease of Use.

The PU of a system can be described as the level to which an individual believes that using the new technology or system will boost his/her performance (Bhatti, 2015). PU in TAM is the extent to which a user believes that the use of a system will enhance his or her performance. PU refers to the extent to which a person believes that making use of a particular system or technology to perform a task will be easier or require little effort (Lu et al., 2014). PEU is the extent to which a user believes that using the system will be effortless. Moreover, Davis (1986), through his TAM model, clarified that an individual's attitude towards a system is not the only factor that influences him/her to use the system, but the effect that the system will have on the person's performance is another significant factor that determines level of acceptance.

This study adopted TAM as a theoretical framework because according to Dillon and Morris (1996), the diffusion of innovation theory offers little information on the factors that influence user acceptance. Diffusion of innovation theory concerns with the spread of an innovation through a population. Researchers in diffusion innovation theory have developed analytical models for explaining and forecasting the dynamics of diffusion of an innovation (an idea, practice, or object perceived as new by an individual) in a socio-technical system. It rather focuses on characteristics that influence individual decisions in adopting a technology, such as compatibility and perceived complexity and the strategies used to market the technology to specific groups and organizations. TAM has been successfully tested on a wide variety of



integration of the technology into the teaching and learning process has been a challenge. This has generally made instructional delivery to be face-to-face instructor-led with limited or absence of electronic collaboration among students and lecturers. All the country's major public universities, as well as the Colleges of Education, have separate ICT policies, which includes an ICT levy for students. This could enable students to have access to 24-hour computer laboratories with broadband connection. However, not all tertiary institutions in the country are equally endowed and there are instances where computer facilities are run purely by private sector entities as cyber cafes on campus.

According to the Ministry of Education (2003), universities and colleges of education in Ghana find it very difficult to maintain their ICT infrastructure due to the inadequate human and financial resources required for the maintenance of those facilities. Localised experiments and pilot projects to exploit ICTs for educational purposes in Ghana have been taking place for many years, particularly at tertiary level. However, there has been a long gestation period for the development of a national policy in this field. Despite being identified as a key goal in the Ghana Poverty Reduction Strategy scheme, in the Education Sector Strategic Plan for 2003-2015 (Ghana; Ministry of Education, Youth and Sports, 2003) and in the ICTs for Accelerated Development Policy (Ghana, 2003), a policy document on ICTs in Education was eventually finalised in November 2008 and published in January 2009.

The policy highlights seven key thematic areas that must be addressed in order to make effective use of the available technologies throughout the education system, and these including: management at all levels of the system, building capacity among teachers, administrators and support staff; developing the necessary infrastructure for equitable access, incorporating ICTs in the curriculum, developing or acquiring

educational content, providing technical support and ensuring sustainable maintenance of installations, monitoring and evaluating the system.

Technology-enabled instruction, especially online learning, has emerged as the most feasible and economically sound means of expanding access to quality education. Online learning is thus being rapidly adopted by educational institutions worldwide as a supplementary mode of education delivery, and indeed has been touted as the next democratizing force in education (Jones, 1997).

In the United States, over 3.5 million college students took at least one online course in the full term of 2006 (Allen & Seaman, 2007). However, in Ghana, and for that matter Sub-Saharan Africa, the rate of internet access and usage is very low; it is estimated that only 1 in 250 people have access to the Internet as against the global average of 1 in 15 (UNESCO Institute for Statistics, 2007). Online learning in higher education poses a great challenge as this mode of instruction delivery is grounded on the available ICT infrastructure. Due to limited technological resources in education, Ghana is more tilted to the traditional lecture mode of instruction delivery, while the present digital content that is aligned with curriculum frameworks is known to be limited in Africa (Farrell et al., 2007).

2.3 Concept of E-Learning

E-learning encompasses a broad range of media and technologies. Definitions of e-learning range from those that are broad in scope; and this includes all forms of organised interaction between people, using computers or networks as the medium of communication (Mwanguzi & Lin, 2010), to the very specific, as in „teaching and learning through the primary medium of Web-based computer resources, minimally including hyperlinks and/or the Internet and synchronous and/or asynchronous communication“ (Kinash et al., 2012). E-learning is instruction delivered on a digital

device such as a computer or mobile device that is intended to support teaching and learning (Mayer & Clark, 2011).

E-learning is the use of internet technologies to enhance knowledge and performance (Olojo et al., 2012). In short, e-learning refers to how a course is digitized so it can be stored in electronic form, and the structure of the course includes content and ways to help people learn it. In the context of this study, the researcher operationalised e-learning as the delivery of a learning, training or educational programme by electronic means covering a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via the Internet, intranet/extranet, audio- and videotape, satellite broadcasts, interactive television, and CD-ROM.

E-learning technologies offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives. E-learning increased accessibility to information, ease in updating content, personalized instruction, ease of distribution, standardization of content, and accountability (Olojo et al., 2012). E-learning points toward a revolution in education, allowing learning to be individualized (adaptive learning), enhancing learners' interactions with others (collaborative learning), and transforming the role of the teacher (Olojo et al., 2012). E-learning is also called Web-based learning, online learning, distributed learning, computer-assisted instruction, or Internet-based learning.

The forms of e-learning have the following features, and may include (a) storing and or transmitting lessons on CD-ROM, (b) local internal or external memory, (c) servers on the Internet, (d) content relevant to the learning objective, (e) media elements such as words and pictures to deliver the content, (f) instructional

methods such as examples, practice, and feedback to promote learning, (g) instructor-led (synchronous e-learning) or self-paced individual study (asynchronous e-learning), and (h) learners building new knowledge and skills linked to individual learning goals or varieties of e-learning.

E-learning comes in various forms. For example, Horton (2011) summarized the different varieties of e-learning instruction as follows:

1. **Standalone Courses:** Courses taken by a solo learner. They are self-paced without interaction with a teacher or classmates. Learning games and simulation: Learning by performing simulated activities that require exploration and lead to discoveries.
2. **Mobile learning:** Learning from the world while moving about in the world. Aided by mobile devices, such as smart phones and tablet devices, mobile learners participate in conventional classroom courses and standalone e-learning while out and about. They may also participate in activities where they learn by interacting with objects and people they encounter along the way. These educational tools made available through “mobile devices” such as palmtops (or handhelds), personal digital assistants (PDAs), tablet, personal computers, mobile or smart phones; such tools, may also take advantage of the connection to the net via “wireless transmission” (Hoppe et al., 2003).
3. **Social Learning:** Learning through interaction with a community of experts and fellow learners. Communication among participants relies on social networking media such as online discussions, blogging, and text-messaging.
4. **Virtual classroom courses:** Online classes structured much like a classroom course, with reading assignments presentations, discussions via forums and other social media and homework, they may include synchronous online

meetings. These educational resources made available through interconnected computer networks, comprising also synchronous and asynchronous communication tools, when used in an educational perspective.

5. Computer-based learning: those learning materials locally available on the user's personal computers and used when the computer is not connected to a network.

The term „e-learning resources“ is an acronym used in reference to electronic resources or electronic information resources. These are collections of information in electronic or digital format that are accessed on an electronic device, such as a mobile phone, computer, etc. They are published resources in electronic versions or format such as encyclopaedias, pamphlets, e-books, e-journals, databases, etc. Several authors have also provided their own definitions. Adams and Bonk (1995), Scan (2010), Moyo (2004), Liu (2006) and Nicholas et al. (2009) defined electronic resources as databases, books, journals, newspapers, magazines, archives, theses, conference papers, examination papers, government papers, research reports, scripts and monographs in electronic format.

Swain and Panda (2009a) regarded e-resources as reservoirs of information that may be milked through various electronic devices such as computers, smart phones, tablets, etc. „They are fine grained and restructured and often stored within the cyberspace in a compact form“. Adeleke and Nwalo (2017) defined electronic information resources as “resources in which information is stored electronically and which are accessible through electronic systems and networks (p. 2)”. Electronic resource is digitized information, facilitated by computers, network connectivity, electricity, other peripheral components, and most importantly human beings.

Electronic resources are now used to supplement printed information sources in the university libraries.

The various types and forms of e-resources in academic libraries include e-databases, e-journals, e-data archives, e-manuscript, e-maps, e-books, e-magazines, e-thesis, WWW, e-newspapers, online databases, e-research reports, and e-bibliographic databases (Ankrah & Atuase, 2018). These resources come in different formats including text, videos, audio, maps, graphics, tables, pictures, and others. Amankwah (2014) also indicated that electronic resources include full text documents, CD-ROMs, resources available on the internet such as e-journals, online public access catalogues (OPAC) and other computer based electronic networks.

E-learning resources can be categorized into three, namely: text based, audio-based and audio-visual based. Text based resources includes books, journals, periodicals and other forms of learning materials that can be accessed electronically, read and printed on paper or copied on storage devices like universal serial bus (USB) and compact disk (CD). Audio based resources include podcasts and live or pre-recorded lectures which are usually uploaded on a dedicated server that is accessible to distance learners or broadcast live via radio. Audio-visual resources are video resources that are available to learners on a dedicated website. Many open and distance learning (ODL) based institutions today now make use of video lectures which they make available to their learners on YouTube or via a dedicated website. E-resources come in various types and forms, including e-journals; electronic databases (such as full-text databases, indexing and abstracting databases, numeric and statistical databases, and reference databases); bibliographies; dictionaries; directories and encyclopaedias; e-books; e-images; and e-audio and visual resources (International Federation of Library Associations 2012).

Creating e-learning resources involves several components: once content is developed, it must be managed, delivered, and standardized. Content comprises all instructional materials, which can range in complexity from discrete items to larger instructional modules. A digital learning object is defined as any grouping of digital materials structured in a meaningful way and tied to an educational objective. Learning objects represent discrete, self-contained units of instructional material assembled and reassembled around specific learning objectives, which are used to build larger educational materials such as lessons, modules, or complete courses to meet the requirements of a specified curriculum. Examples include tutorials, case-based learning, hypermedia, simulations, and game-based learning modules. Content creators use instructional design and pedagogical principles to produce learning objects and instructional materials.

Content management includes all the administrative functions (e.g., storing, indexing, cataloguing) needed to make e-learning content available to learners. Examples include portals, repositories, digital libraries, learning-management systems, search engines, and e-portfolios (Olojo et al., 2012). Access to e-resources is obtained either on campus or off campus (Amankwah, 2014; Rassiya & Chinnasamy, 2014), or at multiple locations (Deng, 2010) using electronic devices, such as desktop computers, laptops, iPads and/or tablets and mobile phones (Amankwah, 2014). Other modes of access include search engines, meta search engines, information gateways, subject directories, scholarly databases (Dadzie, 2005; Kwadzo, 2015; Kwafoa et al., 2014) and library catalogue (Amankwah, 2014; Deng, 2010).

2.4 Significance of E-Learning

The major advantage of e-learning resources is that they can be simultaneously accessed ubiquitously around the world by a great number of users. Electronic resources can be accessed remotely by academic staff in their offices/laboratories or at homes without physical visit to the library. Thus, electronic resources promote efficiency in dissemination of information for research purposes in universities (Thanuskodi, 2012). Electronic resource “is more of a tool to assist in conducting research, a way of scanning a lot of materials quickly”. The act of providing access to electronic resources by the university library to the patrons is referred to as electronic information services.

E-learning resources are invaluable tools for research (Heterick, 2002) – gathering data, information and facts for knowledge advancement (Shuttleworth, 2008) and learning – „the acquisition of knowledge or skills through study, experience, or being taught. E-resources complement traditional print-based materials and ensure the maintenance of updated information, convenience and global distribution (Dadzie, 2005; Vasishta & Jyoti, 2007). They also ensure space saving, rapid and accurate information retrieval, multi-user access, compatibility with search engines and manageability (Vasishta & Jyoti, 2007).

These benefits have necessitated the provision of hi-tech environments for students and staff to widely access and use e-resources for various purposes. Nicholas et al. (2017) also concurred that the use of electronic resources, such as search engines, was highly popular among early-career researchers irrespective of country, language, and discipline. Appleton (2006) elucidates that changes in the traditional way of document delivery services, from print to electronic, have come about swiftly; hence, information services and libraries have transformed significantly so that they

can deliver this new technology effectively to academics. The potential of digital and interactive experiences for students cannot be understated. It is necessary to provide quality e-resources to guarantee engaging experiences of multimodal texts to back up authentic teaching and learning needs.

Also, a diverse range of reading experiences are provided for students to support literacy and reading, access to a balanced range of resources for students and teacher (Okello-Obura, 2010). Brecht (2012), in his study conducted to find out the usefulness of video-based electronic resources among ODL based learners in the United States notes that distance learners benefit a lot from video-based lectures as large number of learners use video lectures as helpful tutoring resources and receive several types of improved-learning benefits including improvement in topic understanding, better grades, and greater ease of learning.

