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Accessibility and provision of digital library resources to the visually
impaired students in academic libraries: A case study of University of
Oslo Library

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DECLARATION

I Patience Agabirwe, declare that this is my original work and to the best of my knowledge has not been submitted to any other academic institution for an award.

PATIENCE AGABIRWE

.....

Submitted electronically and unsigned

DEDICATION

I dedicate this work to Dad, Mum, brothers and sisters. Thank you for all your advice. You have always been there for me. God bless you all.

ACKNOWLEDGEMENTS

This work would not have accomplished without the help of the following people and wisdom of God.

First of all I would like to thank the almighty God, for giving me the wisdom and for being faithful and loving towards me, I am all I am because of his love. I say Ebenezer!!

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I am grateful to DILL consortium for all your support, guidance and all the assistance given to me right from the day I was admitted to be part of DILL programme to this day of accomplishment. God bless you all.

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May the good lord bless you!

ABSTRACT

The study explored the accessibility and provision of digital library resources to the visually impaired (VI) students in academic libraries, and it used the library of university of Oslo as a case institution. This study sought to gather data about the visually impaired students' experiences in accessing digital library resources on the one hand, while on the other, the library staff's experiences in serving these students. By gathering data directly from real users (students) of the digital library resources / services, and the facilitators (library staff), the study intended to contribute to an understanding of, and help inform improved service delivery in this area.

The study sample comprised six (6) respondents. Four (4) visually impaired students (one PhD and three Master's programme students). These were considered to have experience of using digital library resources during the period of doing course requirements including examinations and also during the time of conducting research and writing their theses. Two (2) library staff of the University of Oslo were also part of the sample. One was directly involved in serving the visually impaired students while the other works in the department of providing digital library services. Student respondents were selected by use of snowball sampling technique while the library staff were purposively selected. The study employed a qualitative research design, and data was collected by use of in-depth interviews.

The study was premised in the models of disability - medical and social model but much emphasis was put on the social model which seemed more relevant in explaining the phenomenon under study.

Findings indicate that the visually impaired students largely depend on intermediaries like library staff, fellow students, friends, and reading assistants to access the digital library resources. However, findings indicate that majority of the student respondents are not satisfied with the assistance from intermediaries especially the library staff, although some of the respondents expressed some appreciation of the assistance they receive from these intermediaries. Furthermore, because the university does not adequately guarantee full access to the digital resources, it was found out that the visually impaired students seek for study literature and digital resources from other alternative sources notably, the Norwegian Library for talking books and Braille (NLB), Google scholar and Huseby resource center. The study findings however, indicate that these alternative sources do not also meet most of the information needs of the visually impaired students.

Nevertheless, the study findings indicate benefits the visually impaired students have gained from accessing the digital library resources. Findings also indicate various challenges/obstacles faced by the visually impaired students to access digital library services as well as challenges faced by the library staff to provide digital library services to the visually impaired students. Obstacles identified include; the design of the library interface, document format delivery, administrative challenge, lack of competence, inadequate library facilities and staff services, work overload, among others,

By looking into the highlighted obstacles faced by both students the situation of the VI will likely to be improved.

Keywords: Accessibility, provision, visually impaired, blind students, academic libraries, Digital library resources, university libraries, librarians, visually impaired or blind, assistive technology or adaptive technology, models of disability.

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LIST OF ABBREVIATIONS

ALA- American Library Association

ALT- Alternative

ATs- Assistive Technologies

CCTV- Closed Circuit Television

CD- Compact Disc

CILS- College and Institute Library Services

Compendiums - Compilations of Curriculum Articles

DAISY- Digital Accessible Information system

DILL- Digital Library Learning

DOS- Disk Operating System

DUO- Digitale Utgivelser Ved UiO (Digital publication at University of Oslo)

EBooks- Electronic Books

EclipseReader- Electronic Clipsereader

EIAO- European Internet Accessibility Observatory Project

Ejournal- Electronic Journals

GUI- Graphical user Interface

HTML- Hyper Text Markup Language

IFLA- International Federation of Library Association and Institution

JAWS- Job Access with Speech

JISC- Joint Information System Committee

NLA-Nigerian Library Association

NOVA- Non-Visual Access

OCR- Optical Character Recognition

OPAC- Online Public Access Catalogue

OPES- Oslo Papyri Electronic System

OS- Operating system

OUC- Oslo University College

PDAs- Personal Digital Assistants

PDF- Portable Document Format

RFP- Request For Proposals

TAC- Tatomir Accessibility Checklist

UNE- United Nations Enable

UIO-University of Oslo

UK-United Kingdom

UNESCO- United Nations Education, Scientific and cultural organisation

Un- United nations

VIP- Visually Impaired

VIP- Visually Impaired People

WAI-Web Accessibility Initiative

WCAG- Web Content Accessibility Guidelines

WIPO- World Intellectual Property Organization

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Information is fundamental to all human beings. All people need to access and be provided with information for different reasons including knowledge building and pursuit of academics. This puts the role of academic libraries central in this regard. According to (American Library Association [ALA] (1999, p. 3) historically, academic libraries have served as great equalizers of knowledge. In today's increasingly diverse and complex information environment, the services of academic libraries are needed more than ever. In line with this, Jiao, Onwuegbuzie & Bostick (2006, p. 844) assert that because the academic library is an important component of higher education and provides a significant amount of support for the university's goals; it is generally considered a major element in students' learning and success.

Under normal circumstances, every student should have unlimited access to and be provided with adequate information in academic libraries. All students in higher education are expected to retrieve, use and apply information in their preferred field of study (Stewart, Narendra, & Schmetzke, 2004, p. 265). In line with this, Bernard (2005, p. 4) notes that libraries play a key role in building an "Inclusive Society", serving all kinds of users including those with visual impairment. However, various studies (Carey, 2007; Craven, 2003; Internatioanal Federation of Library Association and Institution [IFLA], 2007; Rae, 2009; Tatomir & Durrance, 2010) show that using the academic library may be a different experience for students who have different learning needs and abilities. It is because of these individual differences that information exclusion becomes inevitable. According to Craven (2003, p. 1), information exclusion or inequality in information accessibility can occur when individuals do not adequately and equally access information in all formats including digital resources without being limited by one's individual learning abilities, this is particularly common with people who do not have normal vision. As Rae notes, lack of access to information is the biggest barrier to full participation in work, recreation and life for people with a print disability (Rae, 2009, p. 8). The visually impaired (VI) students are one group of those academic library users who may be prone to information exclusion most especially with regard to digital library resources.

Today, most academic libraries are shifting from being mere store houses with printed books on the shelves to digital libraries with lots of electronic online resources (Dermody & Majekodunmi, 2011, p. 150). In concert with this, Olle & Borrego argue that the amount of electronic information available in academic libraries and the diversity of tools to locate and access this information has increased tremendously, this increase in the amount of information available and the improvement in its accessibility has had a huge impact on academics' information behaviour (Olle & Borrego, 2010, p. 46). This transition is however associated with opportunities on the one hand as well as challenges on the other side of the VI students. It is an opportunity for them in that it creates greater access to a variety of online information while the challenge is that they require different forms of assistive technologies to access this information of which this information may unfortunately be unavailable in most academic libraries. The goal of this study was to explore the accessibility and provision of digital library resources to the visually impaired students in the academic libraries, using University of Oslo Library as a case study institution.

1.2 Background and context of the study

According to the publications of the United Nations enable (UNE)-“*The Standard Rules on the Equalization of Opportunities for Persons with Disabilities*” (UNE) (2006) <http://www.un.org/esa/socdev/enable/dissre04.htm> Accessed on March.3.2011 and “*The Public Library Manifesto UNESCO (1994)*”, the awareness that information is a imperative and essential right for everyone even those who are disabled has grown significantly. Furthermore, constructive participation and the development of democracy depend on satisfactory education as well as on free and unlimited access to knowledge, thought, culture and information <http://www.unesco.org/webworld/libraries/manifestos/libraman.htm>

Accessed on March.3. 2011. In the same vein, Tatomir & Durrance (2010, p. 577) argue that information access represents a fundamental need of citizens within any society. From understanding legal rights and obtaining medical information to attending school and earning a college diploma, all individuals in theory should possess unhindered access to a wide variety of options and tools capable of completely fulfilling their informational needs.

Putting the VI students into this context, Kwak & Bae (2009, p. 637) claim that, the most important way to improve the social position of the blind, who are socially marginalized, is education. The authors further argue that if the handicapped cannot be granted equal education opportunities with the non-handicapped, this would result into inequality in information accessibility. The authors claim that an academic library can play a considerable role in addressing this inequality.

According to Rae (2009, p. 2), the number of visually impaired people is growing fast world-wide. There were 161 million blind and partially sighted people in the world in 2009 (p.2). Also a study carried out by World intellectual property organization international (WIPO), (2010) estimated that only 5% of the world's one million print titles that are published every year are accessible to the some 340 million around the world who are blind, visually impaired or who live with other print disabilities. Specialized organizations globally, such as libraries for the blind, have taken on the task of adapting these print materials into Daisy, Braille audio or special digital formats at great expense. (http://www.wipo.int/pressroom/en/articles/2010/article_0043.html accessed on February 28, 2010). Rae, notes that less than 20% of websites are accessible to the visually impaired. He argues that 'digitization' is a means of ensuring that such collections are preserved and accessible to all regardless of their disability (Rae, 2009, p. 2).

Traditionally, the visually impaired accessed information through Braille, Tape Audio-Books and large print books produced, recording speech on to audiotapes and provided by specialized libraries for the blind (Bernardi, 2005; Jones & Tedd, 2003). As technology advances, there is a possibility that VI will access information like any other library users. New technologies have now opened up new areas of reading, participation and activities for people with disabilities that were inaccessible years ago. Visually impaired can now access computer programmes, internet and digital resources using Braille displays, screen reader softwares and speech synthesis, scanning software with optical character recognition (OCR). These electronic aids are known as 'Assistive or Adaptive Technology' (Bernardi, 2005, p. 5). However, due to technology innovations the way reading materials were produced and delivered has changed (International Federation of Library Association and Institution [IFLA], 2007).

Craven, Johnson, & Butters (2009) further note that, advances in technology and the use of websites have provided more choices in the delivery of and access to information and resources. For library and information professionals, this has been used effectively to deliver a range of resources and services such as e-journals, online databases, inter-library loans and access to resources for example via the Online Public Access Catalogue (OPAC), thus enabling people to access and share worldwide collections using what is often referred to as the “digital library” (p.70).

According to IFLA (2007) changes in technology in a society are potentially very positive for the visually impaired people, but only if there is the effort invested by all the stakeholders in ensuring the accessibility of electronic information. Otherwise it could leave those unable to read conventional print no better, or even worse off, as more and more information and services move online (<http://archive.ifla.org/VII/s31/pub/FGpart1.htm> accessed on February 28.2011).

Similarly, Tatomir & Durrance (2010) note that in spite of the increased proliferation of information sources, such as the worldwide web and digital libraries, there is a growing gap that exists between individuals with unrestricted access to information and information resources and those persons with limited or no access to the same information. The same authors continue to assert that few professionals and thus few institutions realize that incorporating accessibility features for example into web sites, interfaces and digital materials can be accomplished in a cost effective manner, with negligible expenditure of monetary and human resources. More so, few are aware that making digital resources accessible actually increases the usability of digital resources to the benefit of multiple user groups, not simply adaptive technology users (p.577).

According to Power & Lebeau (2009) the academic libraries and their users have come to rely heavily on databases and electronic resources for their information needs. As with other library materials, it is essential that these resources be accessible to users with disabilities (pp-55-56).

1.3 Background of the study area

1.3.1 University of Oslo

The University of Oslo is Norway's largest and oldest institution of research and higher education. It was founded in 1811 when Norway was still under Danish rule. With eight faculties, the University has approximately 27 600 students, (per year the number of graduates is approximately 4500, of which 400 are doctorates) and 1395 employees currently (<http://www.uio.no/english/about/facts/> accessed on February 28, 2011). It should be noted that the University's official language is Norwegian, but teaching is also provided in English in a number of Bachelor, Master and PhD programmes. The university has won three Nobel Prizes and this indicates the quality of the research at the University (<http://www.uio.no/english/about/facts/uio-facts-figures-2010.pdf> accessed on February 28, 2011). The aim of the University of Oslo (UIO) is to be Norway's leading comprehensive university, comprised of nationally prominent and internationally recognized academic communities in medicine and the natural sciences as well as in the humanities and social sciences, with a special focus on long-term basic research. UIO focuses its academic activities to a greater degree on the basis of three fundamental premises which are quality and comparative advantages, need for knowledge and expertise in society at large and potential for development and cooperation

1.3.2 University of Oslo Library

The university of Oslo library (OIU) is the largest academic library in Norway, founded in 1811 together with the establishment of University of Oslo. Presently, the main library consists of four branch faculty libraries, a central administrative and the Digital Services department (<http://www.ub.uio.no/english/about/>). The four Libraries are Library of Humanities and Social Science, Library of Medicine and health Science, the Faculty of Law Library and Faculty of Mathematics and Natural Science Library. Under each faculty every department has its own library (<http://www.ub.uio.no/english/about/> accessed on February 28, 2011).

All the faculty libraries contain different types of information resources like e-journals, scientific publishing such as thesis, books, reports among others. Some of the foreign literature dated before 1960s is only registered in the library's old main catalogue (HK1). Books, periodicals, online and electronic book (e-book) resources on subscription from online publishers are found in the faculty libraries. Besides, the library provides in-house database search services, for example BIBSYS Ask (an online catalogue of library and information systems for all the Norwegian university), Institutional Repository (DUO) and off-campus database search with journals, research papers, reports and other scholarly literature which are subscribed to by the University of Oslo Library even for the entire University communities (<http://www.ub.uio.no/english/> accessed on February 28. 2011).