On the other hand, e-learning is not the end to every training need. It has limitations according to (Kruse, 2004). The author summarizes them as follows.

Up-front investment required of an e-learning solution is larger due to development costs. Thus, budgets and cash flows will need to be negotiated. Technological issues that play a factor include whether the existing technology infrastructure can accomplish the training goals, whether additional technology expenditures can be justified, and whether compatibility of all software and hardware can be achieved.

Inappropriate content for e-learning may exist according to some experts, though are limited in number. Even the acquisition of skills that involve complex physical, motor, or emotional components (juggling or mediation) can be augmented with e-learning. Cultural acceptance is an issue in organizations where student

demographics and psychographics may predispose them against using computers at all, let alone for e-learning.

Feeling of isolation – participants may feel isolated from their teacher and/or class mates, because there are no physical contacts among them. Participants in e-learning must have sufficient level of skills and knowledge on how to use modern ICT and computers. Some people have phobias concerning using computers and modern ICT. Management of computer files and online software may be difficult for some participants. Slow internet connection could cause frustration.

2.5 Concept of Visual Impairment

Visual impairment is a term used to describe any kind of non-correctable vision loss, whether it is complete blindness or partial vision loss. Visual impairment is often used as an umbrella term, but not all visual impairments are the same. A person is considered legally blind if his or her corrected vision is no better than 20/200, meaning seeing at twenty feet what others see at two hundred feet or having peripheral fields (side vision) of not more than 20 degrees diameter or 10 degrees radius. A person is considered visually impaired when corrected vision is no better than 20/70.

The American Foundation for the Blind (AFB) defines vision impairment as "a visual acuity of 20/70 or worse in the better eye with best correction, or a total field loss of 140 degrees." Visual impairment may also be affected by limited ability to adapt to light or darkness, sensitivity to light, light/dark contrasts, or glare. Vision that falls between 20/200 and 20/400 is defined as severely impaired, while vision from 20/500 to 20/1000 is categorized as profoundly impaired. The Royal Institute for Deaf and Blind Children notes that visual impairment most commonly affects visual acuity, sharpness or clarity of vision, visual range, and colour perception. Visual impairment

is also known as 'low vision'. Vision impairments can result from a variety of causes, including congenital conditions, injury, eye disease, and brain trauma, or as the result of other conditions such as diabetes and multiple sclerosis. Possible causes of impairment include genetic conditions, in utero infections, birth complications, disease, trauma and old age.

Eighty to 90% of people who are legally blind have some measurable vision or light perception. A student who is legally blind may retain a great amount of vision. Many students who are legally blind are able to read with special glasses, and a few can even drive. It is also important to note that some legally blind students have 20/20 vision. Although these students have perfect central vision, they have narrow field or side vision and see things as though they were looking through a tube or straw. They often use guide dogs or canes when they travel. Some blind students with only central vision loss do not require a guide dog or cane. They can see large objects but have great difficulty reading or threading a needle. The term "blindness" should be reserved for people with complete loss of sight. "Visually impaired" is the better term used to refer to people with various gradations of vision.

Most visually impaired students use a combination of accommodations for class participation and learning needs, including books on tape, e-text, or voice synthesizing computers, optical scanners, readers, and Braille. They use taped texts, readers, raised line drawings, talking computer terminals, and other equipment. In addition, they use large print materials, closed circuit magnifiers, or other magnifying devices, as well as large print computer terminals, or telescopic lenses. Partially sighted students may also use large print typing elements for papers. Some will be able to take their own notes in class by printing large letters with a felt-tip pen. Others will tape record lectures for later use.

The way in which vision impairments are classified differs across countries. The World Health Organization (the WHO) classifies visual impairment based on two factors: the visual acuity, or the clarity of vision, and the visual fields, which is the area from which you are able to perceive visual information, while your eyes are in a stationary position and you are looking straight at an object.

The Snellen chart is used to test visual acuity. Your visual acuity is calculated using two numbers. The first number is the distance between the person reading the chart and the chart. The second number is the distance that a person with normal vision would have to stand from an object to see what you did at 20 feet. For example, a visual acuity of 20/80 means that you can read the chart from 20 feet away as well as a person who could read the chart from 80 feet away. In other words, what a person with normal vision would see from 80 feet away, you can't see until you move closer to only 20 feet away. This image shows the crossover between the eyes to create the visual fields. The types of vision impairments are low visual acuity, functional blindness, and legal blindness (which varies for each country):

1. Low visual acuity, also known as moderate visual impairment, is a visual acuity between 20/70 and 20/400 with your best corrected vision, or a visual field of no more than 20 degrees. Generally, students with low vision are able to learn using their visual sense; however, they may need to have print magnified, contrast enhanced, or type font or size changed (Turnbull et al., 2002). Students in this category characteristically work more slowly and experience difficulty working with details (Barraga & Erin, 1992).
2. Blindness is a visual acuity of 20/400 or worse with your best corrected vision, or a visual field of no more than 10 degrees. People with functional blindness typically use a combination of modalities to function within their surroundings (Turnbull et

al., 2002). Students in this category generally read and write using braille. Some functionally blind individuals have sufficient vision to allow them to move around the classroom safely. Others, however, may require considerable accommodations to do so. Near blindness and total blindness are included in this category. Near blindness occurs when visual acuity is reduced so greatly that learning takes place using data from other senses most of the time (Barraga & Erin, 1992). Students with total blindness receive no stimuli from their visual channel. They depend entirely on input from other senses.

3. Legal blindness in the United States is visual acuity of 20/200 or worse with your best corrected vision or a visual field of no more than 20 degrees.

2.6 Empirical Studies

This section reviews studies conducted by previous researchers on the topic under investigation. This section was grouped based on the research questions.

2.6.1 Types of e-learning resources available to students with visual impairment

Availability of electronic information resources is about information being accessible as needed, when needed, where needed. A study by Okiy (2000) showed an unavailability rate of only 7.5%. Ajayi and Akinniyi (2004) found frustration among information seekers due to the non -availability of sources. Iyoro (2004) found that availability of serials at the University of Ibadan was 94 percent, with 242 of 256 respondents agreeing that serial publications are available and readily accessible. The provision of electronic information resources varies among disciplines. They are most available in the sciences and medicine and least in the social science and humanities. Torma and Vakkari (2004) observed that the availability of relevant electronic resources affects how frequently scholars use them. Aina, as cited in Ugbagir (2010)

analyzed the availability of periodical titles used in Nigerian libraries, finding that only 67 (11.5%) of the 578 periodical titles studied were not available in any of the major libraries, and confirming a high availability rate. The study observed that electronic information resources are better provided through consortia efforts the main benefits are that of rationalization and cost savings.

In Nigeria, Atsumbe et al. (2012) examined the availability and utilization of e-learning infrastructures in Federal University of Technology, Minna. Four research questions guided the study. The population of the study was made up of 382 students and 182 lecturers randomly selected from the four schools of the institution. Data obtained were analysed using mean and t-test. Some of the findings revealed that e-learning infrastructures were not adequate in the university for teaching and learning. Management's efforts towards the development of ICT were mainly for administrative purposes. In addition, lecturers and students both had computers and laptops and could access the internet but, they did not use them for teaching and learning. Based on the findings of the study, recommendations were made to encourage the use of e-learning infrastructures to foster teaching and learning in the university. It was also recommended that the university should as matter of urgency organise in-house training for lecturers on the use of ICT for teaching and learning. In addition, it was recommended that the Government should release the necessary funds to enable universities put in place necessary ICT infrastructures that would facilitate teaching and learning in the university.

Adelabu, at al. (2014) investigated the availability and utilization of e-learning infrastructures for teaching and learning at the University of Ibadan. Four research questions guided the study. The population of the study was made up of 482 students and 180 lecturers randomly selected from the four faculties of the institution.

Data obtained were analysed using mean and t-test. Some of the findings revealed that e-learning infrastructures were not adequate in the higher institution of learning. Development of ICT was mainly for administrative purposes. In addition, both lecturers and students had computers and laptops which could be used to access the internet but, they did not use them for teaching and learning. Based on the findings of the study, recommendations were made to encourage the use of e-learning infrastructures to foster teaching and learning in the university. The university should as matter of urgency organize in house training for lecturers on the use of ICT for teaching and learning. Government should release the necessary funds to enable universities put in place necessary ICT infrastructures that will facilitate teaching and learning.

Unomah, as cited by Quadri et al. (2014), conducted a study to determine the unavailability rate in a library and to find out its causes. The survey revealed an unavailability rate of 34 percent. Dike, as cited in Amankwah (2014), conducted research on the scarcity of books in Nigeria and the threat to academic excellence. The author was able to establish that non-availability of information resources had led faculty and students not to use library services. A study by Marama and Ogunrombi, as cited in Ankrah and Atuase (2018), confirmed high unavailability of library and information science (LIS) collections in most Nigerian university libraries, which had negative effects on the use of information resources in the libraries studied.

In Nigeria, Gabadeen et al. (2015) examined the adequacy of the available e-learning technological tools, their accessibility and utilisation at the Nigerian public senior secondary schools. The study adopted a descriptive survey method to collect data on available, accessible, and utilised e-learning technology tools for secondary schools, using a questionnaire entitled “E-Learning Technologies Questionnaire”

ELTQ. The findings of the study revealed that e-learning technologies were relatively available to the teachers and students, reasonably accessible and adequately accessible to students and teachers, respectively, and fairly utilized by both. There was no significant difference in the accessibility and utilization of the e-learning technologies between the teachers and the students. It was recommended that various stakeholders should formulate, legalise, and implement specific ICT policies on e-learning technologies for the Nigerian secondary educational system to fast-track socio-economic transformation.

In Nigeria, Afolabi (2015) explored the level of availability of online learning tools and to find out the level of readiness of both the teachers and students toward using it. Three research questions and three hypotheses were raised and tested for the study. Descriptive survey research design was adopted for the study. A sample of 125 respondents participated in the study. The research instruments were questionnaires; one designed for the teachers and the other for the students. Both were tested for reliability using Cronbach Alpha formula and the reliability co-efficient of each yielded 0.82. The instruments were checked for face validity, content validity, and construct validity by three experts in computer education and educational technology before administration. Data obtained were analyzed using simple percentage and chi square statistical tools. Findings from the study revealed that online learning tools were available, but the practice had not begun. Students and lecturers were equally ready to use online instructional methods whenever they were introduced into the university system. The management of the school were encouraged to introduce online instructional methods into the school's curriculum. Also, the Nigerian government was to ensure that students were taught the use of online instruction right from secondary school.

Similarly, Edem and Egbe (2016) examined the extent of availability and utilization of electronic resources by postgraduate (PG) students in the University of Calabar (UNICAL) Library. Descriptive survey was adopted, and the population of the study was two thousand, seven hundred and twenty-six (2,726), while a sample of four hundred (400) postgraduate library users were selected through stratified sampling; two hundred postgraduate student each from Faculty of Education and Faculty of Science. Questionnaire was the main instrument used for data collection. Data collected were analysed using descriptive statistics such as simple percentages and frequency count. Pearson correlation coefficient (r) was the statistical analysis technique adopted to test the hypothesis under study at 0.05 level of significance. The result of the analysis revealed that electronic resources were available, and students utilized them. The university library had e-journals, e-books and access to databases and Internet resources. Majority of postgraduate students in the University of Calabar often made use of the electronic resources in the University Library. However, online databases were underutilized. Electronic journals were the most often used electronic resources by postgraduate students.

In Nigeria, Olaniran et al. (2016) investigated accessibility to and utilization of electronic resources among pre-service teachers in the National Open University of Nigeria (NOUN). Survey research design was used to carry out the study. Two hundred and thirty eight undergraduate students studying to obtain Bachelor of Education (B.Ed.) by distance were purposively sampled from Ibadan Study Centre of the institution. The results from the survey revealed that electronic resources in different forms like radio broadcast, e-journals, e-books, and CD-ROM, among others, are available and accessible to the pre-service teacher trainees by distance. However, limited internet connectivity and inadequate access to electricity were

shown as major factors constraining most of the participants from accessing and utilizing the available electronic resources. The study recommends for the distance learning providers in developing nations to partner with telecommunication firms and internet service providers with a view to providing constant and affordable internet services to their learners, especially those that are studying to become classroom teachers.

Adeleke and Nwalo (2017) also conducted a study on availability, use and constraints to use of electronic information resources by postgraduate students at the University of Ibadan, Nigeria. The study adopted a descriptive survey design. Samples of 300 of postgraduate students within seven out of the 13 faculties in the University were randomly selected. Data were collected using questionnaire designed to elicit response from respondents, and were analyzed using descriptive statistics methods of percentages, mean, and standard deviation. Results indicated that internet was ranked most available and used in the university. In addition, the researchers found that the level of usage of electronic resources was low.

Olaniran et al. (2017) investigated pre-service teacher trainees by distance and the utilization of e-learning resources. A survey research design was used to carry out the study. One hundred and forty-four pre-service teachers by distance from three institutions offering teacher training programmes by distance in South Africa completed the anonymous web-based survey designed to gather data which provide answers to the five research questions in the study. The results revealed a high utilization of e-resources to learn but a low utilization of e-resources to teach among the respondents. The study recommends institutional based training on the techniques of accessing and utilizing e-learning resources for pre-service teacher trainees in ODL institutions.

Ternenge and Kashimana (2019) investigated availability, accessibility and use of electronic information resources for research by students in Francis Sulemanu Idachaba Library University of Agriculture, Makurdi, Benue State, Nigeria. The study adopted a survey research design, the population of the study was 7952 registered users (students) of the library. The sample for the study was 381 students registered users of the library who were sampled using simple random sampling technique. Two instruments were used for data collection titled “Checklist on Availability of Electronic Information Resources for Research by Students (CAEIRRS)” and “Accessibility and Utilization of Electronic Information Resources for Research by Students Questionnaire (AUEIRRSQ)” which was validated by two experts. The reliability of the questionnaire was established using Cronbach Alpha method and a reliability coefficient of 0.765 was obtained. Data was collected and analyzed using frequency counts, simple percentages and means to answer the research questions. Findings of the study revealed that, e-journals, e-newspapers, Online Public Access Catalogue (OPAC), CD-Rom database, e-magazines, e-books, online database, e-research reports, virtual library online, science direct online and Ebscohost reference databases were the types of electronic information resources available for research by students in Francis Sulemanu Idachaba Library. Findings also revealed that, electronic information resources mentioned above were available for research by students to a great extent. Also, it is revealed from the findings that, the extent of accessibility and utilization of the availability electronic information resources for research by students is great.

2.6.2 Accessibility of e-learning resources among visually impaired students

Access is a general term used to describe the degree to which a resource, services, product, environment is accessible by as many people as possible. It can be viewed as the ability to access information with little or no stress. According to Aguolu and Aguolu (2002), resources may be available in the library and even identified bibliographically as relevant to one's subject of interest, but the user may not be able to lay hands on them. Osundina, as cited in Emasealu and Popoola (2016) studied the relationship between accessibility and library use in institutions in Nigeria and notes that the problem of users is not the question of wanting to use the library, but whether or not the library can provide for their needs and whether there will be access to the information provided. The internet, which facilitates online access, is the interconnection of computers from different geographical locations.

Also, Aina, as cited by Ugbagir (2010) wrote on accessibility to scientific and technological information in Nigeria revealing that of the 7,014 scientific papers published between 1990 and 1995, 5,067 (79%) are journal articles and 1,116 (20%) of these journal articles were not indexed or abstracted making them inaccessible. Further analysis shows that 77% of the papers not covered by any indexing or abstracting services were published in Nigeria. He recommends the establishment of a national science information centre to acquire, organize, provide access and disseminate scientific information resources in Nigeria and other places. For researchers to readily identify electronic resources, libraries must be able to integrate titles with other formats in catalogues and integrated library systems.

Chiaha et al. (2013) explicitly studied the kind of e-learning facilities that students have access to; the percentage and extent students access these facilities as well as the factors that hinder students from accessing e-learning facilities. The result

revealed that about 42.9% of the students had access to e-learning facilities; most students have access to only e-mail accounts and the factors hindering access to e-learning facilities include irregular electric power supply, poor network connection, among others.

Osei-Antwi (2015) explored how accessible ICT tools are to students with visual impairment at the Wenchi Methodist Senior High School of Brong Ahafo Region of Ghana. A total number of 38 respondents took part in the survey. The 38 respondents were made up of 20 males, representing 52.6% of the students and 18 females, also representing 47.24% of the students. The Wenchi Methodist Senior High School was targeted because it is the only school that takes charge of the education of students with visual impairment in the Brong Ahafo Region of Ghana. Simple random sampling was used to select the respondents. The respondents were students with visual impairment in the Wenchi Methodist Senior High School. The instrument used for data collection in the study was a questionnaire. SPSS was used in generating the various output of the analysis of data that was collected. The main findings of the study were that most teachers do not use the computer to give instructions in their lesson delivery to the students with visual impairment in the school. Also, inadequate ICT infrastructure in the school is another major factor inhibiting the integration of ICT into the teaching and learning process of students with visual impairment. The study also revealed that although students with visual impairments have some computers at their disposal, most of them do not learn with those computers. It is therefore important that the government makes ICT facilities accessible to students with visual impairment. Training on how to use the computer for the purpose of learning should also be organized for students with visual impairment.

In Nigeria, Eze, Chinedu-Eze and Bello (2018) examined adoption and utilisation of e-learning facilities by lecturers in Nigerian private tertiary institutions. The study adopted qualitative approach to investigate the adoption and utilisation of e-learning facilities by lecturers in a Nigerian private tertiary institution using 15 semi-structured interviews from the academic staff of M-University. Raw data gathered were analysed using data driven thematic approach (a similar approach to grounded theory). The findings revealed that M-University's e-learning facilities are adequate and accessible to users, and most teachers are comfortable with utilisation of various facilities during classes compared to most public tertiary institutions although, the utilisation has not been maximised.

2.6.3 Utilization of e-learning resources among visually impaired students

The advent of electronic information resources has been a blessing to libraries and information centres. The significant changes associated with electronic information resources are the shift towards end user searching, leading to big increases in the total number of searches carried out. According to Schutte (2004), utilization of electronic information resources and services has led to the shift from an emphasis of the book and journal collection to an emphasis on information services or from ownership to access. Aboluwarin (2001) reported an increase in library use when electronic information resources were introduced and had made staff more knowledgeable about a variety of operating systems, hardware configurations, software packages and interface designs.

Whitmire (2001), as cited by Aguolu and Aguolu (2002) observed that the use of electronic information resources is also influenced by students' use of the library. The more a student uses the library the more familiar he becomes with its resources including its electronic information resources. Similarly, Ehikhamenor (2003) posited

that facilities that attracted the greatest amount of patronage were e-mails, catalogues and databases, e-journals, www resources and software. However, the extent to which the use of e-journals becomes part of normal research practice depends not only on the discipline concerned but also on the role and status of the researcher, the resources and on the specific information needs. Waldman (2003) found out that use was influenced by factors such as computing skills of academics, their age, and gender.

In a study conducted by Luambano et al (2004), it was found that the users of academic libraries are increasingly utilizing electronic information resources as more access points are made available. The findings indicated that at least 86.3% of users were using electronic information resources and services to browse the World Wide Web and to access various online resources, though most of them depend heavily on search engines. A survey of the level of awareness and utilization of electronic information resources in academic libraries was conducted by Abindale, as cited in Thanuskodi (2012). He reported that many Nigerians were not aware of the policy and many libraries do not have micro computers or other electronic information resources, and some of the libraries lack qualified librarians to teach the use of electronic resources. The above shows that most students in the university are ICT illiterates who perhaps have never seen or touched a system before.

Dadzie (2005) investigated the use of electronic resources by students and faculty of Ashesi University, Ghana, in order to determine the level of use, the type of information accessed, and the effectiveness of the library's communication tools for information research. A questionnaire-based survey was utilized. It consisted of 16 questions to determine level of use, type of information accessed, assessment of library's communication tools, problems encountered when using electronic resources and ways to improve the provision of electronic information in the community. The

questionnaire was distributed to all students, faculty, and administrative staff in order to reduce the generalization of the results. A total of 169 questionnaires were therefore distributed and 141 completed questionnaires were returned, giving an overall response rate of 83 per cent. The study found that general computer usage for information access was high because of the University's state-of-the-art IT infrastructure. Usage of some internet resources were also very high, whilst the use of scholarly databases was quite low. The low patronage was attributed to inadequate information about the existence of these library resources. The study recommends, among others, the introduction of information competency across the curriculum and/or the introduction of a one-unit course to be taught at all levels and the provision of more PCs on campus.

Deng (2010) noted that the usage of e-learning resources was not uncommon in a university environment because of the rapid advance of ICTs. The research showed that the usage of e-resources was much dependent on the user and the purposes of using these resources. The author identified awareness and quality of the available electronic resources as important factors that led to the effective and efficient use of electronic resources. The findings shed light on the usage of electronic resources and assist university libraries to better understand the perception and experience of users in using these resources, leading to more effective and efficient use of electronic resources.

Obeng-Koranteng and Dzandu (2013) evaluated the use of e-resources among agricultural research scientist in Ghana. Data was collected from 48 (70.6%) out of 68 scientists at the Food Research (FRI) and Animal Research Institutes (ARI) of the council for Scientific and Industrial Research (CRIS), Ghana. The results showed a very high (97.9%) level of awareness and use of e-resources among the research

scientists whose preferred places of accessing e-resources were their offices and the library (60%). The scientist was most satisfied with the full text databases (73.0%) and e-journal (81.3%) but reported problems of slow access speed (58.3%), high subscription fees and frequent power outages. There was no significant difference in access to and use of e-resources between the scientist from ARI and FRI ($P=0.05$). The study recommended that budgetary allocation for e-resources facilities in agricultural libraries should be improved since scientist are known to have preference for electronic than print resources.

In Ghana, Amankwah (2014) investigated the use of electronic resources by undergraduate students of the Ghana Institute of Management and Public Administration (GIMPA). A survey method was employed, and structured questionnaire were utilized to elicit data for the study. The findings revealed that, though students are aware of electronic resources, they do not fully utilize them to support their academic pursuit due to poor level of information literacy skills. However, few students had not participated at all in information literacy skills training organized by the library. Results from the study also showed that, significant number of students do access electronic resources when on campus and off campus and mostly used electronic devices such as laptops, i-Pad, desktop computers, and mobile phones. The findings indicated that students used the electronic resources to complete assignments, write project works, update lessons notes, for research, and up-date themselves on new information in their fields of study. Some of the major problems respondents indicated using electronic resources included: inadequate computers in the library, poor internet connectivity, power outages, insufficient search skills, etc.

Kwadzo (2015) examined the awareness level and usage of electronic databases by graduate students in the University of Ghana. The focus was on graduate

students of Departments of Geography and Development Resource, and Information Studies. Questionnaire was used to collect the data. The findings were that students were very much aware of the databases available to them as indicated by 96.9% and 93.8% indicated to use them. The studies have also established that majority of students knew about the databases from their lecturers and most of them accessed from the central library. Despite the claimed usage level, databases they focused on were few and many of them were not familiar with those in their discipline of study. Further, the limited number of the databases they knew about, they were satisfied with them and claimed the databases have impacted on their learning and research activities. In light of these findings, it is recommended that librarians especially subject librarians should heighten the publicity of the databases and the research guides to both students and faculty so that they would become familiar with the databases and use them more and effectively.

Borteye and Dadzie (2015) examined the use of open access journals by graduate students at the University of Ghana. Using the survey method, a questionnaire was distributed to 200 graduate students being 5% of the target population of 3,974. The findings of the study show that the majority of students are aware of open access journals resulting in their high usage. Students indicated that open access journals increase developing countries' access to scholarly literature and promote the advancement of scientific knowledge. Nevertheless, the attitude of respondents towards open access was not very positive as many challenges were cited as obstacles to their use. The study recommends measures to address these challenges.

Ankrah and Atuase (2018) examined the use of electronic resources by postgraduate students at the University of Cape Coast. The findings revealed that most of the postgraduate students were aware of the e-resources in the library. The

findings of this study also revealed that most postgraduate students rather preferred to access information from Goggle scholar, and other web-based databases more frequently than the databases in the library. The respondents identified poor internet connection as the most significant constrained for ineffective access e-resources.

Akuffo and Budu (2018) examined students' level of use of e-resources at the Akrofi-Christaller Institute of Theology, Mission and Culture. Using the survey research design, copies of the questionnaire were administered to 33 postgraduate students by accidental sampling. Data analysed using Microsoft Excel 2013 were mainly presented as frequency and percentage distributions. The study revealed high awareness levels, adequate computer competencies, derivation of multiple benefits, and use of e-resources for academic purposes and inadequate search skills of most respondents because of the dearth of training. Constraints to e-resources usage were access problems, search and retrieval problems and staff-related problems. The study informs university administrators and libraries about the need to ensure students leverage e-resources in research and studies. The study proposed, among other recommendations, the provision of regular and mandatory information literacy training for students, the need for the institute's library staff to provide personalised search support to students and the provision of off-campus access to the institute's e-resource subscriptions.