1.3.2.1 Digital services

The department of digital services has the overall responsibility for the library's digital services. Its specific responsibilities include updating the web sites of library; Operation and development of SFX and Metalib (a federated search system developed by Ex Libris Ltd) to Uniport consortium; operation and development of X-port - the library portal for electronic journals and databases (a consortium among university libraries in Bergen, Oslo, Tromsø, Trondheim, and the Medical Library at the Oslo University Hospital); acquisition and management of electronic resources; System Owner DUO - Digital publications at UiO; operation and development of; Opes (Oslo Papyri Electronic System) and databases of non Norwegian literature before 1960s which is the main catalog¹.

The researcher chose university of Oslo library as a case study institution for this research because the university has a quite big number of visually impaired students compared to other universities. It needs to be mentioned that initially, the researcher had chosen to draw the respondents from both Oslo University College (OUC) and University of Oslo. The reasons for selecting these two universities were that she is a student at OUC and also resides near both of them. This, she thought, would make it easy to access the respondents in both

¹ <http://www.ub.uio.no/om/organisasjon/digitale-tjenester/index.html>

universities. However, the few students she found at OUC said that they were not well conversant with English so they could not participate in the study. The researcher decided to shift the study entirely to University of Oslo because she identified the respondents who could speak English fluently and were willing to participate in the study. Besides, the researcher found out in her preliminary investigations that University of Oslo has a well established accessibility department² with a big number of users who were potential respondents of the study.

1.4 Motivation

My first encounter with a visually impaired library user was in 2008 at Kyambogo University (Uganda). I had been recruited to work as a librarian, in the faculty of special needs and rehabilitation. A student who was visually impaired approached me with a tape cassette recorder and requested me to read for her notes and record so that she can go back to the student house and listen to the recorded class notes. It was a bit challenging task for me and I started thinking of how little support the library and the entire university offered to people with special needs particularly the visually impaired. The challenge was how the university could help the visually impaired students access information just like students with normal vision. The library had only one computer with Job access with speech (Jaws) a screen reading software, one Closed Circuit Television (CCTV). The CCTV is a television video camera combination used by people who are visually impaired to magnify the print in books and newspapers. The number of visually impaired students was big so they could compete for the only one available computer and CCTV. As I was recording for this student, I kept on thinking of what we (librarians) could do for them so that they also access information like people with normal vision. I thought that these people cannot continue to depend on other people to read for them and especially in the digital age where much information in libraries is electronic.

Before it was long, I was admitted on International masters in digital library learning (DILL) that is in cooperation between Oslo University College, Norway, Tallinn University, Estonia and Parma University, Italy. I regarded this as an opportune moment to go and see how the

² It is a study centre that provides assistance to students with special learning needs (UIO brochure 2010).

visually impaired persons are served in developed countries so that we can borrow ideas to develop our libraries for the visually impaired persons in developing countries particularly Uganda where I come from. As the course was on-going, my desire was to find out how the visually impaired students can access and be served with information in the digital environment.

This desire was almost fulfilled when I luckily did my internship with organizations that serve the visually impaired persons. During the course of the internship period, I was inquisitive to learn something new that I can take back home. I learnt how to translate text to speech for the visually impaired persons using Digital Accessible Information system (DAISY) open source software and the same software can be used back home to translate text to speech, a service that would be most helpful to the visually impaired students in my university library. The curiosity for more information regarding library services offered to the visually impaired users prompted me to carry out a systematic study to explore the accessibility and provision of digital library resources to the VI students by focusing on the means and technologies used by the VI students to access digital library resources in academic libraries, the benefits of digital library resources, the challenges faced by visually impaired students (accessibility) and the challenges library staff face in the provision of digital library resources to the visually impaired students with a view that the findings would be crucial for the establishment and improvement of digital library services in Uganda's academic libraries particularly Kyambogo University.

1.5 Statement of the problem

According to Delos, “digital libraries should enable every citizen to access all human knowledge anytime and anywhere, in a friendly, multi-modal, efficient, and effective way, by overcoming barriers of distance, language, and culture and by using multiple Internet-connected devices” (Delos, 2001, p. 5). Raseroka (2005) also notes that libraries act as carriers of information content and facilitators of access to information in various forms. They form the basic information delivery infrastructure that may be enhanced by communication technologies and develop into a significant facilitator of the information society. Thus, libraries are regarded as information facilitators which recognize all users

despite their varying learning abilities. They also aim at integrating the 'disabled' users into the system so as to avoid information exclusion. In the digital age, academic libraries strive to offer equitable access to information resources to all the users both the disabled and the non-disabled (pp.91-92).

Most academic libraries are moving towards the provision of electronic resources to their clients, and all the features of electronic materials could be a great opportunity for academic libraries to offer better services to the visually impaired users. This shift presents opportunities for a larger segment of people with "print disabilities" (Coombs, 2000). With the help of screen readers for example, digitized text is, at least potentially, accessible to those who are unable to see print or who have difficulty in reading it: people who are visually impaired and those with certain learning disabilities (Mace, 1996).

In addition, academic libraries are important components of Universities as they facilitate research, teaching and learning. Knowledge is power, and by ensuring access to systems of knowledge and information relevant to the pursuit of enquiry and study, academic libraries play a vital role in universities' quest for academic excellence. Moreover, traditionally, libraries were concerned with the process of acquiring, storing, organizing and disseminating information to satisfy the needs of library users, whether they are scholars, researchers or students. However, these traditional functions of libraries have expanded in recent years with the growth of electronic information resources. As a result, modern libraries are increasingly being redefined as places to obtain unrestricted access to information in many formats and from many sources (Darkey & Akussah, 2008, p. 432).

Carey (2007) asserts that in spite of the outstanding number of intellectual and professional visually impaired persons (VIPs), it is important to recognize that access to content for this group has always been an extrinsic as well as an intrinsic problem; scarcity of content and the capacity to process it have often combined to disadvantage VIPs. In the emerging digital environment for example, while everybody will have access to much more content in the digital age than at any previous time in history, the gap between VIPs and their peers might inevitably widen even in terms of access to text. The effective access to information in an attempt to keep this comparative disadvantage to a minimum requires that the right to information be understood in an active way. Not only must the right be practical rather than

simply theoretical; it must be effective and, in being so, information facilitators may need to make some fundamental changes to the way they think about information access channel (p.780).

It is imperative to note that the development of digital libraries does not guarantee the visually impaired to have full and adequate access of digital library resources in academic libraries due to some obstacles, yet the visually impaired students are expected to take the same courses and do the same exams with sighted students who may have full access to digital library resources. Owing to the fact that the visually impaired students may access some of the digital library resources, this study thus sought to explore the means and technologies used by the VI students to access digital library resources, the benefits of digital library resources to VI students, obstacles both the visually impaired students (accessibility) and library staff (provision) face in accessing and providing digital library resources by and to the visually impaired in academic libraries using University of Oslo library as case study institution.

1.6 Aim of the study

To explore the accessibility and provision of digital library resources to the visually impaired students in academic libraries using University of Oslo as the case study.

1.7 Objectives of the study

- To identify the means and technologies used by the visually impaired students to access digital library resources
- To examine the benefits and challenges in the access (students) and provision (library staff) of digital library resources to the visually impaired students in academic libraries

1.8 Research questions

- What means and technologies do the visually impaired students use to access digital library resources?
- What are the opportunities or benefits of accessing the university digital library resources by the visually impaired students?
- What are the challenges faced by the visually impaired students in the access of digital library resources in academic libraries?
- What are the challenges faced by library staff in the provision of digital library resources to the visually impaired in academic libraries?

1.9 Justification for the study

Comeaux & Schmetzke (2007) it is noted that after more than 20 years of digitization efforts, many library information resources have become available in an electronic, typically web-based format for example information about the library itself, catalogs, indexes, dictionaries and encyclopedias, books and journals, tutorials, reserve materials, and reference services. However, the same authors argue that, the extent to which these new opportunities become realized depends largely on many factors for example the design of the web environment (457). For users with print disabilities, design in the online world matters as much as it does in the physical world. For example, (Carlson, 2004; Foster, 2001) note that missing alternative text tags for content-bearing images constitute barriers for screen-reader users that are as real as missing curb cuts are for people in wheelchairs.

Kwak & Bae (2008) also point out that the problem of disparity of information access is becoming serious for socially marginalized people. Despite information asymmetry, services for the handicapped have pretty much been completely neglected in the library service field in every aspect, including policy, facilities, and services. Moreover, digital libraries should enable the provision of a more convenient environment to all users regardless of their disability in order for them to easily use information services anywhere, any time. Therefore,

such a convenient and user-centric environment is also meaningful to the visually impaired (p.623).

It should be noted that even though information technology has been progressing rapidly, the socially disadvantaged, such as the disabled are marginalized from the benefits of information services. The biggest problem they face is lack of access to digital information services. Thus, to solve this problem there is need to investigate how (means and technology used) the visually impaired access digital library resources, the benefits they get if any, challenges both the visually impaired (access) and library staff (provision) face in accessing and providing digital library resources. This might help service providers to improve the library services for this group of users in order to enable them (VI) to equally access and be provided with digital library resources. All this will be done using University of Oslo library as case study institution

Furthermore, it should be noted that, a well resourced and managed university library significantly contributes to academic excellence; excellence in teaching, learning and research (Raju & Raju, 2009, p. 45). This is why the researcher chose to study the digital library services for the VI students in academic libraries. More so, technology has been the driving force in libraries in all the services as a way of satisfying the needs of their users and therefore the visually impaired users need not to be left out among other users.

While the above findings shed some light on the status of digital libraries accessibility and provision, they do not provide much insight into how the visually impaired access and are provided with digital library resources and the challenges involved. This leaves a room for carrying out a systematic investigation about this phenomenon, which was one of the intentions of this study.

1.10 Scope of the study

The study focuses on accessibility and provision of digital library resources in academic libraries, it is conducted in Norway, at University of Oslo Library involving both visually impaired students and library staff. The cases institution was selected to represent other VI

students and academic libraries. The study highlights the means and technology used by the visually impaired to access digital library resources, the benefits or opportunities they get from accessing digital library resources, the challenges they face in accessing digital library resources and challenges library staff face in providing digital library resources.

1.11 Significance of the study

The outcome of this research will hopefully raise awareness of the means and technology used by the VI students to access digital library resources, the benefits if any, challenges the VI students face when accessing digital library resources, challenges of providing digital library resources to the visually impaired among professional librarians, governments, and experts of digital library resources.

The research sets out to asking the visually impaired students about the experience in accessing digital resources, staff in serving these students. By gathering feedback directly from real users (students) of the services, and facilitators (librarians) it is intended to increase understanding to help inform service improvement in this area.

Lastly, this research is an attempt to provide information that might help academic libraries understand what the visually impaired users think about access to digital library resources and challenges they face in trying to access these resources.

1.2 Models of disability

There are two models of disability according to carson (2005,p.4), that is medical model and social model which are mored presented in chapter three. The researcher will use the social model of disability in data presentation, analysis and discussion of the findings (chapter four).This will be used where applicable. The implications of the social model will be further concluded in chapter five.

1.13 Thesis outline

This thesis is divided into five chapters. The first chapter presents the background of the study and the framework as a whole. Chapter two presents the literature review about the topic of study. The third chapter is concerned with the methodology of the study including notably the research design, Models of disability, data collection methods, research paradigm, models of disability, data analysis method among others. Chapter four presents the findings of the study, discussion and analysis of the data.

The fifth chapter presents the conclusion of the study, recommendations and suggestions of areas for further research.

1.14 Chapter conclusion

This chapter one has given the introduction, background of the topic under study and the background of the case study area. It has also presented the motivation and statement of the problem the research sought to address. The aim, objectives, and research questions of the study are also covered. Furthermore, justification for the study, scope of the study, the significance of the study, and, the thesis outline have all been presented.

The next chapter (chapter two) reviews literature related to the topic understudy.

Chapter Two: Literature review

2.1 Introduction

The literature review is presented thematically following the objectives of the study. It is an attempt to summarise the relevant literature on accessibility and provision of digital library resources to the visually impaired (VI) in academic libraries in order to get a good understanding of what has been documented about the topic under study. The chapter includes definitions of terms, the forms of assistive technologies used by the visually impaired to access digital library resources, the benefits or opportunities digital library resources provide to the visually impaired students, the challenges faced by students to access digital library resources and challenges faced by librarians in providing digital library resources and lastly, the conclusion of the chapter.

Byerley, Chambers & Thohira (2007, p.510), argue that as web-based resources became increasingly common in libraries in the late 1990s, librarians began to realize that many popular online products were inaccessible to people with disabilities. But it is not until around 2002 that information on the accessibility of library web-based databases and electronic library resources started to appear in the library literature. Most of the literature cited in this chapter starts from 2002, though some few articles below 2000 that were considered relevant and important are also cited.

2.2 Definition of terms used

2.2.1 Visually impaired

The term ‘visually impaired’ is used to refer to “all those who have a seeing disability that cannot be corrected by glasses” (Hopkins, as cited in Craven, 2003, para. 5). This definition encompasses a range of conditions, from those who are completely blind, those who may be

able to make out spatial forms but are unable to resolve visual field to a functioning level of detail, to those who cannot discern certain colors. It is thus important to acknowledge that visual impairment is not merely a condition but rather a matter of degree.

Arditi & Rosenthal (1998) define visual impairment as loss of vision which constitutes a degenerative condition that cannot be corrected by conventional means, which include; refractive correction, medication or surgery. Visual impairment can also be perceived as an umbrella concept which includes all degrees of visual loss; mild, severe or total loss (Skjørten, 1997, p. 35). These definitions indicate that visual impairment is a consequence of loss of vision rather than eye disorder.

However, there are number formal definitions of visual impairment that exist. For example Bruce & Baker,(2001) notes that, visual impairment cover a broad spectrum of people, ranging from people who are partially sighted to people who are completely blind. Similarly, Harris & Oppenheim (2003, p. 243) note that there are varying degrees of visual impairment that range from the loss of some sight to total blindness. In the context of this research, findings refer to those students (respondents) who are completely blind. It is also important to mention at this point that throughout this thesis, the concepts of visually impaired and blind will be used interchangeably to mean the same thing.