Studies conducted by Baayel and Asante (2019) assessed issues affecting awareness and use of electronic information resources by first year (Level 100) students. The study adopted survey approach. The sampling method adopted for the purpose of this study was simple random sampling techniques. The sampled respondents were drawn from the total population of 1,780 Level 100 students at the Koforidua Technical University, Electronic Resource Library. About 10% of the

population was drawn as the sample size. A structured questionnaire was developed and administered to elicit information from the respondents. A total of 178 copies of the questionnaire were strictly administered to the students with all duly answered and retrieved. Data collected were analysed using simple descriptive statistics. The study revealed that students' awareness about the availability of academic electronic resources and databases was very low and that students primarily used search engines particularly Google and Yahoo as search tools. The study also revealed constraints that negatively affect students' successful utilisation of e-resources. The result also showed that students' utilisation of the electronic information resources was low. Based on the findings, the study proposes different strategies that should be put in place by stakeholders to address the challenges affecting students' utilisation of electronic information resources.

2.6.4 Challenges encountered by students with visual impairment in accessing and utilizing e-learning resources

Technical Challenges

A plethora of studies have highlighted the lack of technical support, lack of ICT gadgets, high data charges, poor ICT skills and limited access to e-resources as major barriers of e-learning resources accessibility and usage (Abubakar & Adetimirin, 2016; Adeniran, 2013; Deng, 2010; Millawithanachchi, 2012). Among the factors that account for high use of e-resources were freely available access, ease of use, currency (De Vicente et al., 2004; Falk, 2003) and advancement in ICTs (Deng, 2010; Tahir et al., 2010). Other factors include high skill levels (Ani et al., 2010) and high awareness levels (Borteye & Dadzie, 2015; Yang & Li, 2015). In Nigeria, several researchers indicated that, low level of technology penetration, erratic network, epileptic power supply, and expensive airtime/data are the deterrents

university face in the access and use of e-learning resources (Adomi, 2006; Atsumbe et al., 2012; Ikpe & Olise, 2010; Haliso, 2011).

Similarly, Edem and Egbe (2016) examined the extent of availability and utilization of electronic resources by postgraduate (PG) students in the University of Calabar (UNICAL) Library. Descriptive survey was adopted, and the population of the study was 2,726 while a sample of 400 postgraduate library users were selected through stratified sampling; two hundred postgraduate student each from Faculty of Education and Faculty of Science. Questionnaire was the main instrument used for data collection. Data collected were analysed using descriptive statistics such as simple percentages and frequency count. The problems postgraduate students encountered while accessing and using electronic resources were lack of computer skills, slow network, inconsistent internet connectivity, power outage and mass of irrelevant information. Lack of computer skills, slow network, inconsistent internet connectivity, power outage and irrelevant electronic information resources were the problems postgraduate students encountered while accessing and using electronic resources in online Library.

Dobransky and Hargittai (2006) mentioned technical accessibility problems as some of the extra barriers that people with a visual disability need to tackle. Swain and Panda (2009a, 2009b) also noted that user-centric factors were not the only limiting factors for e-learning resources use and access. Limited budgets, which in turn affect subscription capacity, can create resentment among users as they might fail to access required stuff. Limited library hours and poor marketing campaigns were also considered as hindrances to e-learning resources usage by patrons.

An online study was conducted in Canadian colleges and universities by Fichten et al. (2009) and they inspected e-learning problems and solutions reported by

223 students with disabilities, 58 campus disability service providers, 28 professors, and 33 e-learning professionals. Their major findings were that all the groups indicated problems with – accessibility of websites and course/learning management systems (CMS), accessibility of digital audio and video, time limits built into online exams that are inflexible, PowerPoint/data projection during lectures, course materials in PDF, and adaptive technologies. Students also mentioned technical difficulties while using e-learning and connecting to websites and CMS, problems downloading and opening files, issues with web pages that would not load, video clips that take too long to download, poor use of e-learning by professors and their own lack of knowledge working with e-learning. Disability service providers mentioned the disappointing use of e-learning by professors as well as poor accessibility of course notes and materials in many formats. E-learning professionals noted difficulties with course notes and materials accessibility. Professors primarily identified problems raised by the other groups. Sixty- seven per cent of students, 53% of service providers, 36% of e-learning professionals and 35% of professors indicated that at least one of their three e-learning problems remained unresolved.

Olaniran et al. (2016) investigated accessibility to and utilization of electronic resources among pre-service teachers in the National Open University of Nigeria (NOUN). However, limited internet connectivity and inadequate access to electricity were shown as major factors constraining most of the participants from accessing and utilizing the available electronic resources. The study recommends for the distance learning providers in developing nations to partner with telecommunication firms and internet service providers with a view to providing constant and affordable internet services to their learners, especially those that are studying to become classroom teachers.

Adeleke and Nwalo (2017) also conducted a study on availability, use and constraints to use electronic information resources by postgraduate students at the University of Ibadan, Nigeria. Results indicated that full texts data bases are linked to a number of constraints: Interrupted power supply was ranked highest among other factors as speed and capacity of computers, retrieval of records with high recall and low precision, retrieving records relevant to information need, lack of knowledge of search techniques to retrieve information effectively, non-possession of requisite IT skills and problems accessing the internet. The study recommended that usage of electronic resources be made compulsory, intensifying awareness campaigns concerning the availability, training on use of electronic resources and the problem of power outage be addressed.

2.7 Non-Responsiveness to E-Learning Complaints

Fichten et al. (2009) presented the results of two studies on the accessibility of e-learning materials, other information and computer and communication technologies for 143 Canadian college and university students with low vision and 29 who were blind. The results show that, most of the problems with e-learning materials reported by the participants remained unresolved, with approximately half the participants in both groups indicating that at least one of their three most prominent problems with e-learning was unsettled.

2.8 Usage of e-Learning Facilities for Administrative Purposes other than Teaching and Learning

Atsumbe et al. (2012) investigated the availability and utilization of e-learning infrastructures in a Nigerian University. Their specific objectives were to investigate the adequacy of e-learning infrastructures for effective teaching and learning; the

proficiency of e-learning infrastructures to facilitate enhanced lecturer-student teaching and learning interactions; and the factors that inhibit the use of e-learning infrastructures. The findings revealed that there were inadequate facilities specifically directed toward teaching and learning and the e-learning infrastructure available is largely for administrative use, although lecturers and students have access to computers or laptops internet facilities they are not used for teaching and learning.

Millawithanachchi (2012) explored the popularity and usage of e-learning resources among postgraduate students in universities. Factor analysis identified nine factors which are critical success factors (CSFs) on e-learning resources usage. Among the nine CSFs, postgraduates identified „technology“ as the most critical factor in using e-resources. Library support, information literacy, computer competency, usefulness and user attitudes are identified as other CSFs for using e-resources for their learning activities. Adeniran (2013) also studied the factors determining the usage of e-learning resources by undergraduate students and revealed that the use of electronic resources had tremendous impact on the academic performance of the undergraduate students; however, there is a need for them to acquire more skills in the use of electronic resources.

2.9 Under-Utilization of e-Learning Facilities and Resources

Aboderin and Kumuyi (2013) looked at the problems and prospects of e-learning in curriculum development and implementation in secondary schools in Ondo State of Nigeria. Specifically, they examined the availability of e-learning tools for curriculum implementation, the extent to which it was applied by teachers, strategies, and prospects of e-learning in secondary schools. The finding revealed that there were shortages of e-learning tools and the few ones used were not adequately used. On the strength of these, the investigators advised governments to embark on

massive in-service training and retraining (seminars, symposia, workshops, and conferences) for teachers on how to operate computers.

2.10 Lack of ICT Infrastructure

Otyola et al. (2017) investigated the challenges faced by visually impaired students in Makerere and Kyambogo Universities in Uganda. The study followed a cross-sectional survey design and involved 200 respondents (50 visually impaired students, 50 lecturers, 50 university administrators and 50 students who were not visually impaired). Data was collected using questionnaires, interviews, and document review. The findings revealed that the visually impaired students had a number of challenges such as lack of braille machines, laptops and computers, textbooks in braille form and slates around the university environments which eventually affect their academic achievements. Based on these findings, recommendations towards the better education of the visually impaired students were made.

Eligi and Mwantimwa (2017) assess the accessibility and usability of Information and Communication Technology facilities that facilitated learning among students who are visually impaired at the University of Dar es Salaam (UDSM) in Tanzania. The study employed a mixed methods design in gathering, processing and analysing quantitative and qualitative data. A survey was conducted at the UDSM main campus and the Dar es Salaam University College of Education (DUCE). A total of 36 respondents took part in the survey. The study found that ICTs support innovative learning, encourage independent learning, and promote participatory and collaborative learning. On the other hand, the units surveyed at the UDSM faced challenges such as insufficient special ICTs to cater for the needs of who are visually impaired, inadequate training on the use of special ICTs, and a shortage of ICT

experts. There is also a necessity for the students with visual impairments education needs and wants to be met to engender effective learning.

In India, Gill et al. (2017) explored the inadequacies in learning environments and services for students who are visually impaired using ICT in an educational context. The authors designed the study to identify, elucidate problems, and raise issues concerning students who are visually impaired in the course of their post-secondary education through e-learning in Delhi. The study confirmed that e-learning could provide significant opportunities for such students, but there were umpteen issues which needed to be addressed, such as problems of availability, accessibility in holistic way (technological and pedagogical), efficacy, and utility of the system. Additionally, the authors found that, availability of online e-learning facilities, accessibility of websites, availability of books in all formats, description of pictures along with images, good screen readers for all languages, and affordability of original software were some of the problems areas that bothered the students.

In Zimbabwe, Mawere and Sai (2018) investigated the adoption and utilisation of e-resources by students at a university in a developing country. The TAM was used to conceptualise the study. A survey questionnaire was designed and distributed through social media platforms such as Facebook and WhatsApp. Quantitative data were analysed using the Statistical Package for the Social Sciences (SPSS). The chi-square test was used to test for casual relationships within the developed model. A thematic approach was used to analyse qualitative data. Mawere and Sai observed that, though Zimbabwean academic institutions had made e-libraries top agenda in their strategic plans, however, access and utilisation rate among students was still very limited. This could be attributed to a myriad of facts, inter alia, poor marketing

strategies, lack of resources among the students and exorbitant data charges by internet service providers (ISPs).

Eze et al. (2018) examined adoption and utilisation of e-learning facilities by lecturers in Nigerian private tertiary institutions. The study adopted qualitative approach to investigate the adoption and utilisation of e-learning facilities by lecturers. The findings revealed that attitude of users, inadequate internet facility, inadequate training of users affect successful adoption. The study recommended that e-learning facilities should be constantly upgraded, and that universities should train their staff continuously to meet the constant advancements of the e-learning facilities in order to maximize usage.

In another study conducted in Nigeria, Ternenge, and Kashimana (2019) investigated availability, accessibility and use of electronic information resources for research by students in Francis Sulemanu Idachaba Library, University of Agriculture, Makurdi, Benue State, Nigeria. The findings further revealed that, inadequate computers in the library, poor internet connectivity limited subscribed titles, power outages, difficulty to access and use, lack of relevant e-resources in various disciplines as well as the absence of assistance from library staff, were the major problems the students encountered while accessing and using electronic information resources for research. It was recommended that the University administrators and library management should improve on the bandwidth and enhance the internet connectivity to enable the students have easy access to online e-resources. Also, trained personnel should be on ground to assist the students in the use of the available e-resources in the University library and appropriate user education should be organized for students for better use of e-resources in Francis Sulemanu Idachaba Library, university of Agriculture, Makurdi.

Permvattana et al. (2013) also highlighted some common problems faced by students with acute vision impairment as in inaccessibility of Web sites, inaccessibility of learning materials and different learning needs due to their disabilities. One of the most prominent problems was that e-learning IT courses were not specifically designed for students with vision impairments. The guidelines for Web accessibility for students who are vision impaired are not specific enough for the effective design of learning materials for students who are vision impaired. There is also a misalignment of guidelines for the development of accessible teaching and learning materials and Web accessibility standards and guidelines. Additional teaching aids created specifically for students with vision impairments are necessary to ensure the students understand the concepts being taught.

Anene et al. (2014) studied the problems and prospects of e-learning in Nigerian Universities by specifically examining availability of facilities for e-learning and availability of e-learning materials and to ascertain if students make use of e-learning in their studies. They found that one of the obstacles to the use of ICT was infrastructure deficiencies; the students lamented that Nigerian Universities do not have adequate e-learning library domain, online seminars or discussion with lecturers, online examination, and limited bandwidth. Implicit of this study was continual strikes by Academic Staff Union of Nigerian University (ASUU) to force governments to correct abnormalities. Similarly, Aboderin (2015) investigated the challenges and prospects of e-learning at the National Open University of Nigeria and while the study recognized that e-learning influences students' ICT competence, it found that the major challenges included lack of enough computers, shortage of internet facilities, students' lack of access to e-learning facilities and tools, high cost of software and erratic power supply.

2.11 Non-Disability Friendly Nature of E-learning Models

Another problem about e-learning is that e-learning models are commonly designed for sighted students and do not incorporate considerations for students with disabilities, particularly vision disabilities. Learning outcomes commonly assume that all students are sighted, and therefore students with vision impairments are expected to attain the same learning outcomes. More specific and broader communications are required in an e-learning environment for students with vision impairments. Without vision, students and teachers use speech to a much greater extent and a virtual classroom is needed to supplement the physical classroom and laboratory setting. There are major differences between the needs of students with vision impairments and sighted students. Sighted students are able to access images, diagrams and tables and easily interpret these, whereas students with vision impairments are not able to access these at all. E-learning materials are not frequently designed to integrate with the range of assistive technologies used, resulting in students with vision impairments receiving incomplete or inaccurate translations, and, at worst, no accessibility at all (Permvattana et al., 2013).

Again, students who are visually impaired are often isolated by their disability and e-learning models seldom include considerations of social elements. Students with visual impairments need confidence to build through the sharing of knowledge and skills. Means of communication on issues including assistive technologies, the technology of the learning environment, learning matters, accessibility and general matters need to be part of the learning environment (Permvattana et al., 2013).

2.12 Teachers' lack of understanding on the e-learning needs of Students Who are Visually Impaired

A final problem that is discussed in the literature is the assertion of Permvattana et al. (2013), who were of the view that teachers seldom understand the needs of students with vision impairments and the barriers to learning these students face. The authors continued that teachers need to know how to solve learning problems that relate to vision disabilities; they need to understand not only assistive technologies, but also how to work around inaccessible features of the curriculum and the learning environment. An understanding of the needs of students who are vision impaired is an essential component when designing an effective and accessible e-learning environment.

2.13 Environmental Adaptations Made for Students with Visual Impairment to Access and Use E-Learning Resources

Owusu-Amoako (2015) explored the support services and adaptations for pupils with visual impairments at Bechem St. Joseph's Practice Inclusive Basic School in the Brong Ahafo Region of Ghana. The descriptive study involved an administration of structured questionnaires to 14 teachers of the Bechem St. Joseph's Practice Basic Inclusive School. The study sought to describe how the school environment and facilities have been adapted to enhance the participation of pupils with visual impairments in learning and establish whether there were specialized personnel to support the pupils to participate in learning. The results of the study revealed that school buildings and furniture arrangement were friendly to pupils with visual impairments whereas the school layout, playground and the environment were poorly designed. Furthermore, the teachers introduced adaptations in the curriculum while resource teachers provided additional instructional support in the form of braille

writing, transcription of class work and enlargement of prints which helped to meet the needs of the pupils with visual impairments. The research also revealed that the school had a resource room for the resource personnel and adequate supply of writing materials for pupils with visual impairment. However, computers with adapted software packages to augment instructional support for the blind were lacking. Based on these findings, the researcher recommended that the Government to help the school to procure computers with adapted software packages to supplement instructional support for the students with vision impairments. Most students with visual impairments have some usable vision. Their visual learning can become more efficient if they can enhance their skill to use their vision through training or the use of assistive devices. Vision specialists can offer assistance in developing students' visual skills and in making accommodations necessary for helping students use their vision in productive ways. Such services include making maps, adapting reading materials, and assisting in general accommodations. Most experts agree that Universal Design of Learning (UDL) is key to integrating students who are blind and visually impaired into the college classroom dynamics. UDL allows educators to address and modify course curricula that exclude any student, particularly those with a disability that affects their ability to learn and/or receive instruction in a class setting. Although each situation is different and the student is the best source of information regarding useful accommodations, the following accommodations are typical for a student with blindness:

1. Audiotaped, brailled, or electronically formatted lecture notes, handouts, and texts
2. Verbal descriptions of visual aids
3. Raised-line drawings and tactile models of graphic materials

4. Braille laboratory signs and equipment labels; auditory laboratory warning signals
5. Adaptive laboratory equipment (e.g., talking thermometers and calculators, light probes, and tactile timers)
6. Computer with optical character reader, voice output, Braille screen display and printer output

Many options are available for teachers selecting reading and writing materials for students with visual impairments. According to their needs and preferences, students may use printed or braille materials. Printed materials should be clear and be printed using an easily readable font. Providing an easel to hold reading materials can help students with visual impairments do close work more easily (Barraga & Erin, 1992). Black felt-tip pens and soft lead pencils are useful writing utensils for students with visual impairments because of the increased amount of contrast they create against white writing paper (Koenig, 1996). An extra light source at the student's work area can be helpful for some students (Heward, 2000). If a student can benefit from an additional light, the light's placement should be determined in collaboration with the vision specialist.

Some simple strategies for using printed materials can help students with visual impairments learn visually without requiring huge adjustments to the classroom environment. Simply holding books or other materials closer to the eyes is enough to help some students with visual impairments (Heward, 2000). Using magnification devices or large print materials are two accommodations that are often implemented in the classroom (Barraga & Erin, 1992). Such equipment and materials are available for students who need them. In order to create universally accessible courses,

postsecondary institutions must take the following steps to ensure their classes and campuses are completely inclusive:

1. Modify course instruction to meet the needs of every individual learner. For blind and visually impaired students, this means the availability of auditory software, large-font presentations and/or braille materials.
2. Allow students with special needs to complete coursework, give presentations and take exams using alternative formats.
3. Work with students with specific needs to gain access to adaptive software and technology that helps them learn effectively.
4. Appoint individuals who can assist these students as note-takers, readers, scribes, or other essential roles.
5. Offer students with special needs additional time for assignments and tests, as well as getting to class.
6. Ensure all classrooms, dormitories, dining halls and other facilities are completely accessible to every student, regardless of disability.
7. Guide students with disabilities to specialized counsellors, resource centers and other on-campus services dedicated to assisting these individuals.

2.14 Summary of Literature Review

This chapter has attempted a review of works on access to e-learning resources among pre-service teachers with visual impairments in some selected Colleges of Education in Ghana. Making use of both local and international empirical reviews, the gaps in the literature reveal that the use of e-learning resources in our educational settings have been very beneficial on varied grounds but poses great challenges for pre-service teachers with visual impairments who do not offer courses in ICT in their Colleges of Education given their conditions. They learn ICT on their own outside the

school or learn with the assistance of their sighted colleagues in school. The literature also brings to the fore the differences in the challenges faced by pre-service teachers with visual impairment as well as the sighted ones. It therefore follows suit that much attention needs to be paid to these unresolved issues in order to improve upon the conditions of students with visual impairment relative to access to e-learning.



CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter discusses the methodological issues involved in the research enterprise. These include the profile of the study areas, the research design, sample and sampling procedures, and data collection instruments as well as the fieldwork. Other issues addressed are the data analysis and conclusion with an enumeration of the challenges encountered on the field as well as the ethical considerations involved in the study. It is important to state here that there are only three colleges of education in Ghana designated for training of students with visual impairments. It is therefore important that a study that borders on students with visual impairment in the colleges of education can only be conducted from these three colleges of education and hence the researcher's choice of these study areas.

3.1 Profile of the Research Sites

The study was carried out at WESCOE and the PCE in the Ashanti and Eastern Regions of Ghana, respectively. WESCOE is located very close to the Suame Roundabout in the Old Tafo Municipal Assembly in the Ashanti Region of Ghana. When the study was being conducted, the college had a staff of 97, made up of 52 teaching staff (32 males and 16 females) and 45 non-teaching staff (32 males and 12 females). The school had a student population of 836 (518 males and 318 females). It is worth noting that all the selected study sites had their campuses hooked on to Wi-Fi and ultramodern e-learning resource centres used by both sighted and students who are visually impaired for their academic work.

The PCE is located at Akuapem Akropong in the Akuapem North Municipal Assembly in the Eastern Region of Ghana. At the time the study was conducted, it had a student population of 966 (597 males and 369 females). The college had a staff out of which 64 were teaching staff (40 males and 24 females) and 42 non-teaching staff (23 males and 19 females).

3.2 Research Design

The researcher employed a qualitative approach to inquiry with a case study. Creswell and Creswell, (2018) stated that case study is a research method that enables the researcher to gain a better understanding of a subject or a process. Case studies are good for describing, comparing, evaluating, and understanding different aspects of a research problem. The employment of the case study statistics enables researchers to gather data from variety of sources and by using several different methods to describe the demographic background of respondents. The employment of the case study paved way for the researcher to ascertain and describe in detail the characteristics of the pertinent issues involved in the accessibility of e-learning resources among pre-service teachers in the two colleges of education in Ghana. It aided the researcher to unearth the conditions or relationships that existed, opinions that were held, processes that went on, effects that were evident or trends that were developed. With a case study as a research design, the researcher was saved from experimental manipulation or any random selection to a group as in the case of experimental research. The absence of the experimental manipulation allowed the researcher to uncover new facts and meanings which helped in the observation, description, and documentation of aspects of the situation as they naturally occurred. A major drawback of a case study is that it lacks scientific rigour and providing little basis for generalization of results to a wider population.

3.3 Population of the Study

The target population for this study comprised all students who were visually impaired drawn from the Presbyterian College of Education and Wesley College of Education. A proper definition and specification of population for this study was very critical because it served as a guide in appraising the sample credibility, sampling technique and the outcome of the research as well (Banerjee & Chaudhury, 2010; Pernecky, 2016). The total population for the study was 13 pre-service teachers with visual impairments, who were distributed as follows: PCE - 7 students (6 males and 1 female) and WESCOE 56 students (5 males and 1 female).

3.4 Sample and Sampling Procedures

The respondents for this study were the students with visual impairment drawn from the PCE and WESCOE in the Akuapem-North and Old Tafo Municipal Assemblies in Eastern Region and Ashanti Region, respectively. These schools are both-sex colleges of education. The choice of these two groups were informed by the fact that issues pertaining to access to e-learning resources among students with visual impairment in these colleges of education could be better understood from their end and in this vein, it was imperative for such information to be solicited directly from them.

With respect to the determination of sample size in qualitative data, Patton (1990) contended that there are no strict guidelines that govern it. Onwuegbuzie and Collins (2007) also opined that sample size in qualitative research should not be too large that it is difficult to extract thick, rich data. The sample size should not be too small that it is difficult to achieve data saturation (Flick, 1998).

For the purposes of this study, a total of 13 respondents were selected. This was made up seven (7) students from PCE and six students from WESCOE. The

students from PCE were made up of five second year students (4 males and 1 female) and two male students from first year. At WESCOE five males and one female all in second year were selected. None of the respondents was selected from the first-year students at Wesley College because that group had no student with visual impairment amongst them. It is important to stress that all the participants selected from the two study sites were totally blind (braille users) with exception of 1 participant each from these two colleges who were partially blind (print users).

With regard to the sampling technique, non-probability sampling technique namely purposive sampling was employed. In the case of the purposive sampling, the students with visual impairment at WESCOE and PCE were purposively selected because they possessed certain characteristics and knowledge that were of much relevance to the topic under study (Babbie, 2005; Giorgi, 2017; Sarantakos, 1993). The process of sampling in this case involved the identification of the respondents and arranging times for meeting them (Denzin & Lincoln, 2016; Glesne, & Peshkin, 2018; Sarantakos, 1993).

3.5 Data Collection Instruments

The research instruments, which were used for this study, were semi-structured interview and focus group discussion guides. The instruments were developed by the researcher and were reviewed by researcher's supervisor who is an expert in the field of study. This exercise was done to ensure maximal credibility, confirmability, and dependability of the research instruments. This approach of instrument trustworthiness in qualitative study is in tandem with the assertion that there can be no validity without reliability in so far as a demonstration of the former is sufficient to establish the latter as opined by (Lemon & Hayes, 2020; Lincoln & Guba, 2011; Lincoln & Guba, 1985). The choice of these two instruments gave the

respondents the opportunity to express themselves freely. Through the use of the semi-structured interview and focus group discussion guides, the researcher was able to use probes and prompts, explain or rephrase the questions that seemed unclear to the respondents; and arrive at highly personalized data.

In relation to the deficiency of the semi-structured interview guide it can easily be pointed out that an inexperienced researcher may not be able to ask probing questions which may lead to loss of some relevant data. Gray (2013) described these as strengths and weaknesses of interviews. The strengths of the focus group discussion guide are grounded on the fact that it allowed the researcher to probe and even have the flexibility to explore any unanticipated issues that cropped up. Its weakness lies in the fact that the data were difficult to analyse because context was essential to understanding of participants' comments. In order to avoid the setting under dynamics, the researcher was required to exquisitely moderate well (Krueger, 1994).

The content of the interview guide reflected the objectives of the study. The interview guide was divided into five sections. Section A (Questions 1-4) covered the demographic details of respondents and these included the gender, programme offered by students, their levels and their respective colleges. Section B (Questions 5-9) dealt with the availability of e-learning resources to the students who are visually impaired in their respective colleges. Some of the questions here required respondents to indicate their understanding of the term „e-learning, availability of e-learning resource on their respective campuses, their knowledge on some computer applications like Microsoft Word, PowerPoint, Excel and other social media handles like Instagram, WhatsApp, and others. The researcher also sought from the respondents if there were

specially designed devices and computer applications installed purposely for them to make learning easy and convenient.