2.2.2 Academic libraries

Horn, Calvert, & Stuart (2009, p. 243) define academic libraries as university libraries and those libraries which serve the vocational education and training sector through colleges or institutes of technical and further education. According to Hunt (1989, p. 7), an academic library is defined as “an institution within an institution”. In a statement famous among British librarians, (the University Grants Committee, as cited in hunt, 1989) describes an academic library as the ‘central organ’ of a university, by its treatment of which the entire ‘character and efficiency’ of the parent body must be judged. The primary purpose of the university library is to support the teaching and research carried out in a university (Hunt, 1989).

In this research, both definitions will be used to mean an academic library.

2.2.3 Digital libraries and Digital resources

There are various definitions of digital libraries cited in different literature; the notable ones and most considered relevant to the topic under study include the following.

Lesk (1997), defines digital libraries as “organized collections of digital information (p.1)”. Similarly, Arms (2000) refers to digital libraries as “managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network (p.2)”.

According to Francisco-Revilla, Shipman, Futura, Karadhar, & Arora (2001), digital libraries are defined as ones that collect pointers to Web-based resources rather than hold the resources themselves. The authors further state that a library’s Website is an example of this definition (p.67).

Ubogu, (2006) states that, the transition from analog information to digital is very pervasive, resulting in various forms of digital resources which include but are not limited to; websites, electronic books and journals, digital government archives, electronic sound, image and film collections, business and educational databases. In line with this and as already noted in chapter one (section 1.9), in the past few years, many library information resources have become available in an electronic, typically web-based format for example information about the library itself, catalogs, indexes, dictionaries and encyclopedias, books and journals, tutorials, reserve materials, and reference services (Comeaux & Schmetzke, 2007). Digital resources have significantly changed the way in which libraries function as information providers, for example Digital libraries allow access of full text, can be accessed from anywhere including laboratories, offices and homes twenty-four hours a day. Moreover, traditional print collections are being transformed into versatile electronic resources (Ubogu, 2006, p.9).

In this research, digital library resources are used to refer to digitized versions of print, electronic library, document formats such as PDF, HTML, and e-books and e-journals which are designed to be read online or through specific hardware interfaces, online catalogues and

online databases. In addition to the above text forms of digital library resources, there are also other forms which include elements such as images, graphics, hypertext, and navigational buttons and links.

It should be noted that in this study, digital resources and electronic resources will be used interchangeably to mean the same thing.

2.2.4 Accessibility

In the context of this research, the following definitions of accessibility are used. According to Ree (2008), accessibility means that information has to be made available for almost everyone including persons with disabilities. This accessibility may be direct or through the use of some form of assistive technologies. Craven, Johnson, & Butters (2010) assert that , the term “accessibility” generally refers to the application of technical solutions to the design of a web site in order to render it more accessible to users, in particular users of assistive technologies (such as screen reading technology) (p.71).

According to Craven (2003), the term accessibility can have several meanings, including physical access to hardware and software as well as ensuring users can not only access or 'read' what is on the screen (be it using magnification, speech output or Braille output) but also interacting with resources and services (p.2).

2.4 Forms of assistive technologies

Technology can provide the means for a blind or partially sighted person to overcome barriers such as the need to read print, use a computer, take notes and communicate both on paper and electronically (Brophy & Craven, 2007, p. 954). According to Koulikourdi (2008, p. 387) assistive technologies are defined as products, devices or equipment that are used to maintain, increase or improve the functional capabilities of people with disabilities. Lee, assert that assistive computer technology as often referred to as adaptive, access or enabling technology, means any modification made to standard computer software and hardware to enable people with disabilities to work independently (Lee, 2005, p. 47). Likewise, Saumure & Given (2004, p. 30) notes that adaptive technologies have become critical in the academic

lives of visually impaired students by enabling them to access previously inaccessible materials. The authors also assert that, adaptive technologies help reduce on the student's dependence on volunteers to read aloud to them information. This enhances the students independence (Saumure & Given, 2004, p.32).

According to Konicek, Hyzny, &, Allegra, (2003), assistive technology is exactly what the name implies: technology that can assist a person in meeting a goal. The authors add that there are a number of assistive technology products that are used to obtain access to computer-based information. These products can range from low-tech to high-tech and consist of hardware (a physical piece of equipment such as a scanner) or software (a program that is installed on a computer that will provide a specific feature or expand a specific function) (p.102).

Additionally, Brophy & Craven (2007) note that assistive technologies enable a visually impaired user to access on-screen information receiving output in a way that is appropriate to his or her needs. The authors added that, these technologies are important to the visually impaired because they help them to interact directly with the site or to download information into an alternative format. For example, Video magnifiers and electronic readers, Optical Character Recognition software, magnification software, speech output systems and electronic Braille devices all have a part to play in a solution for a particular individual. The authors further argued that, often people will use a combination of the above technologies to enable them to read electronic print. For example use of speech output predominantly, with Braille output to verify unusual spellings or language (pp.951-955).

According to Paciello (2000), assistive technologies focus on alternative approaches to input or output. For input, voice recognition systems are used and for output, speech synthesizers are used which are software based (Jones & Tedd, 2003, p. 107). Some of the assistive technology devices include alternative keyboards and pointing devices, speech recognition, eye tracking, Braille displays, and screen readers (Paciello, 2000).

Generally, there are many technological aids or assistive technologies that the visually impaired people can use. For example, (JISC's Techdis database as cited in Lewis, 2004, p. 23) claims to contain details of over 2,500 items of assistive technology alone. All these

cannot be covered in this study due to limited time and scope. However, the most common assistive technologies which are used to access digital library resources include the following;

2.4.1 Screen Readers: Pal, Pradhan, Shah, & Babu (2011) assert that, Screen readers are software programs that through a speech synthesizer or Braille translator allow a user to interact with material on a computer screen (p.515). Furthermore, Lee urges that, screen readers or speech access software are the most common forms of assistive technology which are used with speech synthesis hardware to convert the text on the computer screen into speech. Some screen readers work two-ways, both reading and writing. He further argue that, people who cannot use a keyboard or mouse because of limited mobility may use this two-way software (Lee, 2005, p. 48).

Additionally, screen reading software reads data loud on computer screens, including text, pull-down menus, icons, dialog boxes, and web pages. They run simultaneously with the computer's operating system and applications. Thus assist the visually impaired to adapt to screens and monitors and extract information from the graphical user interface and translate the contents into speech (Hackett, Parmanto, & Zeng, 2005). Konicek, Hyzny, & Allegra (2003, p.102-103) noted that a screen reader scans data displayed on the computer, and conveys the information aurally by means of a synthesized voice, thereby empowering the person without vision to negotiate information on the computer through basic keyboard commands.

According to Lazar, Allen, Kleinman, & Malarkey (2007, pp. 249-250) screen readers are the most popular assistive technology utilized by users with visual impairment. Moreover, because Braille literacy rates are low, speech output is the most common assistive technology for users with visual impairment (Zhao, Plaisant, Shneiderman, & Lazar, as cited in Lazar, et al, 2007). In addition, other assistive technology tools for the blind, such as tactile displays, are prohibitively expensive. As noted by (Jones & Tedd, 2003; Lazar, et al 2007) two of the most popular screen readers are Job access with speech (JAWS) and Window-Eyes. In line with this, Pal, Pradhan, Shah & Babu note that, these two screen readers rank highest in functionality, and support the range number of applications (Pal, Pradhan , Shah , & Babu 2011, p. 515)

Konicek, Hyzny and Allegra argue that each screen reader renders information differently, and its function will vary depending on other considerations such as browser compatibility, the length of time it takes for a page to load and the connection method for example modem or Ethernet connection (Konicek, Hyzny & Allegra 2003, p.103). Moreover, Lee (2005, p. 48) states that by using a screen reader, the blind can access OPAC, electronic books, newspapers and various information resources through the Internet.

A lot of attempts have been made to enhance screen readers for example BrookesTalk tool, is an integrated screen reader and Web browser tool (Zajicek, Powell, & Reeves, as cited in Lazar, et al 2007) that was introduced to provide a more stable integrated environment and more navigational information about the content on a Web page (through structuring and mark-up of the content on the page by the application), although these are excellent enhancements for screen reader users, they are not widely used by blind computer users. The majority of blind computer users still use either Window-Eyes or JAWS (p.250).

2.4.2 Scan / Read Systems: Scan/read systems combine software and a flatbed scanner to read aloud any printed text. Textbook pages, class handouts, and texts can be scanned in and then read aloud by a computer(Adaptive Technology Center for NJ Colleges, 2003).

Scan/read systems combine the use of a computer, a scanner, optical character recognition software, and speech output to read aloud any printed text while providing a visually-enhanced display on a computer monitor. Users of scan/read systems place the pages to be read on a flatbed scanner and click the “scan” button. (Using a document scanner instead of a flatbed scanner is a faster alternative). The print is then converted into an electronic file, similar to a word processing file. Scan/read programs then speak the words on the screen while highlighting the corresponding text. This provides a “synchronized auditory and visual presentation of the text, while the speech output provides ongoing auditory feedback (Hecker, Burns, Elkind, Elkind, & Katz, 2002, p. 244). Scan/read systems include; Kurzweil1000, OpenBook, (Adaptive Technology Center for NJ Colleges, 2003)

2.4.3 Portable Note-takers: Lightweight, portable note-takers provide speech output without a visual display and can be connected to printers and computers for printing and

uploading text. Braille keyboards and refreshable Braille displays are available for Braille users. A QWERTY keyboard version is available for people who prefer touch-typing.

Portable note takers include; Braille Lite Series , Braille 'n Speak , Type 'n Speak, PacMATE Series , Type Lite, VoiceNote , BrailleNote (Adaptive Technology Center for NJ Colleges & The College of New Jersey, 2003)

2.4.4 Digital Book Readers: Software playback systems are full-featured software packages designed to play RFB&D's AudioPlus CD books on a desktop or laptop computer. They are specially designed with the blind and visually impaired community in mind. These include; eCclipseReader , Victor Reader Soft , PlexTalk (Adaptive Technology Center for BJ Colleges &The College of New Jersey, as of 2003).

2.4.5 Braille Displayer. It is also called a Braille display or soft Braille. A series of dots can be raised to form Braille characters. Braille displays are usually augmented to standard keyboards. Blind people use the keyboard as an input device and the Braille displayer to read what is on the screen. (Adaptive Technology Center for BJ Colleges & The College of New Jersey, 2003).

As noted by Pal , Pradhan , Shah , and Babu (2011), Braille displays provide access to information on a computer screen by electronically raising and lowering different combinations of (usually nylon) pins in Braille cells. These are typically used in addition to audio output depending on individual preferences, though where the user is Deaf-Blind, these are the primary means of communication (p.517).

2.4.6 Braille Translators: Braille translators translate text to Braille. Non-text information such as charts, graphs or mathematical formulas cannot be accessed. There are several packages which are based on DOS, Windows and MAC (Adaptive Technology Center for NJ Colleges, 2003)

According to Pal , Pradhan , Shah , and Babu (2011, p. 514), a Braille translator is the backend tool that forms the connecting link between the OS (operating system) and Braille output device. The Braille file created by the translator is then sent to a Braille printer or read

on a Braille display or smaller personal device. Duxbury Systems' Braille translator for Windows is one of the most widely available Braille translators in the market today.

2.5 Opportunities or Benefits of digital library resources to the visually impaired students

According to Saumure & Given (2004, p. 33) access to electronic information is much more efficient. Accessing information in this fashion allows the visually impaired students to skip the steps that involve having print material scanned and then converted into electronic form without forgetting the physical trips to libraries and other offices at campus. Thus, access to electronic information saves the student's time and energy. Additionally, the authors further assert that, access to electronic information by visually impaired students make them less dependent on others to provide them with needed information and are also able to access information in a more timely manner.

In Samaure's study, one student argues that;

“Information on the internet is already in a form that I can work with and copy. I can take notes from that easier than from library materials” (p.33).

Lee (2005) states that visually impaired people are now able to access reading and information materials in the same way as their sighted counterparts. They can directly access the original text by using assistive technology. Even a totally blind person can search the Internet when the computer is equipped with assistive technology such as a screen reader (47). Additionally, Saumure and Given assert that, with the use of assistive technologies, for example speech synthesisers, the visually impaired students access information on the internet including the library's academic catalogues, databases and other supplementary web materials. This access is particularly useful in helping the students to download full text journal articles thus increasing the speed the students access the academic materials and are able to use the academic information (Saumure & Given, 2004). The same authors further note that because an internet resource is already in a digital form, it can be more quickly adapted to an accessible format in this case audio format. Students do not therefore need to depend on another person's judgement for selection and retrieval; particularly electronic journals are more useful to the visually impaired in accessing academic information (p.30).

Likewise, Lee (2005, p. 47) notes that with electronic materials, the same document can be converted into varying formats such as Braille or speech by using assistive technology. This makes the visually impaired to choose their preferred formats of output, whether that be speech or Braille. In addition, multiple copies of the same format can be made within a short time; otherwise it would take several days or months if it is done by manually intensive methods.

According to Leporini, Andronico, & Buzzi (2004, p. 57) computers and the internet significantly contribute to increased independence of disabled people in study work, and free time, leading to greater autonomy and social integration". More so, (Ludi, 2007) asserts that the feeling of independence and self reliance is important for the visually impaired users.

In the same manner, Lee (2005, p. 47), asserts that the visually impaired are able to browse the up-to-date online catalogues and choose what they want to read, not what others think they want to read. Therefore, technology provides disabled people two fundamental rights: independence and choice. Probably the dream of a world where visually impaired people can independently access magazines, books, newspapers, documents and even private mails has come true. Thus, technology helps enhance the self-esteem and self-reliance of the disabled as they work and study independently and even feel normal.

Lee further notes that in the matter of storage of bulk Braille that has always been a headache in libraries, Braille materials in digitized format solve this storage problem. All these issues show the possibilities of libraries to play a significant role in minimizing the dearth of reading and information resources for the visually impaired (Lee, 2005). Besides, more libraries in turn are increasingly moving into producing and providing electronic document through their digital library services. All these features of electronic materials are a great opportunity to general libraries to open their doors to the visually impaired who have long suffered information exclusion (Lee, 2005). (Chapman, 2007, p. 918) notes that, resource discovery help both sighted and the visually impaired to find resources corresponding to stated search criteria, identify a resource as the document sought, or distinguish between one or more items with the same title; select a resource appropriate to the user's needs; and obtain access to the resource.

Brophy & Craven (2007, p. 954) point out that the interface of choice for nearly all digital library services is the World Wide Web. There are significant changes taking place in Web technologies, and the graphical user interface (GUI) has rapidly become dominant and looks likely to remain so. From an accessibility perspective, this has at least allowed standard approaches to be developed to try to ensure that all users are able to access all services. The library Web site will provide information about opening times, services offered, and contact details. It may also offer access to the catalogue, online journals, abstracts, and contents pages, as well as providing online access to borrower details and renewal and reservation services. The provision of full-text journal articles and the development of e-book provision will provide increased opportunities to access library services remotely. This will be further enhanced by the continued implementation of copyright legislation that allows alternative formats designed for people with visual or other impairments to be produced from digital files.

2.6 Challenges faced by the visually impaired students in accessing digital resources in academic libraries.

2.6.1 Failure to follow Web accessibility initiative (WAI) guidelines by library website designers

According to Lewis (2004, p. 8), although WAI guidelines have been developed and in place, these have not always been followed, and even where they have, they have been interpreted in many different ways. Tatomir & Durrance, (2010, p. 577) argue that in the digital era, access to websites and digital resources for mainstream technology users occur almost instantaneously. However, the load times for users of adaptive technologies remains unacceptably slow, often taking several minutes, rather than several seconds, for the resources to fully load. In spite of the fact that federal web accessibility legislation and international web accessibility initiatives have been enacted for over a decade and a half, a majority of library databases are largely inaccessible to adaptive technology users and fail to meet basic accessibility requirements established under federal law and international standards (Tatomir & Durrance, 2010, p. 577).

Byerley, Chambers, & Thohira (2007), conducted a study entitled ‘Web-based Library Databases’. The study covered 12 online databases commonly subscribed to by libraries, such as Lexis-Nexis, ProQuest, and FirstSearch . After a comprehensive questioning of each participating company, the researchers found that there was a persisting gap between accessibility legislation and guidelines and its actual integration into online products and services. For example of the 12 companies studied, the study found out that only 4 – ABC-CLIO (a publisher of reference works for the study of history and social studies in academic, secondary school, and public library settings, Elsevier, JSTOR, and ProQuest, stated that their products met all of the accessibility guidelines established under Section 508 of the Rehabilitation Act and the Web Content Accessibility Guidelines (WCAG) standards. Additionally, the study found out that only 7 of the 12 participating companies had included and were continuing to integrate accessibility features into their products (Byerley, Chambers, & Thohira (2007)).The authors further indicate that only 5 of the companies studied indicated that accessibility issues were given low priority due to the difficulty and expense of complying with federal and international standards. Subsequently, the study concluded that while a slight majority of online databases incorporated some accessibility features into their online products, due to the lack of comprehensive usability testing with disabled users, these features are most likely not be sufficient for persons with disabilities to easily or fully utilize these online products (Byerley Chambers, & Thohira 2007).

According to Lee (2005) it is estimated that approximately 80 percent of online and digital materials are inaccessible to persons with disabilities, due to text, icons, images, links and document formats which are unreadable by adaptive technologies. Most of the inaccessible information constitutes materials necessary for education and employment. Obviously substantive barriers continue to impede the integration of accessibility features into online and digital environments. The implication is that federal laws and international initiatives have not been successful in fostering industry compliance. This is further evidenced by the various studies done by (Byerley, Chambers, & Thohira 2007; Shirley & Douglas 2008).

Finally, Burrington (2007) argues that just like many other people, visually impaired persons like to satisfy their information needs through the internet and for those who use screen readers this is not always easy as so many websites are not fully accessible. “For those of us who use screen readers it is not always easy as so many websites are not fully accessible to us” (P. 765).

2.6.2 Design of the library web interface

Stewart, Narenda, & Schmetzke (2004) argue that the migration of library indexes and databases to the online environment has created unprecedented opportunities for people with certain disabilities; people with “print disabilities”, who, because of lack of sight, cognitive disabilities (such as dyslexia) or insufficient motor control, cannot independently access printed works. Assistive input and output devices, such as modified computer keyboards, audio web browsers and screen readers with speech or Braille output, provide access to electronic text. However, the extent to which these new opportunities become realized depends, for a good part, on the design of the web environment (p.266). More so, the same authors note that from the perspective of accessibility, design of the library interface matters as much in the online world as it does in the physical world. Even the most advanced assistive devices cannot overcome the barriers associated with inaccessible design. On the same challenge, Brophy & Craven (2007, p. 955) note that unless accessibility is built into the design of a site, even the most up-to-date assistive technologies will still be unable to access it. The same authors add that different types of assistive technologies present different problems to accessing a Website. Observations in the Non-visual Access to the Digital Library project (NoVA), Craven & Brophy, (2003, p. 118) revealed problems specific to assistive technologies, such as pixelated text when using magnification and screen readers not reading out every link on a page because of poor interface layout.

It is often difficult to differentiate meaningfully between the “library” and other information services in the electronic landscape. Indeed, there is considerable evidence that at least some groups of users tend to try to resolve their information needs first by use of general search engines and only move on to library services when that source fails (Brophy and Craven, 2007, 954). It is unlikely, however, that they would distinguish any one set of services as a

library. Increasingly, portals are being developed to provide an access point to a range of such services, and it is now perhaps more meaningful to speak of the digital library as encompassing a wide range of services accessed through a portal, which may be “internally” or “externally” provided and mediated. Whatever the focus, ensuring access to as many people as possible makes good business sense as well as being ethically and legally sound. However, in this regard, Arms is quoted to have said;

“digital libraries are of little value unless they are easy to use effectively” (Arms 2000 p. 143)

This is particularly true for users with a visual impairment, who in the past have all too often been treated as a side issue in designing the user interface. If design for all principles are fully implemented across all library IT systems, including their Web sites, all users will be provided with an equitable level of access to information and services.

Additionally, Brophy & Craven (2007, p.953) access to digital library resources can be broken down into user-related processes; resource discovery, location, request and delivery. In order for resources to be discovered they must be described (i.e. metadata), organized and then utilised/ used. For that to take place there is generally a user interface. The design of the user interface is integral to the success of the mentioned processes above and adopting a “Design for All” approach can help ensure a positive experience for as many people as possible. However, despite WAI, reports show that people are still facing accessibility and usability problems (Lewis, 2004; Dermody & Majekodunmi, 2010). Finally, Lee assert that , many of library websites cannot be accessed in particular by people with visual impairments due to their highly graphical and design (Lee, 2005, p. 50).

2.6.3 Document Delivery

Byerley, Chambers, & Thohira (2007, p. 522) notes that the most common formats for document delivery in online databases are HTML full-text, html full-text plus graphics, and PDF (portable document format). Of these formats, html full-text is considered to be the most accessible, and it is the preferred platform by the disability community. Much as Adobe Systems makes significant advances toward improving the accessibility of PDF files. Still,

PDF is problematic because many databases contain legacy PDF, text PDF and image PDF generated with earlier versions of Adobe that are not properly tagged for screen readers. Moreover, PDF files that have been created with newer versions of Adobe are only as accessible as their tagging allows. The authors add that, many vendors of web-based databases, especially the aggregators are at the mercy of the contributing journal publishers who may provide the journal content in an accessible or inaccessible format. When vendors do not have control over the structure of the full-text content, they cannot guarantee that it is accessible (Byerley, Chambers, & Thohira (2007, p. 522).

Slatin & Rush (2003), noted that not all text-based document formats are accessible. Just like HTML based documents, text-only PDF files may or may not be accessible with screen readers depending, on whether they were created with the proper tags that identify their structural elements. In the same vein, Dermody & Majekodunmi (2011) argue that PDF documents that are not tagged well and are in form of images cannot be accessed by the screen reader, this was evidence in a study on online databases and the research experience for university students with visual impaired. In this study, a student noted that “*my biggest fear is finding the perfect PDF document for a research project but not having it in an OCR format, meaning that i cannot use a screen reader to read it*” (pp.154-155).

In line with this, Stewart, Narendra, & Schmetzke (2004) argue that in order to gain understanding of a true picture of the accessibility of documents, even those PDF documents that are text-based need to get closely scrutinized. In addition, the authors add that it is quite conceivable, if not likely that document formats and thus their accessibility vary among the different databases offered by the same vendor. While vendors typically develop their own database interfaces, the different databases they offer may have been procured from different sources, each favouring a different format for their full-text documents (Stewart, Narendra, & Schmetzke, 2004).

According to Brophy & Craven (2007) using FLASH, JAVA Script, and PDF is a problem particularly to those using screen reading technologies. Access to these proprietary formats has generated a great deal of discussion among Web developers and designers and accessibility experts. One argument is that although these formats are much more accessible, many people are either not aware of this or are not prepared to try and use them because of a

bad experience in the past. Another argument is that although these formats are “technically” accessible, they are not necessarily usable yet and may also require the use of the most up-to-date versions both the format itself and the assistive technology to render them accessible (Brophy & Craven, 2007, p. 963).

Additionally, Kathy, Hyzny, & Richard (2003, p. 103) assert that Adobe Acrobat produces a PDF file that amazingly retains the look of the original document. This “page scan” cannot be read by screen readers. Moreover, Adobe Capture performs an OCR scan, but when it cannot decipher a letter, it imbeds images of unrecognized characters. These characters look like text, but are actually images and screen readers cannot read these “image” characters unless one edits these “image” characters to make them into text. Proofreading and editing such PDF files is extremely time consuming. Similarly, Whitehouse, Dearnely, & Murray (2009, p. 177) note that PDFs that are inaccessible are in form of scanned images of text that cannot open with screen readers and appears as a mass of jumbled text when they open.

2.6.4 The challenges of using assistive technology

Vigo, Kobsa, Arrue, & Abscal (2007) claim that assistive technologies play an important role in the application of accessibility guidelines. In their evolution over the years, the visually impaired have increasingly gained control over formerly completely inaccessible content, thus making browsing easier for users with disabilities. However, every new version of an assistive technology addresses new accessibility issues. Strict version control is therefore necessary since several guidelines are contingent on different versions of user agents. On the other hand, even if guidelines are fulfilled, some versions of Assistive Technologies (ATs) may not convey the content of a web page adequately. For instance, even when a change in the language of web content is correctly flagged using the language attribute “checkpoints 4.1 and 4.3 in WCAG”, the content will not be adequately read out to users who are running older versions of for example 5.0 of the Jaws screen reader since those are not capable of recognizing this HTML attribute (Vigo, et al 2007). Similarly, Lewis argues that something that is not unique to VIPs is that users have to learn how to use any solution. It may only be simple to use if there has been some investment by the user in doing. This is likely to be

accepted for a frequently used service, but for occasional use this will act as a barrier (Lewis, 2004, p. 24).

According to Chandrashekar & Caidi (2007, p. 245) a visually impaired person (VIP) uses a screen reader software that reads out the text content on the computer screen serially through a voice synthesizer or converts it into refreshable Braille display. However, there are some inherent problems with the use of screen reader software. Since the user hears only small portions of text at a time, there is a loss of context. Hearing, repeating a portion of text such as headers and links on every page leads to information overload. Similarly, Vigo, et al (2007) note that Navigation is slowed down when navigation bars, menus or banners are read time and again. More so, information access is sequential, unless a page is tagged appropriately to indicate tables, headings, lists (Chandrashekar & Caidi, 2007, p. 245).

A study on web accessibility conducted by Brophy & Craven(2007, p. 961) found out that Screen reading technologies pose problems when using Web sites. The study further shows that people who were using assistive technologies mentioned various problems they experienced while accessing the Internet. According to Pilling, Barrett, & Floyd, the problem of not being able to afford the more up-to-date technologies such as JAWS by the visually impaired, lack of support and training in the use of assistive technologies are additional barriers to access of web resources (Pilling, Barrett, & Floyd, 2004). More so, Brophy & Craven (2007, p. 955) note that barriers can also arise because many disabled people cannot afford, or are not motivated, to upgrade their assistive software to the latest version. JAWS, for example, is a powerful screen reader that provides the user with many options in terms of Web site navigation, however, it is an extremely complex (and expensive) piece of technology that requires initial training in its use if its potential is to be realized and may also require further training whenever a new version is released. Observations made during the NoVA project confirmed that success in using some of the more advanced features provided by screen reading technology was often dependent on awareness, training, and experience (Craven & Brophy, 2003, p. 118). This issue has often been neglected, with designers making unwarranted assumptions as to what will be available to the user. Thus, a considerable amount of effort expended on checking whether current versions of popular products “work” (in accessibility terms) has ignored the issue that real users may be accessing current Web pages with old software.

It is noted by Goble, Harper, & Stevens(2000) that, a web page is a user agent of accessing information and a method used to present information to the user. For sighted people a user agent may refer to a web browser, for VIP this may also include a web browser and the device (assistive technologies) that presents information in an appropriate way such as a screen reader. The user agent could be a screen reader which reads text out a loud text by text and line by line in a serial way and forces readers to listen word by word instead of moving around the page between headings and frames. Although screen readers enable VIP to read text from the screen moving in a serial way does not support travel or mobility.

Lastly, Carey, (2007) notes that as librarians will appreciate more than any group, other than classical philosophers, the key to efficient navigation is sound taxonomy, this is even more the case for VIPs who cannot rapidly scan vast arrays of classes of data. In the computer environment, screen readers cannot easily convey, either in voice or Braille display, the spatial aspects of data classification, and even where the metadata does not rely upon spatial clues, the choices offered are too many to be efficiently retained by a user who listens or touches exclusively one line at a time (p.774).