Section C (Questions 10-14) borders on how the visually impaired students are able to access the e-learning resources on their campus. In this section, questions like respondents' understanding of the term „accessibility“, the arrangement of their ICT laboratories, and how well their classrooms were designed to facilitate e-learning, were asked. Section D (Questions 15-16) addressed the challenges faced by students with visual impairments in their bid to access and use e-learning resources in their studies. There were also questions that sought to improve the challenges raised by the respondents in this section. Section E (Questions 17-18) focused on how the environment was adapted to enable students with visual impairments use e-learning on their respective campuses. The researcher implored the respondents to bring on board issues pertinent to the topic under study that had not been captured in the interviews.

The content of the focus group discussion guide had only one part (section A) which covered questions on availability, accessibility, environmental adaptation, typology of software and applications which they could use best and for what purpose and many more. The semi structured interview and focus group discussion guides were developed by the researcher and were reviewed by researcher's supervisors who are experts in the field of study. This exercise was done to ensure maximal validity and reliability of the research instruments. This approach of instruments validity in qualitative study is in tandem with Lincoln and Guba's (1985) assertion that there can be no validity without reliability in so far as a demonstration of the former is sufficient to establish the latter.

3.6 Pre-Testing of Instruments

The instruments were pre-tested at The University of Education Winneba and University of Ghana. Three focus group discussants with three interviewees were selected for the pre-test. The two pre-testing sites had students with visual impairments as well as sighted students studying there, therefore the researcher chose to pilot the instruments there. These two pre-testing sites were chosen because they shared similar characteristics in terms of the respondents for the study areas. Through the pre-testing, the researcher was able to identify all ambiguities, repetition of questions and difficulties associated with the instruments. For example, the questions „How has the classroom been designed to facilitate e-learning?“, and “Which of the following softwares and applications can you use best while you access information?”, were all repeated in the pre-testing exercise. These were corrected by the researcher before the actual interviews and focus group discussion were conducted. They were the issues that emerged from the pre-testing of instruments.

3.7 Data Collection Procedure

Primarily, the researcher employed semi-structured interviews and supported it with focus group discussion to collect primary data for the study. The semi-structured interview conducted by the researcher lasted for three weeks. It commenced on 16th September, 2020 and ended on 8th October, 2020 in the morning and evenings based on respondents’ schedule (See Appendix C). With the exception of five of the respondents (4 males and 1 female) who were in the second year at the PCE, all the remaining 8 students, made up of two first year male students in PCE, and six second year students (5 males and 1 female) from WESCOE were interviewed via telephone at their own request. The interview for the five respondents took place at the PCE, upon the researcher’s special arrangement with the respondents to meet

with her face-to-face basis for the interview session. The researcher arranged for the telephone interview because of restrictions imposed by the COVID-19 pandemic.

However, the researcher made sure that the respondents, who were interviewed face-to-face were all given personal protective equipment made up of hand sanitizer, nose mask and face shield by way of complying with the COVID-19 safety protocol. The researcher obtained phone numbers of the selected respondents from WESCOE from the resource person in the college. From both study sites, each interview lasted for 50 minutes with the researcher recognizing the fact that the respondents in the two study areas were preparing for their end of semester examinations. The nature of the composition of the respondents did not only enable the researcher to maintain some level of homogeneity, but it also created an enabling environment for optimal participation of each respondent (Krueger & Mary, 2014) and reduced inhibitions among participants to participate in the interviews. It was a mix gendered group as well. All the interviews were manually recorded, and where permission was granted, they were recorded electronically with a voice recorder. The researcher used a modernized recorder with many functions (erasing functions, pen drive function and no replacement of cassettes).

Two focus group discussions (FGDs) were organized and moderated by the researcher. The choice of the two FGDs were informed by the number of resources and time available to the researcher. Each group was made up of 4 focus group discussants. The researcher selected respondents who provided very rich responses during the semi-structured interview sessions and others who volunteered for the two FGDs. The guidelines for the FGDs were discussed with respondents in each case. The two FGDs for the two Colleges of Education all took place at Presbyterian College of Education on 16th September, 2020 upon the researcher's special

arrangement with the respondents to meet her on a face-to-face basis for the focus group discussion. Here too all Covid-19 safety protocols were sternly adhered to. Each of the two FGDs was mixed gendered. The first one was made up of 3 males and 1 female; the second was made up of 3 males and 1 female. The selection of these respondents gave them the chance to express their opinions and enabled the researcher to arrive at a diversity of opinions from the respondents (Debus, 1990). The nature of the composition of the group did not only enable the researcher to maintain some level of homogeneity, but it also created an enabling environment for optimal participation of each respondent (Krueger & Mary, 2014) and reduced inhibitions among participants to partake in the FGDs. In each case the FGD lasted a little over one half hours. The researcher moderated and recorded the discussions which were made possible because the researcher used a modernized recorder with many functions (erasing functions, pen drive function and no replacement of cassettes). The researcher was able to moderate the discussions with the aid of an FGD guide that covered both engagement and exploration questions.

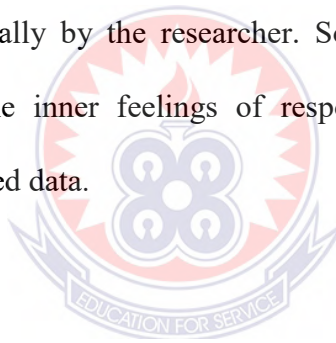
3.8 Ethical Concerns

Although, the units of analysis for this study were the students with visual impairment drawn from the two research sites, very stern ethical standards were observed. The researcher obtained an introductory letter indicating the academic nature of the study from the Department of Special Education, University of Education, Winneba. The researcher went to the two schools and introduced herself to the heads of the resource centres and presented the introductory letter to them. The researcher was then granted the permission to contact the students and explained to them the nature of her study. She indicated to the respondents that participation in the study was voluntary and not obligatory. It was explained that the study was in partial

fulfilment of the researcher's Master's degree in Special Education. She went on to say that information on their names would not be included in the study and other personal details would be kept away from public domain. The steps taken show the researcher duly abided by the principles of informed consent, voluntary participation, confidentiality, and anonymity.

3.9 Data Analysis

The data in the form of textual materials from the field was edited, coded, and classified into themes. The questions were presented in modules to reflect the study objectives. The aim of the data analysis was to discover patterns among the data and patterns that point to theoretical understanding of social life Babbie, (2005). The data analysis was done manually by the researcher. Some of the responses were cited verbatim to highlight the inner feelings of respondents which could have been concealed by the quantified data.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Overview

This chapter presents the results and discussion of access to e-learning resources among students with visual impairments in the two colleges of education in Ghana selected for the study. The chapter begins with descriptive analysis of the background information of the respondents of the study which included gender, educational levels, and programmes offered. It discusses the results in relation to the research questions of the study.

4.1 Demographic Background of Respondent

Table 1 indicates the gender distribution of the respondents in the two study areas. As shown in Table 1, PCE and WESCOE represent Presbyterian College of Education and Wesley College of Education, respectively. Out of the thirteen respondents interviewed from the two study areas, five interviewees were males and one interviewee was a female drawn from the WESCOE whereas six males and one female were selected from the PCE. It can be observed from Table 1 that males dominated the participants in this study as males were eleven out of the thirteen interviewees.

Table 1: Distribution of Interviewees by Gender

Sex	WESCOE Number	PCE Number
Male	5	6
Female	1	1
Total	6	7

Source: Field data (2020)

Table 2 discusses the educational levels of respondents from the two colleges of education. From Table 2, all six students who participated in the study from WESCOE were second year students. At PCE, Table 2 shows that seven students participated in the study.

Table 2: Distribution of respondents by educational level

Level of Education	WESCOE Number	PCE Number
Year 1	0	2
Year 2	6	5
Year 3	0	0
Total	6	7

Source: Field data (2020)

Table 3 presents the programmes pursued by the interviewees drawn from the two colleges of education. As shown in Table 3, there were two interviewees who were studying Moral Education and Twi; four of the interviewees were pursuing Religious and Moral Education and Social Studies at WESCOE. At PCE, two interviewees were studying JHS Programme (University of Education, Winneba), four interviewees were studying Religious and Moral Education and Social Studies, and one interviewee was studying Religious and Moral Education and Literature in English.

From Table 3, it can be said that majority of the respondents at WESCOE offered Religious and Moral Education and Social Studies while at PCE, the same can be said of Religious and Moral Education and Social Studies being the most offered programme, and the least being Religious and Moral Education and Literature in English. At WESCOE, the second most offered programme was Religious and Moral Education and Twi

Table 3: Distribution of respondents by programmes offered

College	Programme of Study	Number
WESCOE	Religious & Moral Education and Twi	2
	Religious and Moral Education & Social Studies	4
PCE	JHS Programme (UEW)	2
	Religious & Moral Education and Social Studies	4
	Religious & Moral Education and Literature in English	1
Total		13

Source: Field data (2020)

The next section presents and discusses the problem in an attempt to answer the research questions of the study.

4.2 Research Question 1

What are the types of e-learning resources available to students with visual impairment?

Under this research question, the researcher first sought respondents' understanding of the term „e-learning“ and the results showed that all the 13 interviewees had a fair knowledge and understanding of this term as confirmed by (Adeleke & Nwalo, 2017; Amankwah, 2014; Ankrah & Atuase, 2018) who explained the term „e-learning“ as learning through the use of the internet. This is illustrated in the following responses:

„In my view, e-learning simply means that learning through use of the internet or acquiring knowledge through the use of the internet“ (ABK)
„I understand the term e-learning to refer to online or electronic learning“ (CA) a male respondent at WESCOE

“As for me I understand e-learning to mean electronic or technological means of learning”- DC-a female respondent at WESCOE

“If you ask me my understanding of e-learning all I can tell you simply is that learning through internet and other applications”-QR a male respondent at PCE.

“I refer to e- learning as the use of electronic gadgets to access educational information from tutors or information database”-DL a male respondent at PCE.

“E-learning simply means the use of ICT tools to study or access information for academic purposes or otherwise”-DV a male respondent at WESCO.

Types of e-learning resources available

Eleven out of the 13 participants in the study indicated the availability of e-learning resource at both colleges which they used for their studies. They made mention of e-learning resources such as laptops, internet center, Goggle glasses, screen readers, SanDisk (pen drives) smart phones (tablets), CCTV and compact disc which benefited them as far as their studies were concerned. The participants further mentioned additional electronic resource like projectors, with the support from T-TEL. This affirms studies conducted by (Adelabu et al., 2014; Afolabi, 2015; Atsumbe, 2012; Ugbagir, 2010) on the high availability of e-learning resources in various universities and other tertiary institutions.

However, two of the interviewees confirmed the availability of these e-learning resources, but they were worried that the resources were inaccessible, because of the actions and inactions of the college authorities. The following responses confirm this point:

„Here at WESCO, we have an ultra-modern e-learning centre that has been furnished with brand new laptops, pen drives, printers, scanners and photocopier machines. The e-learning centre has been very helpful to us looking at the benefits we derive from it as far as our studies are concerned. It is always opened to us and I can say that day and night.” (CK) – male respondent at WESCOE

„The e-learning centre can visibly be seen here but in my view, there is a problem accessing it. This is because we depend on our sighted colleagues to get the information needed.” (TT) – a male respondent at WESCOE

„I have shunned going to the e-learning centre. My reason is simple-it takes a long time in the mornings before the centre is opened to students. As a result, students who want to use the place in the mornings are most of the times not able to access it. Because the place is not always accessible, I have bought a modem that I use for personal studies” (KB) - a male respondent at PCE

„I have chosen to call it internet centre and all I can say that it is always opened for students to go there and do their private studies and search for information as well.

Even at times we use smartphones provided by the school when we have more people visiting the centre. This I think is very good because I remember when I lost my phone, I was given smart phone for browsing by the school which we are to pay later” (AB)-a male respondent at PCE

„There are laptops as well as desktops here. I understand all of them came from T-TEL. For me that’s what I normally use for my studies” (CK)

Our e-learning centre is fully furnished with laptops, desktops, goggle glasses which we use for studies anytime we visit this centre”-SOD a male respondent.

“I can say that our e-learning centre has a lot of electronic materials in there. I can talk of desktop computers, projectors, goggle glasses and scanner. To me these materials have helped us a lot”- MN a male respondent at PCE.

“We have a lot e learning materials available at our e-learning centre and mention can be made of laptops, internet connectivity, projectors, goggle glass, computer application software like NVDA and JAWS- You see these electronic materials have benefited us in our studies”- MN a male respondent.

„We have a lot of e-learning materials including laptops, desktops, and scanner at our facility that we work with when it comes to online studies. I haven’t verified this information yet but I understand there are some devices underway to be supplied to the e-learning centre. It will augment the devices we have at our e-learning centre”-OPR, a male focus group discussant at WESCOE.