2.6.5 Navigation links and Organization of the library web pages

Vigo, et al (2007) point out that navigation is part of web browsing and consists in moving around in an electronic environment, deciding at each step where to go next. Tatomir & Durrance (2010) note that lack of skip navigation links and jump-to links that direct users to the most important page elements present barriers to adaptive technology users who cannot simply scan quickly over a page. Thus pages lacking skip navigation/jump to links create serious barriers to use, making it difficult and time consuming for adaptive technology users to interact with the resource. Users can easily become lost on a page and have to return to the beginning of the web page and reread all previous sections of that web page in order to find the place where they became lost (p.582).

According to Lewis (2004, p. 21), the mental process of navigating an environment for a person who is totally blind is affected by the fact that they are unable to scan their

surroundings visually. In the physical world, navigating from one place to another means following a set of sequential steps. The significant factor here is that the process is serial. Each step follows the last. This applies equally to electronic interfaces. Craven & Brophy (2003) in a study on Non-Visual Access to the Digital Library (NoVA) found out that the parallel design of websites is a significant barrier to use by visually impaired people. For example they describe a website with over a hundred links organised on a single page, not displayed in any particular order, because there was an assumption that the user would scan it for the one they want. Additionally, In the study carried out on the accessibility of online databases Dermody & Majekodunmi (2011, p. 155), students indicated that the amount of links on the result page in databases was a barrier and interfered with their screen readers. Students indicated that the amount links leads to confusion and makes searches longer. For example for every extra button that can be clicked, the likelihood that people will get confused increases and for screen reader users, the more busy the database interface, the risk of not being able to keep pace (Dermody & Majekodunmi, 2011,p.155) .

Brophy & Craven (2007, p. 961) in their study on web accessibility further note that respondents cited problems relating to the organization of the page, leading to an inability to navigate the site. The authors note that Web sites and Web pages are organized in a way that is not logical to navigate using tab keys or that had been designed with too many layers, which makes it difficult for blind to find the information they are looking for. For example, in the same study, it is indicated that single pages that were overly long were mentioned by respondents as a problem for some users because they had to keep scrolling down the page and possibly up again, making it a time consuming process. For people using screen reading technology, poor use of titles for Web pages prevents them from quickly establishing which page they are looking at (the screen reader can read out the title first). An example of poor use of titles is where each page of a site simply gives the name of the company, thus not helping visitors to quickly establish which part of the site they are in (Brophy & Craven, 2007, p. 964). Similarly, Power & Lebeau (2009, pp. 61-62) assert that although the homepage and second level links are easy to find, often a well labelled link sat at the bottom of a home page or service page. Many home pages currently use a design of three to four columns. Placing the needed link at the bottom of the last column forces a person's screen reader to read an entire page to find the link, unless the web designer has included special code directing the screen reader to go directly to that link. Furthermore, terms that have been

alphabetized in a list, such as “User with Disabilities” and “Services for People with Disabilities,” will necessarily force the user down to the bottom of a sometime lengthy list of choices, again forcing the user of a screen reader to waste valuable time finding the link to information (Power& Lebeau, 2009).

Tatomir & Durrance argue that, the limited use of incompatible programming languages and scripts such as Java, are inaccessible to adaptive technologies, causing the adaptive software and equipment to freeze, crash or fail when interacting with pages that include these programming languages. Obtaining compliance with this feature of the Tatomir Accessibility Checklist (TAC) may prove difficult, as programming languages like Java allow web designers to produce inexpensive easy to engage with web pages with graphic user interfaces. However, the authors claim that if web designers limited the use of incompatible programming languages, then more web pages and digital resources would be accessible, and fewer alternative accessible versions of web pages would have to be created and maintained (Tatomir & Durrance, 2010, p. 582).

As noted by Craven & Snaprud (2005), the European Internet Accessibility Observatory Project (EIAO) study on user requirements and usability showed that keyboard access (shortcut keys, tab navigation, and/or keyboard navigation) was the most frequently cited accessibility problem experienced by the respondents. Problems either with lack of ALT text, poor use of ALT text, or an inability to navigate the site were also cited (Craven & Snaprud 2005). Brophy & Craven (2007) argue that, these particularly pose challenges for someone using screen reader who needs to use keystrokes to navigate a page that has been designed to be navigated using a mouse. For example, this may force the blind to listen to the whole page being read rather than being able to tab logically to a relevant link, or through the main headings on the page Brophy & Craven (2007).

Tatomir & Durrance (2010,p.581) assert that clearly labelled page elements, clearly labelled links, windows, icons, frames, text boxes, and dropdown menus are nearly as important as the incorporation of skip navigation and jump-to links into a web page. The authors argue that if a page item is not clearly identified or not marked in any way, it is difficult for the adaptive technology and its user to easily identify these items on a web page. As a result, important information and page features may be passed over or be left unnoticed by adaptive

technologies and thus reducing the amount of accessible information available to adaptive technology users. The authors further note that, there is a problem of absence of identically named page elements where many web pages and digital materials use the same name to label links, icons, windows and menus. For example, a web page may contain to “home” links, with one link sending a user to the web site’s home or main page, while another home link will send the user to the user’s registered home page. In cases where names are used more than once on a web page, adaptive technologies will often, after encountering an item with a given label, skip over all other items with the same label. Therefore, users of assistive technology often miss important information and page features (Tatomir & Durrance 2010, p.583).

Westin, (2005, p. iii) notes that in the case of the Web, the adaptive technological problems can be particularly vexing because of its stateless, two-tiered (that is to say, client/server) architecture. The adaptive technologies reside on the client side, but the Web content can be designed and served with no knowledge of how the adaptive technology (AT) is configured, or even that such is being used. Consequently, Web content that is designed without regard for such technologies can render the content useless for the end user

2.6.6 Legislative challenges

Rae (2009, p.6-7) argues copyright affects the access of digital library resources to the visually impaired. The author notes that being able to find a work in alternative format does not necessarily lead to access. Licensing agreements of library materials in alternative formats can pose a challenge between the library and the rights holder. The strategies or tools that are used to control who can access digital content and how they can use may pose a challenge to people with print disabilities. For example Digital Rights Management (DRM) might be as simple as putting a copyright notice on a document, or it might go much further and encrypt a document so that you must input a special code (or key) to read it, and only on a designated machine. The level of DRM applied depends on many factors, including copyright, distribution rights, business models and the inherent value or sensitivity of the information. As noted by DAISY consortium board of directors (2007), DRM limits the legitimate use of digital publications by persons who are blind and print disabled. Persons

who use Assistive Technology commonly manipulate digital publications in ways that most people without disabilities do not understand. Moving an eBook to a portable device with refreshable braille, or copying it to a hand held device for reading "on the go" are two simple examples of common legitimate usage that are prevented by DRM. From a content management or library perspective, DRM can complicate or make impossible the upgrade of digital collections to new and future technologies (DAISY consortium board of directors, 2007).

2.7 Challenges of provision of digital library resources by the library staff to the VI students

2.7.1 Library subscribed Online Databases

According to Byerley, Chambers & Thohira (2007), it is noted that most databases are inaccessible by VIP and this affects the level of provision of electronic resources in academic libraries. The authors further note that although most database vendors know section 508 accessibility standards they do not take accessibility issues seriously. For example the authors affirm that Lexis-Nexis database understands the need to meet Section 508 accessibility standards but does not make accessibility a high priority for customers outside the federal arena. Whitehouse, Dearnely, & Murray (2009) assert that while some publishers are taking considerable steps to be helpful in creating accessible databases others are not minding and this has led many learning support staff (librarians) to struggle, to deliver the level of service they aspire to provide to the visually impaired clients. Regardless of the fact that librarians have all the information to evaluate the databases, it is the reality that most librarians lack the time, resources, and/or skills to evaluate the degree to which their library subscribed databases are accessible to their disability communities (Byerley, Chambers & Thohira, 2007).

On the contrary, Byerley, Chambers & Thohira,(2007) note that, the inaccessibility of databases to some extent, the blame for this is with librarians themselves especially those charged with the selection and procurement of databases.

“If librarians do not consider accessibility when selecting online resources, and if they do not give the impression that accessibility counts, why should vendors consider it a selling point?” P.253.

2.7.2 Work overload

According to Whitehouse, Dearnely, & Murray (2009, p. 175), librarians have a vast bulk of other duties on top of supplying materials in an alternative format and serving visually impaired library users. In a study carried out by the same authors on Still “Destined To Be Under-Read”? Access to Books for Visually Impaired Students in UK Higher Education”, Alistair McNaught (senior manager) of TechDis, reported that librarians have at least six other duties to take care of.

2.7.3 Librarians expertise, training and neglect

According to Stewart (2005) while librarians may acknowledge the need for accessibility with regard to their libraries’ own web pages, they rarely raise this issue when selecting electronic indexes and databases for procurement from outside vendors. One significant reason for this neglect is insufficient information about the competing products when it comes to the question of accessibility and usability. The vast majority of librarians have neither sufficient expertise with assistive technology nor the time to acquire it. They thus depend on others to provide this information (p.266). Many librarians lack training in the use of the technology, tools, and sources of alternate formats and adaptive or assistive technolog (Epp, 2006, p.423). Moreover, Whitehouse, Dearnely & Murray (2009) argues that, there are seem to be insufficient or lack of formal training to non-existent training in libraries on how to serve students with print disability. The authors note that most librarians get the skills at conferences, seminars, or are self-taught, or learning on the job from colleagues. This renders their services to blind community challenging. Besides, the steep learning curve involved in acquiring the necessary skills makes it impractical/prohibitive in terms of time demands (Byerley, Chambers, & Thohira, 2007, p. 526)

According to, Johnson, (1999, p. 424) human resources play an important role in a student's human behaviour. However, Wade (2003, p. 311) argues that, while librarians are in the business of helping people, they are also susceptible to prejudice and misconceptions about the visually impaired. Many librarians are simply unconvertible around any person with a disability with perhaps a feeling that there will somehow offend the person. This affects the provision of services to the blind people. More so, many librarians inadvertently impede information access and provision by not understanding the visually impaired student's particular needs (Saumure & Given, 2004). Moreover, another difficult situation faced by librarians serving the blind is caused when a user with a disability does not want to use the accommodations that the library has created. In this case, the librarian has to make his or her best effort to help, but then the choice is left with the user alone, if that is what the user wants (Wade, 2003).

In regard to this obstacle, Schmetzke (2001) advises that librarians need to develop more accessible library Web sites, library catalogues, and online databases. As an example of cooperative training, the British Columbia College and Institute Library Services (CILS) in British Columbia, Canada, delivers regional workshops for academic librarians, disability service providers at higher education institutions, and public librarians in the province to learn about the information environment for people with disabilities (CILS, as cited in Epp, 2006). The participants learn about public policies regarding access to information, including copyright law. They discover emerging alternate formats and accessibility issues relating to library catalogues, online reference databases, and library literacy programs.

2.7.4 Legal restrictions

Roos (2007) asserts that as a general rule, copyright vests in the author of a published work, but publishers enter into agreements with the authors whose work they publish that provide among others, for the transfer of copyright in the published works to the publishers on certain terms. However, these terms require a license to be granted both by the authors and publishers. The process can become very complex in cases where the original publisher transfers those rights pursuant to a merger or takeover or if, in case of smaller commercial concerns, they are wound up and the rights are not disposed of in a manner that makes it

possible to trace the current holder. This affects the provision of services to the visually impaired (879).

Nicholas, as cited in Whitehouse, Dearnely, & Murray (2009, pp. 171- 174) argue that although 2002 Copyright (Visually Impaired Persons) Act allows a print text to be digitized without permission from the rights holder, provision of a digital copy does not already exist. For example a third category of complaint relates to restrictive procedures insisted on by publishers. In their study on Still “Destined To Be Under-Read”? Access to Books for Visually Impaired Students in UK Higher Education, the authors referred to their respondent who noted that publishers have predetermined rules that books should only be read on one computer, this was not clear as it did not specify whether providing the computer’s IP address fitted in with best practice, and the students involved could not be provided and have access of an electronic version for example downloaded version and read from home. Furthermore, it was ridiculous support workers were given one chance to download a book from home. The respondents in this study further reported that in an instance where support workers are given one chance to download a book from an e-shelf, and when something went wrong and they needed a second attempt, unfortunately the publisher was unsympathetic (Whitehouse, Dearnely, & Murray, 2009). Additionally, in the same study, respondents highlighted issues of cost. While acknowledging that some publishers provided copies for free, respondent number 35 reported that one publisher asked for £182 for the text file of a book, which, in fact was available on Amazon for £20. There was some concern here that it was discriminatory for visually impaired students to have to pay for an electronic copy of a book which a student without a print disability could borrow for free from the university library (Whitehouse, Dearnely, & Murray, 2009, p.175). The same study also identified a challenge of lack of standard license terms. Respondent number 12 noted that variable license terms added to the administrative burden on staff who were already very pushed for time, and that terms could be restrictive, for example a publisher stating that a book could only be used by one student even though another visually impaired student might need to use it was a challenge to provision of library services to the VIPs .

2.8 Chapter conclusion

Although the digital library resources and the Internet are a precious source of information and offers great availability of services, all the above drawbacks can discourage the VIPs from accessing on-line services. Accessibility is essential for those who use assistive technology to navigate digital library resources, search for information and exploit the entire benefits electronic library resources offer to library users irrespective of their physical disability. In this chapter the researcher has presented literature related to the topic; first the definition of terms commonly used in this research are presented, secondly, the different forms of assistive technologies used by visually impaired students to access electronic resources are presented, the benefits offered by digital library resources to the visually impaired students, challenges of accessibility of digital resources by the visually impaired students and finally the challenges faced by the library staff in providing the visually impaired students with digital library resources in academic libraries.

The next chapter (chapter three) presents the methodology use while carrying out this study.

Chapter Three: Methodology

3.1 Introduction

This section describes the methodology that was used when carrying out this research. It describes the research paradigm, research design, models of disability, research method, sampling methods. Data collection methods and instruments, and method of data analysis which the researcher employed in this study and the rationale for using each of them. The section further describes the study population, data quality and control, ethical considerations, limitations of the study and lastly chapter conclusion.

It should be noted that, the researcher over used the book Research methods in information by Alison Jane Pickard (2007), the book helped the researcher to gain understanding in the research process, especially research paradigm. Therefore, in some sections it is extensively referenced.

3.2 Research Paradigm

A paradigm is defined by Kuhn as “the entire constellation of beliefs, values, and techniques shared by members of a given (scientific) community” (Kuhn, as cited in Pickard, 2007, p. 6). A paradigm consists of “ontology”, the nature of reality; “epistemology” the philosophy of how we can know that reality; and “methodology”, the practice of how we come to know that reality (Pickard, 2007, p.5). Like other social science disciplines there are three major research paradigms in information science. The three major research paradigms are positivism, post-positivism and interpretivism as presented here according to (Pickard, 2007, p.6). This study used interpretivism to guide the research process, but however, the researcher will first present the other two paradigms in brief.

3.2.1 Research Positivism Paradigm

In brief this paradigm was attributed to the French philosopher, Auguste Comte. The proponents of this paradigm adopt realist ontology, they believe in social reality existing independently of those creating it (Pickard 2007). The methodology for this paradigm is mostly experimental or manipulative with quantitative approach and analysis of variables.

3.2.2 Postpositivist research paradigm

The ontology of postpositivism is critical realism. Postpositivists believe in the existence of social reality independently of any external being but with recognition that the reality is subject to uncertainty. Epistemologically – it can be described as modified objectivist/dualist view, this means that the researcher is responsible for the interpretation of the discovery with objectivity. The objectivity is showed by external validity. Postpositivists employ modified experimental or manipulative methodology, with quantitative and/or qualitative approaches and variables analyzed. The research purpose for using this paradigm is either for prediction or control or explanation leading to generalizations (Pickard, 2007, p.12).

3.2.3 Interpretivist research Paradigm

The ontology of interpretivism is relativism. Interpretivists believe that there is no universal and multiple realities and realities are constructed within the social context (Pickard, 2007, p. 12).

Interpretivist epistemology is described as subjectivist/transactional. The researcher and the subject are dependent on each other and are both changed by the experience and knowledge as a result of interaction, time and context (Pickard, 2007, p.12). In short, the tenet of interpretivism is that people are involved in interpreting their changing world.

The methodology for this paradigm is usually empathetic interaction. The researcher interacts with the object of the research, then, reality is constructed and interpreted by the researcher.

The approach usually is qualitative and the focus of research is to understand or reconstruct leading to transfer of findings (Pickard, 2007, p.12).

Interpretivism is categorized into two: empirical interpretivism, a human inquiry approach which examines natural social phenomena, while the second one, critical theory which investigates ideologically oriented social structures (Pickard, 2007). This research took Empirical interpretivism that deals with investigation of natural setting of the social phenomena (Pickard, 2007, p.11).

Interpretivists, think that to comprehend others is to understand the meaning of what they do and this is possible by simply understanding them in their own terms (Fay, 1996, p. 113). They seek to understand the entire context both at the macro and micro environmental level (Pickard, 2007, p.12).

In this study, interpretivism was used to guide the research process for example the data collected from the respondents were treated and analyzed from the actor's (respondents') point of view. The researcher avoided her personal judgments or preconceived mind and all sorts of bias about the reality / responses elicited.

3.3 Research Design

3.3.1 Qualitative research design

Research design is defined by Creswell (2009) as “plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (P.3).” Creswell further explained that in social science research there are three distinct research designs: qualitative, quantitative and mixed methods.

Qualitative design is concerned with understanding how people interpret their experiences, how they construct their worlds and what meaning they attribute to their experiences (Merriam, 2009, p. 5). The characteristics of qualitative studies include the search for meaningful and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigation strategy, and the end product being richly productive (Pickard, 2007, p.39).

According to Creswell (2009), qualitative research is used to investigate and understand the meaning of individuals or group attribute to a social or human problem. It uses open-ended questions in qualitative interview questions and presents the research results in words in a relatively flexible structure. It is an inductive style with small samples.

The researcher used a qualitative research design. The research design was used because the problem in context requires holistic, in-depth investigation of a phenomenon or situation from the perspective of all stakeholders involved (Pickard, 2007, p.93).

Qualitative design was used as already mentioned in mentioned because it allows the researcher to generate meaningful results with a small sample group, this approach is appropriate because the research is aimed to contribute to a better understanding of how the visually impaired access digital library resources and how librarians provide digital library resources to them in this era where most academic libraries are moving towards digitizing of their collection and providing library resources and services in an electronic / online form.

3.4 Research method

3.4.1 Case study

In this research, a case study was employed as a research strategy. This research strategy is generally preferred when answering “how” and “why” questions about a particular topic(Yin, 2009, p. 2).

According to Noor (2008), case study is preferred when the questions are targeted to a limited number of events or conditions and their inter-relationships. In line with this Yin(1986) suggests that the term refers to an event, an entity, an individual or even a unit of analysis. It is an empirical inquiry that investigates a contemporary phenomenon within its real life context using multiple sources of evidence.

Anderson (1993) noted that a case study is chosen as a strategy because it is not intended as a study of the entire organization rather it is intended to focus on a particular issue, feature or unit of analysis in order to understand and examine the processes and activities in organizations.

In this study the unit of analysis for this case study was “*accessibility and provision of digital library resources by and to the visually impaired in academic libraries*”. This was assumed as a current phenomenon that had been initiated and opened for discussion by and within libraries especially in academic libraries where access and provision of library services has moved from traditional to electronic or digital libraries taking into account information access and provision for all library users irrespective of anyone’s disability.

The researcher chose to investigate the accessibility and provision of digital library resources to the visually impaired in academic libraries using the university of Oslo which is considered as part of the entire library focusing on the small group of library users who have special needs of access to and provision of digital library resources. This research sought to identify the means and technologies used by the visually impaired to access digital library resources; to examine the benefits or opportunities of digital library resources if any and challenges in the access (students) and provision (staff) of digital library resources to the visually impaired students in academic libraries. Lastly, hypotheses and further areas of research will also be identified. Therefore to get the real experience from respondents who are familiar with access (students) and provision (staff) of digital library resources/electronic resources, a case study among other research methods seemed a good option.

3.5 The models of disability

There are basically two distinct models of disability which explain the condition of disability in public discourse. These are; the social model and the medical model. According to both Carson (2009) and Danforth (2006), the medical model perceives disability as individual inability to perform certain tasks. Through the medical model, which is also known as the functional limitations model, disability is viewed as “an individual phenomenon of psychological, physical, or behavioural deficit” (Danforth, 2006, p. 344). The emphasis of the medical model is placed on the person’s physical, biological impairment as the source of the individual’s limitations. The model focuses on working with the individuals to improve their level of functioning in specific areas, in an effort to “correct” an assumed deficiency (Danforth, 2006). According to Danforth, the medical model does not only encourage

societies to look at disabled as abnormal but also implies that the social status of those with disabilities is somehow lesser and that “there are persons who should be different than who they are” (Danforth, 2006, p. 353). Similarly, Carson (2009, p.4) refers to medical model as “personal tragedy model”. In other words, the model understands disability as an individual problem. For example if somebody has an impairment (visual, mobility or hearing impairment) it is understood as his/her disability. The model regards the difficulties that people with impairments experience as being caused by the way in which their bodies are shaped and experienced (p.4).

On the other hand, the social model (which emerged from the disabled people themselves) is primarily a result of society’s response to the disabled which makes them feel socially isolated and oppressed (Carson, 2009, p.4). Through the social model, disability is understood as an unequal relationship within a society in which the needs of people with impairments are often given little or no consideration (Carson, 2009, p.4).

In this research, the researcher preferred to use the social model rather than the medical model because the former explains the topic under study more exhaustively than the latter. This is reflected in the subsequent chapters of this thesis.

According to Carson (2009) social model perceives disability as caused or imposed by society. Therefore according to the social model, people are disabled due to failure of social organisations to provide facilities which enable every citizen to participate in society activities. In short, an individual is disabled if the society fails to take into account the needs arising from his or her physical or mental inabilities. In addition, from the social model perspective, disability is considered to be a social problem which may arise from social culture and beliefs rather than personal traumas. Thus, this model explicitly disassociates disability from the individual and attributes it to the society. According to the social model, people with impairments are disabled by the fact that they are excluded from participation within the mainstream of society as a result of physical, organisational and attitudinal barriers. These barriers prevent them from gaining equal access to information, education, employment, public transport, housing and social/recreational opportunities. The social model further argues that these barriers have nothing to do with individual disabled people’s bodies, instead they are created by people so it is possible to remove them (Carson, 2009).

Additionally, while many individuals have physical or sensory impairments or learning difficulties or are living with mental health needs, it is not the individual's impairment which creates disability but the way in which society responds to these impairments. Carson presents illustrative examples of social model's perception of disability where he says that if a wheelchair user cannot climb stairs, then a ramp or a stair lift should be fitted or if a blind person cannot read written information then the solution is to provide him/her with an alternative reading aid such as audio or Braille (Carson 2009, p.18). In relation to the above, (Simpkins, as cited in Lewis 2004, p. 21) gives the example of a disabled person who is not able to use a bus. In the medical model, the problem lies with the person's condition preventing him/her from using the bus, whereas in the social model the problem is the design of the bus which prevents him/her from accessing it.

The researcher regards (or we regard) the social model as relevant to the topic under study because lack of access to and provision of digital library resources to the visually impaired in academic libraries is seen as a barrier to the visually impaired. Therefore the barriers that prevent them from accessing digital library resources should be addressed. It may be claimed that if people with disabilities are to be able to effectively participate in the activities of the mainstream society, which is their human right; changes in the way society is organised have to be effected. Additionally, it may be claimed that if conditions that sustain social disability of access to library digital resources are allowed to persist, then the visually impaired cannot function just like any other person with normal vision. Lastly, using the social model, disabled have a right to be part of society and should access and be provided with all the necessary information services the non disabled people have access to.

3.6 Research sampling technique

3.6.1 Purposive Sampling

In this study, purposive sampling technique was used to select the library staff participants. As defined by Chambers & Schutt, purpose sampling is a non-probability technique in which sample elements are selected for a purpose usually because of their unique position (Chambliss & Schutt, 2010, p. 123). Patton noted that the logic of purposive sampling lies in

selecting information-rich cases for study in depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of research. This sampling technique involves studying the entire organisation of some limited group or a subset of a population. It targets individuals who are very knowledgeable about the issues under investigation (Patton 2002, as cited, in Pickard, 2009,) In this study purposive sampling was used to select library staffs who particularly serve visually impaired students and those who work on designing and responsible for providing access to digital library services for the university library. An email requesting for their consent was sent to them before the day of the interview.

3.6.2 Snowball sampling

Chambers & Schutt (2010, p.124), defines snowball sampling as a method of sampling in which sample elements are selected as they are identified by successive informants or interviews. Pickard (2007, p.65) defines snowball sampling as an approach where there are no prior criteria, the sample grows gradually in the sense that the researcher begins with key informants who would direct the researcher to another eligible participant. With snowball sampling, the researcher identifies one member of the population and speak to him or her, the person identifies or points to other participants, they also identify others until the required sample is got (Chambliss & Schutt, 2010, p. 124). This technique is useful for hard to find research participants.

Snowball sampling was used to select the visually impaired students. While conducting this research; From the start, the sample had included Doctorate in Philisophy (PHD) students, graduate and undergraduate students, however, undergraduates were left out since they confessed that they could not express themselves in English very well and were not using electronic library resources most of time. It is also important to note that initially, the researcher contacted the accessibility department at Oslo University College who later linked her to the accessibility department at the University of Oslo, the University of Oslo identified potential participants and consent was first thought until they accepted to be part of the study. The researcher made initial contacts with the key informants after consent to participate in the study through email; that is a visually impaired student, this blind student in turn pointed out

other potential respondents who in turn pointed out their friends as the research progressed until the required sample was got. The researcher terminated the sample when she discovered that there was no new knowledge added by the new respondents.

3.7 Research Population

The population included PHD and Masters visually impaired students from the library of the university of Oslo who were considered to have experience of using digital library resources / electronic information services in their academics and as they carry out research or write their thesis. One Library staff (Librarians) who serve in this library particularly who serves the visually impaired students was also included in the sample and one library staff who is in the group of designing or working on digital library services for the university library was also included in the sample.

3.8 Data collection methods

3.8.1 Interview method

The researcher used interview as the data collection method of the study. The interviews were conducted to study both the visually impaired students and staff as information mediators who deal with these users in providing information services to them. This was done to get the point of view about the topic under study from the selected group of participants.

Kvale & Brinkman (2009) noted that interviewing is an active process where the interviewer and interviewee through their relationship produce knowledge, this knowledge is produced in a conversational relation; it is contextual, linguistic, narrative and pragmatic (pp.17-18).

According to Pickard (2007) an interview is a descriptive qualitative and an in-depth data collection instrument. It is a useful means of accessing data from the respondents, it also allows respondents to be free and express their opinion, thought or experience in their own words.

Kvale & Brinkman (2009) notes that, interviews are particularly well suited for studying people's understanding of the meaning of their lived world, describing their experiences and self understanding and clarifying while elaborating their own perspective on their lived world.

An Interview can be structured or semi-structured or unstructured. In semi-structured interview, the interview is generally much more like a conversation than formal and it is what Kahn and Cannell, describe as "a conversation with purpose" (Kahn & Cannell, as cited in, Byrne, 2004; Marshall & Rossman, 1999). The interviewer records the interviewee's responses by either use of tape recorder or field note-taking. In addition, the interviewer aims at making informal observations on the state of the interviewee. Data analysis involves organizing and analyzing the accumulated mass of detailed information obtained from the field, typing, editing, coding themes, specifying links between responses, weighting the responses by counting their occurrences, and making interpretations.