Specially designed devices and software

Another sub-theme the researcher sought to find out bordered on whether students with visual impairment had specially designed software which facilitated their studies. The results gathered from the respondents at two colleges showed that all the 13 interviewees alluded to the fact that they had specially designed software and other applications that helped them in their studies given their conditions. They mentioned software such as Non-Visual Desktop Access (NVDA), JAWS, Screen readers, Mavis Beacon, Keyboard Learner and many more. This is seen in the following responses:

When it comes to specially designed software that we use for our studies when we visit the e-learning centre, truly I can say that we use JAWS, NVDA, Mavis Beacon and others which have helped us a lot given our condition (KB) a male respondent at PCE

„One software which anytime I visit the e-learning centre is called NVDA. And I can say that it has helped me a lot particularly with online reading (CA) - a male respondent at WESOCE

For most of the times, I use JAWS for my online works whenever I visit our e- learning resource centre (TT) - a male respondent at WESCOE

„At least I can confirm that we have devices and software like screen readers, voice dictionaries, NVDA and JAWS which we use for our studies “Looking at my situation I always get happy anytime I visit the e- learning centre because of the availability of specially designed software like NVDA, JAWS, voice dictionaries and many others. All these softwares facilitate both our online and offline learning”- whenever we visit this centre”“DV a male respondent at WESCOE had this to say - SOD a male respondent at WESCOE.

“Partially I get happy when I visit the e-learning centre all because of the voice dictionary, the screen readers, NVDA and JAWS. I have benefited from immensely particularly when I am doing my online notes.” - DC a female respondent at WESCOE.

Coping with learning in the absence of specially designed software

The researcher also investigated how the interviewees at the colleges coped with learning in the absence of specially-designed software. The results gathered from the respondents showed mixed responses, in that some interviewees said they consulted their sighted friends for the needed assistance as far as their studies were concerned, while other interviewees indicated that they had always sought assistance from their lecturers and resource persons. The following are the responses to buttress this point:

„It is always not easy whenever these specially designed softwares are not in place during our visit to the e-learning centre. For me when it happens like that I find myself in great discomfort but I most at times do is that I speak to my lecturers and they help me out with audio notes. Sometimes too getting in touch with the lecturers become very difficult because of their tight schedules and their travels (CK) – a male respondent at WESCOE

„For most of the times you visit the e-learning centre and you are told that all the computers that have the specially designed softwares installed on them are faulty and that I am compelled to go and come another time when they fix it. Personally, what I do in such situations is to consult one of the lecturers who happens to be my country man. He has been assisting me in such situations” (TT) – a male respondent at WESCOE

“As for me whenever I am told that the specially designed software are malfunctioning what I simply do is talk to some of sighted friends and they help me out particularly during examinations and quizzes” (KB)- a male respondent at PCE

“My sighted friends are always ready to assist me with audio notes and explanations whenever the software we use are not working” (CA) – a male respondent at PCE

„To be sincere with you madam, I need to tell you that I have nothing to do as far as my studies are concerned in the absence of these specially designed gadgets. What I do is to wait till the situation at the e-learning centre has been restored to normalcy”- QR a male respondent at PCE.

„I don't do anything concerning my studies until I see that faulty gadgets and malfunctioning softwares are fixed and I begin studies particularly if it is about going online. Because I know I have wasted some time while I did nothing, I put in much seriousness and effort when I begin to learn online“—DV a male respondent at WESCOE.

„I usually talk to my sighted peers for assistance in terms of notes and other relevant information whenever some of the gadgets and softwares we work with are not functioning properly“—DC a female respondent at WESCOE told the researcher.

“I have an intimate sighted friend I normally call on him for assistance in case the devices for our studies get a fault- SOD a male respondent at WESCOE.

“There are several instances that we find our software and gadgets not functioning. What I do during these times is to contact my sighted colleagues so that they help me whatever notes and documents I need for my studies”- MN a male respondent at PCE.

4.3 Research Question 2

How accessible are these e-learning resources for pre-service teachers with visual impairments in the Colleges of Education?

The researcher sought to ascertain from the respondents whether e-learning resources were available to them. Six of the interviewees revealed that they encountered difficulties accessing the e-learning resource. They gave the following reasons as in the non-user-friendly nature of some of the applications and softwares, inaccessibility of websites, inadequate laptops at the e-learning centre which supports the works of Osei-Antwi (2015) and the fact that not all the scientific papers or abstracts are indexed as affirmed by Aina, as cited by Ugbagir (2010). The works of Permvattana et al. (2013) corroborate the fact that ICT courses are not designed for students with visual impairment and that they are not user friendly.

The following responses illustrate this assertion

„I is very worrying to go the e- learning centre to learn and you realize that most of the laptops are faulty. In such situations I get highly worried because I have no personal laptop to rely on for my personal studies (ABK) - a female respondent at PCE

“When it comes to accessibility, I can say that sometimes we encounter a lot of challenges at the e- learning centre. I can personally talk about the fact some of the device like the CCTV is not easy working with especially when it comes to the magnification of the font size and even at times some of the websites cannot be accessed and has no website guidelines (CA) – a male respondent at WESCOE

“Whenever we complain of inadequate laptops and tablets at the e- learning centre. The same national anthem is always recited to us as in

„school authorities have procured brand new machines underway. I can tell you that about half of the tablets they supplied to this centre are defective and nobody knows what they are doing about it. Always the same old story is being told (TT) - a male respondent at WESCOE

“It is very irritating to go to the e-learning centre and after landing on a paper you are interested in or searching for you are again posed with a serious challenge all because that paper has not indexed or catalogued properly”-(ABK) – a female respondent at PCE

„“For me I think there is no need to prolong issues regarding this question. Madam the fact is that there is poor network connection and again all of us here can talk of reduced bandwidth. Sometimes visiting the e-learning facility is so loathing that a student is not ready to go there even during emergency situation” the situation at the e-learning centre is very appalling (KB) - a male respondent at PCE

Designed classroom to facilitate e-learning

Regarding accessibility to e-learning resources, the researcher also probed as to whether the students with visual impairment had their classrooms designed to facilitate e- learning. The participants generally indicated that some of their classrooms had no Wi-Fi connected, all their classrooms were accessible. The following are the responses to support this statement:

“We have no Wi-Fi services fixed in our classrooms but I can say that all our classrooms are physically friendly and it makes our movement

in the class very comfortable for us”- AB a male respondent at PCE shared this with the researcher

“When it comes to e-learning in our classrooms, all I can say is that I will rate the school zero but I can say that the classroom and its surrounding is physically friendly”- ABK a female respondent at PCE revealed in the interview session.

“Nothing like e- learning happens in our classrooms but objectively I can say for a fact that all our classrooms are physically friendly”-CA a male respondent at WESCOE disclosed this to the researcher.

Other respondents also revealed that they had to go through various difficulties accessing the e-learning resource. They gave the following reasons as in poor network connection and erratic power supply which most at times makes their computers faulty. This supports studies conducted by Chiaha et al. (2013) that factors hindering access to e-learning facilities include erratic power supply and poor network connection, among others.

The following are quotes that support the views of the interviewees;

“We have a very nice e- learning centre but it’s surprising to note that we get in here and for almost three hours we are not able to access any information online all because of poor network connection. This something all my colleagues can confirm on this campus”-DC a female respondent at WESCOE

„It is sometimes worrying at certain times at the e-learning facility when it comes to accessibility. Because sometimes for almost a whole day there will be no light in there. And based on my personal observation school authorities are always reluctant to use the school plant to power the e- learning centre. Anyway I can tell if there may be some technical reasons as to why they don’t use the plant to power the centre during power outages”- QR a male respondent at PCE.

„If the information I need isn’t that pressing I bet you, you never see me in that facility all because of poor network connection”-DV a male respondent at WESCOE

„Now it has become a norm that when you go the e-facility that show I call it. You are going to meet either poor network connection or no

light in your search for information. So me I try to buy my own bundle and use my phone small small”-SOD a male respondent at WESCOE.

„I always buy my own bundle and use my phone to browse for information because at our ICT lab there is always poor network. It is a very worrying situation because all I know is that I have billed for internet charges and as far as I am concerned all I know is that once I pay my school fees I know internet or online charges catered for by the school. It is very annoying when you visit the e-learning centre to see the network being slow.”- DL, a male focus group discussant at PCE.

Designed classroom to facilitate e-learning

In terms of accessibility to e-learning resources, seven of the interviewees mentioned that the architectural designs of their classrooms did not facilitate or support e-learning and that the college authorities had done very little about it. The following are the quotes to support this statement:

„Madam it is very sad ooo. There is no classroom that has been specially built to support e- learning. Not even cables for browsing in the classrooms”- DC a female respondent at WESCOE.

„I know our school is old one and for that matter we have very old buildings here. So when it comes to classrooms that are designed to facilitate e- learning, there is nothing like that and I don”tsee anything being made to change the narrative”-“ DL a male respondent at PCE.

„Even the Wi-Fi on campus cannot be accessed at all places. You have to stand at certain places before you can go online. So come to think of designed classrooms built to support e- learning. There is absolutely nothing like that here”-“ SOD a male respondent at WESCOE.

„I haven”tcome across a classroom here that has special features in it all because of e – learning. No! No! We don”thave such classrooms here. May be if they are about to start then I don”tknow”-“ MN- a male respondent at PCE had this to say.

4.4 Research Question 3

What are the challenges encountered by students with visual impairment in accessing and using e-learning resources?

Resorting to e-learning hardly happens without challenges, and in that regard the researcher elicited from the interviewees the difficulties they faced. The data gathered from the field from interviewees highlighted challenges such as lack of technical support, lack of ICT gadgets, erratic network, and high data charges. Six of the interviewees all from WESCOE raised these challenges in the interview session with the researcher and it is tandem with studies conducted by (Abubakar & Adetimirin, 2016; Adeniran, 2013; Deng 2010; Haliso, 2011; Millawithanachchi, 2012; Ikpe & Olise, 2010; Olaniran et al., 2016). The following quotes point to the assertion made by the interviewees:

"I have never learnt through e-learning without encountering challenges. Sometimes it is either there is bad network especially during exam sessions": CK a male respondent at WESCOE.

"On several occasions the problem I face whenever I try using e-learning is highly technical. At times you report and it fixed for you.

Sometimes too they won't mind you at all and they will be giving flimsy excuses- TT a male respondent at WESCOE.

„I can personally say that when it come e- learning my challenges are the high data cost and the lack of ICT gadgets": TT a male respondent at WESCOE

„Elearning is very good and fantastic but it is very costly in terms of data charges. When I am doing my private studies I can buy more than 20 cedis worth of credit a day": AB a male respondent at PCE.

„High data charges is killing me I must say. Sometimes you go to the e-learning facility and there is poor network and in this case you as a serious student you have nothing to do than to buy credit and bundle, sometimes in gigs and it is very costly. "Some people don't know but the fact is raising money has always not been easy to us as students not

forgetting the fact that some of us are family men. All I know is that once I pay my school fees all I know is that my internet charges have been catered for because I know very well that I am billed for that. - PAK a male focus group discussant at PCE.

The data gathered from PCE showed mixed response with four of them complaining of poor internet connectivity that confirms the works of (Adomi (2006), Ikpe and Olise (2010), Haliso (2011) and Atsumbe et al. (2012) erratic network, epileptic power supply, and expensive airtime/data are the deterrents university face in the access and use of e-learning resources. The remaining three interviewees suggested that Wi-Fi service should be extended to many areas on campus other than the current situation where it is restricted to a small area. The following responses buttress the viewpoints of the interviewees:

„The internet connectivity here is very poor especially during exams time. Sometimes it takes a very long time before you can download just 2mb document. At times I am compelled to use my own phone which is faster than the schools Wi-Fi”-DC, a female respondent at WESCOE shared this with the researcher.

“E-learning on this campus is not enjoyable at all. You will be searching for an information and you realise that it takes a very long time before the site opens. I suspect there is something wrong with our Wi-Fi here or the internet service”-QR, a male respondent at PCE.

“Please I have nothing to tell you that the Wi-Fi on this campus is very slow. You ask anybody here and he or she will tell you the same story” -DV, a male respondent at WESCOE.

“You see the Wi-Fi on this campus can only be accessed at only some few places and not every part of this campus. Sometimes you can see all of us gathered here and even where to sit becomes a problem.” How do you install Wi- Fi at one particular joint and you want all of us to cluster here. This may even pose security threat to us. The mere fact that we manage situations here doesn”t mean that we are comfortable with the current happenings - OPR a male focus group discussant shared this with the researcher at PCE.

“You see the Wi-Fi on this campus can only be accessed at only some few places and not every part of this campus. Sometimes you can see

all of us gathered here and even where to sit becomes a problem.” - SOD a male respondent at WESCOE shared this with the researcher.