The strength of this method is that it generates large amounts of data quickly; and when done well, it is able to achieve a level of depth and complexity that is not available to other methods particularly survey-based approaches (Bjerne 2004, p. 182). In addition, a semi-structured interview is so flexible in such a way that the interviewer can change the order of questions depending on how the interview is flowing unlike the structured interview which strictly follows a pre-determined order of questions. Also as mentioned above, the use of open-ended questions allows the respondent to express his/her opinion fully.

The disadvantage is that semi-structured interview consumes a lot of time and most especially the desire for a high degree of depth and detailed information through probing and prompting. Besides, the interview is prone to inconveniences and fatigues encountered in the interview process such as tiredness, weather, hunger, which might affect the quality of the interview and data gathered.

The interviewer borrowed recording equipment from Oslo University College (OUC) learning centre and was used in data collection. To ensure the equipment was used well, she first learnt how to use it before going to the field so that she is familiar and well conversant on how to use the equipment.

The researcher recorded the responses from respondents, however consent was first thought from the respondents and they all agreed to be recorded. All interviews took roughly 40 to 50 minutes.

3.8 .2 Pilot study

Teinjligen & Hundleynote (2001) defines a pilot study as;

“The term 'pilot studies' refers to mini versions of a full-scale study (also called 'feasibility' studies), as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule. Pilot studies are a crucial element of a good study design. Conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood “(p. 1).

Interview pilots were carried out for visually impaired students and librarians or facilitators. The reason for carrying out interview pilots was to practice the art of interviewing and to test from the respondents if the questions posed to them were understandable. Additionally, pilot study was conducted to test the device; recorder that was used to record the real interviews for further transcriptions.

An important point was noted by one of the pilots who complained that during the interview, the questions were not direct therefore needed more structuring to meet the target group of respondents. This helped the researcher to read through the questions again and make the necessary changes together with her supervisor.

The device worked well, the voices were clear and no technical hurdles were experienced.

3.8 .3 Data collection instruments

In the study, an interview guide was used as a reminder to ensure that all the basic issues for research were covered. It was used to guide the researcher in order to collect the necessary data concerning accessibility (visually impaired students) and provision (Library staff) of

digital library resources to the visually impaired in academic libraries. The first phase of the interview was conducted to visually impaired students.

A semi structured Interview guide for the second phase was drafted and used for library staff who serve the visually impaired students and also work in the group that designs digital library services/electronic information services for the university library; to get their opinions on the provision of digital library resources in academic libraries to the visually impaired students. Library staffs experience and advice was sought in order to enhance access to and provision of digital library resources to the visually impaired.

3.9 Research procedure

After the researcher obtained confirmation to carry out the study , instruments were pretested for the purpose of validity and reliability, data was then collected using the method discussed in the methodology chapter, the collected data was transcribed, compiled, analyzed and finally presented in the form of a report.

3.10 Ethical considerations

The researcher made sure to be careful with the questions during interview in order not to pose any question that would make the participants nervous. The researcher made sure she avoided causing physical or psychological harm to respondents by asking embarrassing and irrelevant questions, threatening language or making respondents nervous.

3.10 .1 Informed consent

According to Kvale & Brinkmann, informed consent entails informing the research participants about the overall purpose of the investigation. It involves obtaining voluntary participation of the people involved and informing them of their right to withdraw from study at any time (Kvale & Brinkmann, 2009, p. 70).

Respondents were informed about the procedures of the study and freely made their decision to participate or not. The information regarding the purpose of the study, benefits to the subjects, and expected duration of their participation as well as procedures to be followed were all explained to the respondents before the interview started. As part of the ethical issues, consent of the participants was sought and all the participants who agreed to participate the study were assured that their involvement in the study was purely voluntary and the results would be used for only academic purposes. The willing participants were further assured by the researcher that the information they provided would not be exploited nor misused during and after the research.

The researcher sought for consent by sending emails to the respondents and also by first asking for permission before taking any recording during data collection. Because most participants were visually impaired, they were again asked before interview took place, to consent verbally to participate in the study.

3.10 .2 Confidentiality

As noted by Kvale & Brinkmann (2009) confidentiality in research implies that private data will not be disclosed. In this study anonymity and confidentiality was strictly observed during description and reporting of findings. From the beginning of the research, the researcher made sure that respondents' privacy was respected (p.72).

3.11 Validity and Reliability

Kvale & Brinkmann (2009) assert that reliability pertains to the consistency and trustworthiness of research. The authors further argue that, reliability is treated in relation to the issue of whether a finding is reproducible at times and by other researchers (p.245).

As noted by Kvale & Brinkmann (2009, 246), validity pertains to whether a method investigates what it is purposed or intended to investigate.

Before the interview commenced, the interview questions were tested to ensure the questions yield the data the research expected to answer. In addition, the researcher sought views of the supervisor to make sure that valid instruments were administered and where necessary adjustments were made.

In qualitative research, Nolan & Behi (1995) suggest, the results of the findings should be presented back to the respondents and their views should be explored. Similarly, Kvale & Brinkmann (2009) argue that during the interview, the interviewer condenses and interprets the meaning of what the interviewees described and sends back the meaning to the interviewee. This is to give the interviewee an opportunity to reply for example they can say I meant this and not that. This process continues until there is only one interpretation left. The interviewer analyses the recorded interview and sends the interpretation of the analysis to the interviewees, they can now give comments on the interviewer's interpretations as well as elaborate on their original statement as a form of membership validation (pp.195-196). Although it is important to achieve a balance of power between respondents and the interviewer, Riley, advises that respondents should not be given too much power in relation to defining the research interpretations (Riley, as cited in Nolan & Behi, 1995).

In this study, the interpretation and results of the analysis were sent back to the participants to make sure that what they said during the interview was analysed well and is reliable. There were no major opinions concerning the interpretation of the findings. However, some respondents had some comments and agreement was reached by the researcher and the participants after discussion on phones. Where it was necessary adjustments were made, but these were minor.

3.12 Limitations of the study

There was difficulty in getting and making appointments with respondents both students and library staff. However, the problem was solved through the accessibility department of Oslo University College who connected the researcher to the University of Oslo and then the supervisor was able to communicate to some of the staff to link the researcher to those respondents who qualify to be included in the sample. Because the researcher used snowball for students, it was easy to indentify other respondent after the identification of the first respondent who linked the researcher to other potential respondents until the required sample was got. Purposive sampling (staff) also helped in getting respondents fast since the research knew the characteristics of library staff to include in the sample. This escalated the problem of time and therefore the researcher had to postpone the time for data collection.

Lastly, it would have been an interesting outcome if the researcher had included both visually impaired students and sighted students to compare their views. This was inevitable by the researcher due to limited time therefore; this research could not involve both groups.

3.13 Interview transcription

The data collected from interviews was transcribed every after interview when the research's mind was still fresh. This also allowed the researcher to note out important themes as they emerged from the data being transcribed (Pickard, 2007, p.177). It was rigorous and iterative because the audio recording was replayed several times in order to get all information transcribed.

3.14 Data analysis and presentation

For data analysis, the researcher used constant comparative analysis as explained below. This method was originally developed by Strauss (1987) for use in the grounded theory methodology of Glaser & Strauss (1967). The strategy involves examining data while comparing the data with all the similar/different data gathered during the fieldwork in order to develop conceptualisations of the possible relations between various pieces of data. The strategy demands that the creation of categories is driven by the raw data and not established prior, although it is inevitable that prior research will have identified some salient issues and therefore will influence the choice of important issues (Pickard, 2007, p. 241).

The original version of grounded theory stressed the idea that theory emerged from, and was grounded in data. Careful analysis of data items using the constant comparative method would lead to the emergence of conceptual categories that would describe and explain the phenomenon under study. However, Strauss revised his theory to still drive the coding from data but not also have a more structured approach. According to Strauss & Corbin (1998) coding is divided in three series of activities:

- Open coding
- Axial coding

- Selective coding

Open coding

As defined by Strauss & Corbin (1998, p. 101) open coding is the analytic process through which concepts are identified, their properties and dimensions are discovered in data.

It is the first phase of the analytic process where the researcher deconstructs the data, taking it apart and examining the discrete parts for differences and similarities (Pickard, 2007, P.243).

Asking questions and keeping a sharp eye out of similarities leads eventually to concepts that are in essence very similar, being labelled with the same name there by creating a category. Each category is then defined in terms of a set of discrete properties and dimensions to add clarity and understanding (Pickard, 2007).

Using interviews as data collection method, the data provided were transcriptions of in-depth conversations. After the transcription was done, the researcher read through the data and all the interview transcripts were coded. Different colors were used to mark the points that were related and the differences. Yellow color for example indicated related answers and red indicated different answers from respondents.

Axial coding

According to Strauss and Corbin (1998, p.123) Axial coding is the process of relating categories to their sub categories, termed as "axial" because coding occurs around an axis of a category, linking categories at the level of properties and dimensions.

Moving from general categories of concepts to related sub-categories is moving from open coding to axial coding. Handling the categories themselves is a more refined task whose aim is the identification of the conditions that give rise to a particular phenomenon and the context it occurs (Pickard, 2007, p. 243). The phase of axial coding is to search for links between categories, and checking the content of the category itself. This type of coding is conducted in tandem with data collection. The researcher started to analyze the data at the same time she was still interviewing. Therefore each interview was informed by the previous one.

Having coded the first interview transcript, each subsequent reading of this and other transcripts with the categories was carried out. The researcher read through interview

transcripts and new codes that were considered indispensable were added as the process of coding continued.

Repeated coding was performed to review interpretations, in the light of new data gathered and as new codes were generated, until no new knowledge were being discovered. For consistency of application the already established coded sections were compared with other similarly coded segments.

After all coding was finished, the related codes were merged and created a category.

Selective coding

Selective coding is the process of “integrating and refining a theory”(Strauss & Corbin, 1998, p. 143). It is the final stage of data analysis, where theory has reached saturation and no new connections, properties and relations are emerging from analysis. In this phase grounded theory is demanded to provide a section for recommendations and suggestions for further research.

3.15 Chapter conclusion

This chapter has laid down the research methodology used to conduct the study. It described the research paradigm, research design, models of disability, research method, sampling methods, data collection methods and instruments, and method of data analysis which the researcher employed in this study and the rationale for using each of them. The section further described the study population, data quality and control, ethical considerations, limitations of the study data analysis and presentation method used.

The next chapter is the presentation, discussion and analysis of data collected from the field.

Chapter Four: Data presentation, discussion and analysis

4.1 Introduction

This section presents the findings / data collected from the field, the discussion and analysis. The data was collected from respondents (visually impaired students), and library staff at the University of Oslo with the help of semi-structured in-depth interviews. The thrust of the study was to explore the accessibility (students) and provision (Library staff) of digital library resources to the visually impaired students in academic libraries.

The first part of this chapter is concerned with the presentation, discussion and analysis of data obtained from the students about accessibility of digital library resources while the second part is concerned with library staff about provision of digital library resources to the visually impaired students. A total of 6 respondents were interviewed, four (4) of whom were visually impaired students, while two (2) were university library staff. The respondents were given the following codes; for students, respondent 1, coded as #1, respondent 2, coded as #2, respondent 3, Coded as #3, and respondent 4, coded as #4. For the library staff, respondent 1 was coded as interviewee #1 and respondent 2, was coded as interviewee #2.

Data is analyzed by use of constant comparative analysis. This is a method of analyzing qualitative data where the collected data is coded into emergent, categories, themes or codes. Data was constantly revisited after preliminary coding, until it was clear that no new themes were emerging. The results are presented as they were got from the respondents, from the outcome of the conversation / in-depth interview. The following categories emerged in the data collection; Access to university digital library resources, Other alternative sources of accessing digital resources and study literature, benefits of accessing the university library digital resources by the visually impaired students, challenges faced by the visually impaired students to access the university digital library resources and finally, suggestions on how the digital library services could be improved from the point of view of the visually impaired students. Some of the categories and themes emerged in researcher- respondent interactions through in-depth interviews while others were based on the objectives of the study.

PART ONE: presentation, discussion and analysis of data elicited from the students.

4.2 Access to university digital library resources

The following are the results from the study presenting the access to digital library resources by the visually impaired, the various means and technologies they use to access digital library resources.

4.2.1 Access to university digital resources

The respondents were asked if they have access to digital library resources at the university, and all of them said that they do but not to all the available resources of different formats and in the university digital library. Those formats they have access to include Portable Document Format (PDF) in form of text, Document extended (DOCX) a new file extension that Microsoft 2007 uses when it saves the document in the new default format, Text, micro soft documents (DOC), Hyper text markup language (HTML) digital resources. Respondents reported that sometimes they have access to electronic databases and electronic articles too.

Respondents however reported that they do not have access to every digital resource or document. The degree of accessibility to the digital library resources depends on the format of the resources. For example digital resources that is in PDF which is in form of a scanned image or picture was mentioned among the electronic resources that is hard to be accessed. The respondents said that a screen reader cannot read it a loud and it is not searchable either. This response is actually in agreement with what (Whitehouse, Dearnely, & Murray, 2009, p. 177) point out that PDFs that are inaccessible by screen readers are in form of scanned images of text that cannot open with screen readers and appears as a mass of jumbled text when they open. Similarly, this is in line with Konicek, Hyzny, & Allegra (2003, p. 103) who noted that Adobe Acrobat produces a PDF file that amazingly retains the look of the original document. The same authors add that these characters look like text, but are actually images and screen readers cannot read these “image” characters unless one edits them to turn them into text format.

Most respondents reported that they do not access most of the digital library resources because the screen readers they use do not work properly with the system the university digital library is using. Nevertheless, the few digital library resources that are accessible can be read online and some can be downloaded and read later electronically using their computers but if it was in electronic format it would be much easier to read and understand as one respondent emphasized. This would give the visually impaired students a sense of independence which they mostly need.