“The Wi-Fi areas on campus can be found in the Home Economics block. Sometimes where to stand becomes a big problem for all of us. They should extend it to our halls so that we shun the movement here and there all because of internet”- MN-a male respondent at PCE.

“Sometimes where to stand to access the Wi Fi becomes a problem because it does not cover a wide range of area – because of this we all have to gather at one place before we use the Wi-Fi. I don’t think that is the best way to go, they have to do something to extend it all parts of campus” –SOD, a male respondent at WESCOE.

4.5 Research Question 4

What are the environmental adaptations made for pre-service teachers with visual impairment while accessing the e-learning resources in these Colleges of Education?

The researcher also found out from the respondents how they coped with usage of e-learning in terms of environmental adaptation. Almost all the interviewees, (11 out of the 13) revealed that nothing had been done for them concerning environmental adaptation related to e-learning. In their views they saw nothing disability-friendly on their campus. However, the remaining two interviewees described the layout of lawns and tiles as particularly useful because that help them to navigate the campus more easily, especially on their way to their classrooms and the e-learning centre. This finding confirms that of a study conducted by Owusu-Amoako (2015) that revealed that school buildings and furniture arrangement were friendly to pupils with visual impairments.

The following responses illustrate the assertions made by interviewees at Wesco regarding environmental adaption:

“I can recall one Friday when I was told that one of the best friends had fallen down and was ignored. When I asked the person who told me of this incident what caused the injury, all that he told me was that my friend was alone on his way to the resource centre, and unfortunately, he fell down and was ignored. This matter was reported to our resource person but madam nothing happened. All these happened because the environment is not disability friendly. We share the same facilities with the sighted students whether you can see or not, that “your own problem.”- ABK, a female focus group discussant at PCE.

“There is something like a tile and lawns here. I know very well that my colleagues don’t want to hear of the tile and lawns at all whole thing it is not everywhere and movement on some parts of campus is very deadly. But me I manage it small small. Generally, the environment is not disability friendly. No one cares about us so we keep quiet and pray we complete and go.” -CA, a male respondent at WESCOE.

“You yourself can come and see the ramps and tile for yourself and then you draw your own conclusion as to whether it is helping us or not. You still need assistance from a sighted friend before you can move smoothly on it.” - AB, a male respondent at PCE.

“When it comes to environmental adaptation in this campus, all I can say is that the situation is very worrying particularly for some of us who are blind and cannot see anything at all. Taking into consideration the topography of this school, if you are not very careful you can easily fall down because of the hills and round nature of the paths here. My sighted friends have been my helper when it comes to going for classes. The point is that environment is not disability friendly.”- CK, a male respondent at WESCOE

„ There is nothing done for we the visually impaired students in terms of environmental adaptation. The environment itself is not physically friendly. Movement in the night for us has not been easy at all”-DC a female respondent had this to say at WESCOE.

„ On this campus we have device our own ways and means of living here. The environment is not friendly to people with disabilities particularly our people who have problems with vision”-SOD a male respondent at WESCOE shared this with the researcher.

„ Our situation is left into our own hands – there is nothing disability friendly on this campus. Sometimes I have to struggle before I can visit certain offices on this campus. Come to think of where our hall is and imagine going to the administration block and even the resource center. Huge difficulties I can say but there is nothing we can do. Our

sighted friends have helped us a lot” - QR a male respondent at PCE shared this with the researcher.

„There is nothing on this environment that helps us in terms of adaptation in using e- learning. You yourself have been here for decades do you see anything of that sort please madam”? - SOD a male respondent at WESCOE.

4.6 Discussion of Key Findings

Regarding the typology of e-learning resources available at the two research sites, the results showed some convergence with 11 interviewees indicating the high availability of e-learning resources like laptops, screen readers, tablets and projectors as confirmed by (Afolabi, 2015; Atsumbe, 2012; Ugabir, 2010). However, the other two interviewees indicated that the e-learning resources were inaccessible to them citing reasons, such as, the school authorities locking up the e-learning facility when needed. In terms of specially-designed softwares and devices, the results of the study revealed that all the 13 respondents in the two study areas had softwares like NVDA, JAWS, Goggle Talkback, keyboard learner and other devices like goggle glasses and screen readers which they used for their online studies given their situation. Regarding how the respondents coped with their studies in the absence of these specially designed softwares and devices, the results gathered showed a mixed response from the two study areas. Seven of the interviewees indicated that they sought assistance from their sighted friends, 3 of the interviewees consulted their lecturers for help, and 3 interviewees did nothing to help themselves.

In terms of accessibility of e-learning resources, the results of the study showed that all the 13 interviewees from the two study areas encountered difficulties citing reasons as non-user-friendly nature of some applications, inaccessibility of websites, inadequate laptops, poor network connection, erratic power supply and the fact that some scientific papers are not indexed; all of which confirm studies

conducted by (Chiah et al., 2013; Permvattana et al., 2013; Osei-Antwi, 2015; Ubagir, 2010). The findings of this study, as revealed by revealed by all the 13 interviewees, showed that there was not a single classroom block with a Wi-Fi that was specially built to facilitate e-learning among students with visual impairments. However, six interviewees confirmed the physical friendly nature of their classrooms.

The findings of the study unearthed the same challenges among all the 13 interviewees from the two study areas regarding the access and utilization of e-learning resource. The respondents cited the following as some of the challenges they faced: (a) lack of technical support, (b) high data charges, (c) erratic network, and (d) the limited Wi- Fi services to many areas on their campuses. All these findings corroborate works conducted by Olise (2010), Abubakar and Adetimirin (2016), Haliso (2011), Olaniren et al. (2016), Adeniren (2013), and Deng (2010).

In terms of environmental adaptation for students with visual impairments in using e-learning resources, all the respondents, except two, revealed that nothing had been done for them. This finding corroborates a study conducted by Owusu-Amoako (2015), that buildings are unfriendly to students with visual impairments.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter presents a summary of the findings of the study, conclusions drawn from the study and the recommendations regarding the directions for future research and policy formulation.

5.1 Summary

Primarily, this study set out to examine the accessibility of e-learning resources among pre-service teachers with visual impairment at PCE and WESCOE in the Akuapem North and Old Tafo Municipal Assemblies in the Eastern and Ashanti regions of Ghana, respectively. The TAM was employed as theoretical orientation of the study to address the research questions formulated for this study. Using a qualitative approach to inquiry with a descriptive design, the study employed a semi-structured interview and focus group discussion guides which were pre-tested to elicit data from thirteen interviewees with all of them drawn from these two colleges of education. The data collected included the demographic data, typology of e-learning resources available to these students with visual impairment, accessibility of e-learning resources, challenges encountered by these students in accessing and using e-learning resource and the environmental adaptation for these students with visual impairment in using e-learning.

5.2 Conclusions

In relation to the findings above the following conclusions could be drawn. The typology of e-learning resources available to the students with visual impairments

could be described as partly confirmed because some of the respondents from the two study areas talked of the high availability rate whereas others complained of the e-learning facility itself being locked up at certain times by school authorities.

Regarding the issue regarding of accessibility of e-learning resource all the interviewees indicated that they encountered various difficulties such as non-user friendly nature of some applications, inaccessibility of websites, inadequate laptops, and the fact that some scientific papers were not indexed.

Participants from both colleges indicated that students with visual impairment faced several challenges when accessing and using of e-learning facilities to enhance their learning. Some of the challenges they mentioned were lack of technical support, high data charges, erratic network, and others.

In terms of environmental adaptations for these students with visual impairments in using e-learning resource, it was partly confirmed. Eleven of the participants stated that the authorities in their respective college had done nothing to address the needs of students with visual impairments. Two of the participants, however, indicated that they had adapted by walking on the tiles and lawns within a small area.

5.3 Recommendations

In the light of the findings and conclusions drawn, the following recommendations are made to improve the e-learning experiences of students with visual impairments in colleges of education in Ghana.

Firstly, although, availability of e-learning resources was not a major problem, yet, there were times the e-learning facilities in both schools were not available for use, either for maintenance or unexplained reasons. In view of the fact that e-learning facilities are now critical to the success of all students, especially, students with visual

impairments, it is recommended that the management of WESCO and PCE, through the head of Information Communication Technology (ICT) notify students with visual impairments in advance concerning the closure of e-learning facilities during maintenance sessions. It is also recommended that faulty equipment are fixed on time to save students from delays in accessing the e-learning facility.

In terms of accessibility to the e-learning facility and resources, it is recommended that the Government, through the Ministry of Education, should equip e-learning facilities with specially designed modern softwares and devices, as well as the technical units with all the tools they need to fix faults that are reported to facilitate e-learning. Additionally, it is recommended that Wi-Fi services in the colleges are expanded to cover classrooms, residential halls/hostels, and resource centers for students with visual impairments. The support of T-Tel can be sought on this matter.

With regard to the challenges associated with accessing e-learning resources, it is recommended that authorities in both schools, through the ICT head, should institute measures to make sure that ICT technicians are always available so that they can help students resolve technical issues they may face, on timely basis. It is again recommended that the Government, through the Ministries of Education and Environment Science and Technology, should initiate measures to increase the bandwidth on campuses for faster internet services to facilitate e-learning. This will help solve the problem of poor and erratic network connection relative to e-learning.

Regarding environmental adaptation for students with visual impairments in using e-learning resource, it is recommended that management of both schools extend the tiles and lawns for easy movement of students to the ICT centre.

5.4 Suggestion for Further Research

The researcher suggests that further research be carried out to ascertain the provisions made for students with impairments in terms of e-learning infrastructure, particularly with students with visual impairments in the two colleges designated for their training. A comparative analysis of such study would be an improvement of this work.



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APPENDIX B

Semi-Structured Interview Guide

UNIVERSITY OF EDUCATION

DEPARTMENT OF SPECIAL EDUCATION

This research is purely academic. The researcher hereby seeks your views on access to e-learning resources for her MPhil Thesis. All information shall be treated as confidential. Your assistance is therefore needed to make this research work a success.

SECTION A: DEMOGRAPHIC DETAILS OF RESPONDENT

1. Name of College:

2. Sex:

Male

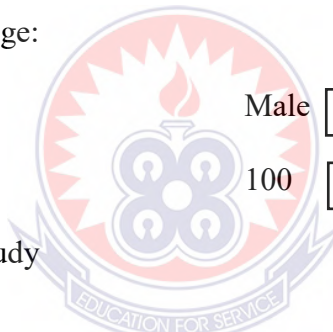
Female

3. Level:

100

200

4. Program of Study



SECTION B: TYPES OF E-LEARNING RESOURCES AVAILABLE TO THE VISUALLY

IMPAIRED STUDENTS

6. In your view what is your understanding of the term e-learning?
7. What type of e-learning resource is available to you on your campus?
8. Do you have specially designed devices and computer software installed purposely to make learning easy and convenient to you? Yes /No.
 - a. If yes, please share with me some of these devices and software and how are they user friendly to you?
 - b. If no, please share with me how you cope with learning in such a situation

9. How well can you use the following applications?

- A) Microsoft word
- B) Excel
- C) Microsoft power point
- D) Telegram
- E) Facebook
- F) Whatsapp

5. Discuss with me three benefits you derive from the e-learning resources available on campus

SECTION C: ACCESSIBILITY OF E-LEARNING RESOURCES

10. What do you understand by the term accessibility?

11. How accessible is the e-learning resource center on your campus?

12. How is the ICT laboratory arranged to meet your needs?

13. How has the classroom been designed to facilitate E-learning on campus?

14. How often do you resort to e-learning on your campus?

SECTION D: CHALLENGES ENCOUNTERED BY VISUALLY IMPAIRED STUDENTS IN ACCESSING AND USING E-LEARNING RESOURCE

15. Please share with me any three challenges you encounter while you access and use e-learning on your campus.

16. In your view what do you think can be done to address the challenges you have raised?

SECTION E: ENVIRONMENTAL ADAPTATION FOR STUDENTS WHO ARE VISUALLY IMPAIRED IN USING E-LEARNING RESOURCE

17. How do pre-service teachers with visual impairment adapt while accessing the e-learning resources in these Colleges of Education

18. Is there anything relevant to this topic you would like us to discuss which has not been captured in this interview?



APPENDIX C

Focus Group Discussion Guide

1. Share with us your views on availability of e-learning resources on your campus
2. What are some of the challenges you encounter while you access information from your e-learning facility?
3. What suggestions can you offer with regard to the challenges associated with accessibility?
4. Which software(s) and applications do you think you can use best while you resort to e-learning?
5. When do you normally use these software(s) and applications?
6. What environmental adaptation is made for pre-service teachers with visual impairment on your campus?
7. In what way has the environmental adaptation put in place on your campus benefited you especially with your movement on campus?
8. Is there anything relevant to this topic you would like us to discuss which has not been captured in this focus group discussion?
9. How often do you visit the e-learning facility on your campus?