For the formats that are not accessible are always scanned by the visually impaired themselves or with the help of the reading assistants and turned back to PDF format that can be accessed by the screen readers or the reading assistant reads the text a loud for the visually impaired student. However, respondents said that this is so tiresome and time consuming.

Some respondents said that they have tried several times to log on to the university digital library website independently to access the digital library resources but without any success. For example, Respondent 1# reported that;

“What happens is that at one point when I go to open the library website, i want to go to the online resources, at some point I require help i need somebody to click the link for me or one of the links then BIBYSIS opens, and then I get the reading material I need but it is like I cannot do it independently because they have arranged it in a way that the screen readers do not read all the links”.

Similarly, respondent 3# said;

“ I have tried to log on and search the university digital library resources alone, it was not that I tried once or twice but I tried it a couple of times and it did not work, you know I was not able to search myself because jaws cannot read some parts of the webpage which I need to go to or some of the links which I need to click because the difficulty with jaws I think is that if there is something or links written on the top of the screen or webpage, jaws does not find that if it is not in the main part but up like a bar or buttonsthen jaws cannot go to that part”.

One of the respondents mentioned that she accesses the digital library resources through other search engines for example Google scholar. Google scholar guides her to the library’s electronic resources and there she can access the digital library resources. Otherwise, the respondent would not have access to these documents direct from the university digital library website without first using other internet interfaces.

4.2.2 Ways through which visually impaired students access university digital library resources

Respondents noted that they access university digital library resources with the assistance of other people, who include university library staff, friends and reading assistants.

4.2.2.1 University library staff (Librarian(s))

All the respondents reported that with the assistance of the librarian who is supposed to specifically work on visually impaired students, they are able to access most of the university's digital library resources. They said that if they want to access the online digital library resources, they go to the library and ask the librarians to search for them. The results of the searched electronic documents is exchanged between the library staff and the visually impaired students by sending links through student's emails, and in that way students can select whatever they feel is relevant for them and read them from home or anywhere. Since it was established that all the respondents have email accounts / addresses, the use of email is a very important tool for librarians to communicate with the visually impaired students.

However, some of the respondents reported that they were not satisfied with the assistance from the library because of lack of freedom to search by themselves and over dependence on the librarian who searches for them. They reported that while they visit the library to get the library staff who can search for them, they (students) feel that information they get is not as timely as retrieving electronic materials by themselves if they were able to do so. Respondent 3# for example said;

“The librarians are the ones who search but not me, if I was searching may be I can ...you know.hmm...i have to be very specific when telling them what I need but if am searching independently i can be as broad as i want or as narrower as i want and then when i go through everything, i can decide which i need and which i do not need but if somebody else you are telling and they are trying to help you especially if they are not very sure of what and of how to help you then, it is difficult because you may miss out some information or some articles that you particularly need”.

Some respondents noted that they use the library staff but not that much considering the time they have for lectures, and also available time the librarians have to serve them (visually impaired students) and also perform other duties. It was further mentioned that very often the librarians who are supposed to assist the visually impaired students are engaged in other

duties, thus they do not give the visually impaired students sufficient time. Other respondents said that some librarians seem not to be conversant with how to search for the visually impaired students. Respondent #3 for example said;

“One time I was there and the librarian was doing other things so I had to wait until I was attended to. Then another time, the librarian was not aware of how to help me. She was not that much aware of how to search for example for the articles that I needed but she tried but it was not that much helpful because she did not have much time to stay with me. Then other times I could go to the library and she is not there or she is serving other students”.

The above response is in conformity with the study that was carried out by Harris & Oppenheim (2003, p. 251) which revealed that in the provision of library services for the visually impaired students in UK further education libraries, only 12 out of 230 libraries had full time equivalent staff trained to deal with specific needs of the visually impaired students in accessing the library and its resources. This puts the visually impaired students at a disadvantage since they cannot easily access the digital library alone.

Some of the respondents said that if they cannot access enough information for their studies, it affects their performance and that is why they cannot compete favourably with the sighted students.

On the contrary however, respondent #2 reported that the librarians are very helpful because it would be very difficult for her to search for articles alone without their assistance. The respondent said that she often sits with the librarian and the librarian searches for the articles and reads the results of the search to her to confirm if they are relevant to her. She further said that she always presents to the librarians the kind of service and the librarians try their level best to meet her needs. To this respondent, the librarians are generally interested in making sure that the visually impaired students get the better service. She added that the librarians enjoy working together with the visually impaired students and finding good solutions that function well for the visually impaired student to be able to access digital library resources.

Some respondents reported that much as librarians are helpful, the visually impaired students need to know the right search terms and tell exactly what they need to the librarians to search for them. In this way, both students and staff would work better for the improved service delivery.

4.2.2.2 Reading assistants

Some respondents said that in addition to librarians; the blind students also have reading assistants who sometimes help them access the university's digital library resources. The reading assistants help the students in searching for electronic documents and also help them scan some of the documents which are in the format that is not easily accessible for example PDF documents that were scanned as images or pictures. Respondent #2 said;

“In other cases I also have a reading assistant and she sometimes go with me to the library and we search for articles together from a computer and she helps me to find articles or books and also check if they are electronically available”.

The respondents said that it is the Norwegian government which employs the reading assistants to assist the visually impaired to access reading literature and assist in other related activities. However, one respondent reported that the reading assistant was not that much helpful in the first semester of her studies but was very helpful during the time the student was writing her thesis.

4.2.2.3 Friends and fellow course mates

All the respondents said that sometimes they access the university digital library resources with the help of friends or fellow course mates. It was noted that if the electronic document is very important, the respondents check with friends who search for them and then send that document through emails as full text or the link of the document that the visually impaired students can read at home or elsewhere in their convenient times.

All the above ways indicate that the visually impaired students cannot adequately access digital resources from the university digital library independently, yet all the respondents said that they would prefer searching for articles themselves because they can get a variety of documents to choose from the best option they consider so as to have the best answers to their search questions.

Generally while sighted students may log on to the links, browse and search for the electronic information related to their coursework, the visually impaired rely and depend on library

staff, reading assistants, friends and fellow students to search and retrieve materials on their behalf.

4.2.3 Other alternative sources of digital resources and study literature

4.2.3.1 Other libraries

As experienced by the respondents, the university digital library does not adequately guarantee sufficient access to all the digital library resources and other study literature that the visually impaired students need. Therefore they feel they need to use other libraries to get reading literature for their studies. All the respondents said that they use Norwegian library of talking books and Braille (NLB) to access study literature resources for their studies. However it was established from the respondents that NLB online catalogue does not allow or provide full text documents or articles to the respondents, therefore the respondents order for DAISY books as alternative formats. There was dissatisfaction of the service from the respondents' point of view as they said that the system is too slow and cannot provide all the reading literature that is needed at a given time of the visit. For example, compendiums (compilations of curriculum articles) cannot be produced by NLB.

One respondent said that if she wants a compendium in electronic format or DAISY format, she takes it to NLB to be produced into DAISY. However, another student reported that NLB cannot produce compendiums for her because this library does not own the copyright to produce compendiums for anyone. The respondent added that compendiums are only produced by the university which buys copyright from the author or publishers and has the right to produce the compendiums. Unfortunately, the university does not have them (compendiums) in electronic formats and the university does not send the compendiums to NLB. Therefore, this often interrupts their studies since the students have to look for ways of accessing compendiums. Respondents expressed discontentment because the sighted students get compendiums without any struggle unlike them. They also expressed a feeling of information exclusion not because they are visually impaired but because the university has not established provisions for putting the study literature in electronic format.

Another respondent said that sometimes she gets assistance for her reading literature from Huseby resource center) in Oslo. She explained that the centre assists her more or less like the university library. The respondent emphasised that, Huseby has no special services for the visually impaired and all their literature is not in electronic or Braille form. It was noted that the respondent uses three kinds of libraries (University library, NLB and the Huseby) to get sufficient reading materials for their studies.

From the above responses, it was established that in addition to digital library services provided to the visually impaired students by the University library, the students go extra miles to look for other services from different sources which they cannot easily access at the university library. They do this in order to collect adequate reading literature for their studies so as to be able to keep the same pace with the sighted students.

Some respondents said that students in Norway join universities regardless of their economic and social status. This implies that if you are a student, the library is part of the natural service like being a student, all students should have the same access to university resources including library resources at the same time in the same way without looking at anyone's physical disability. Respondents reported that, the library services should also be clear for the visually impaired students. The respondents further said that the library should have the entire responsibility to ensure that everyone has the same access to electronic digital library resources. This shows that the visually impaired do not access the digital library resources unreservedly like the sighted students because they are visually impaired but because the society in this case the university has not responded to their needs in the way it would have done and this is agreement with the social model of disability, which states that, disability is understood as an unequal relationship within a society in which the needs of people with impairments are often given little or no consideration (Carson, 2009, p. 4).

4.2.3.2 Google scholar and other search engines.

Respondents reported that because it is sometimes impossible to access the university's digital library resources directly, they have resorted to searching other possible sites on the internet that can at least be accessible. Google scholar was mentioned by most of the

respondents as their first choice because they said that it provides online full text articles and journals which they access using their screen readers.

Respondent #1 demonstrated a search on the university digital library to show why she does not use the library and was not able to get what she wanted, consequently, she could not continue searching the library website. She said;

“...here is the problem, then I do not have to continue it has a lot of things or links I have to leave the university library website because it does not work, I decided to leave it and never to use it and just decided to forget about it. The problem here it does not show the link I am trying to get...it is a broken link”.

Therefore from the above responses, it can be said that the visually impaired students access the digital resources and other study literature through some kind of parallel support by use of different internet sites / search engines notably Google scholar. These can be accessed at university library, NLB, or Huseby or other internet sites with assistance from reading assistants or friends.

4.2.4 Forms of Assistive technology used to access digital library resources

The respondents were asked about the technology they use to access the digital library resources. Some respondents said that they use Job access with speech (JAWS) software for windows, a screen reader that reads electronic text a loud. Other respondents mentioned windows eyes software by Microsoft that reads electronic text a loud from a DOS based computer screen. These are the most common and world's most used software, as it is also noted by Lazar, et al (2007, p. 250), that the majority of blind computer users use either Window-Eyes or JAWS. Respondents also reported that screen readers vary in terms of work processing and access time and use different command keys and techniques in their use, and thus require special training for their proper usage. This is also supported by (Speir, as cited in Jones & Tedd, 2003, p.108). This affects the accessibility of digital resources especially if the users do not get enough training for example on how to use short cuts, or skip from one link to another. This also puts the visually impaired students at a disadvantage position since they have not had such training. Respondents # 2 and #4 said that they were using jaws three years back but later on changed to windows eyes because that time the version of jaws was too slow and posed a big problem on the internet therefore they decided to change to

windows eyes that they considered to be faster. However, they said there has been improvement in technology from that time, and that Jaws today has also improved and its features are the same as windows eyes though with different commands.

It was noted that when the visually impaired students are using the screen readers to access digital resources, each page seems different and it is sometimes difficult for them to determine the layout of each new page. This is common when they try to access the university digital library resources because the design of the library website seems not favourable to the use by the visually impaired.

One respondent mentioned another screen reader called super nova and he said that this is exclusively for people who are completely blind. The respondent added that it is rarely used in Norway.

The other softwares which most of the respondents mentioned are open book and Abby fine reader which they use to scan document formats that are not easily accessible for example PDF formats that are in form of pictures or images. Respondents explained that Open book software is used to scan or import the electronic document to open book program and put it into a PDF format that can be read by the software. Respondents also mentioned Omnipage software that is also used for scanning documents. However, they said that this software (omnipage) is not easy to use or to set up technically. Respondent # 4 mentioned another type of software which is called Eye reader. He explained that the software is also used for scanning documents and it functions with windows eyes.

Lastly, some respondents mentioned Infor box speech synthesiser as yet another form of software that is used to turn text into speech. Respondents explained that it is very useful because it enables them to access a big volume of information through listening which would take them a lot of time when using other forms of software. They however, said that the downside of this software is that it requires special training and also the visually impaired students cannot use it themselves without the assistance from technical people who have the expertise in using this software.

4.3 Benefits or opportunities of accessing the university digital library resources by the visually impaired.

4.3.1 Freedom or independence

The respondents reported that once these digital library resources could be accessed in all various formats, the blind students would have freedom of downloading and saving the document in the folder they want. They can also read online documents thus have the freedom to do whatever they feel suits them. For example, respondent #4 said that some or most of the electronic documents he uses in school are saved on his computer and he can always access them at anytime, anywhere and even after the course he will still use the documents as long as his laptop is functioning. This provides the respondent with a great deal of independence in accessing the information at any convenient time. This response is in agreement with Lee (2005, p. 47), who pointed out that visually impaired people who use various digital resources and internet services feel a great sense of independence.

Respondents said that the liberty of independence for the visually impaired students is important since it allows them to work at their own pace without any pressure or dependence on other people. This enables them to move at the same pace with the sighted fellow students and it also promotes a sense of confidence in them. With adequate access to a wide range of reading materials, respondents said that they are able to participate fully in discussion groups with their fellow course mates. This promotes information inclusion as well as social interaction. This response is in conformity with Leporini, Andronico, & Buzz (2004, p. 57) who argue that computer generated programmes and the internet significantly contribute to increased independence of disabled people in study, work, and free time, leading to greater autonomy and social integration.

Similarly, respondent # 4 said;

“Access to library digital resources makes me independent. I am not depending on somebody to produce for me books, i can go and find the material i want when i need it, I can also do other things outside the curriculum because i need to find my own books, my own materials therefore these digital resources is the big step forward and therefore as blind people we need to have access to them. If they are put in an accessible way it is very convenient for us and therefore it is possible to be independent”.

Similarly, respondent #3 also said;

” If all electronic resources were to be accessible it would be very good for me, I could read them, download them on my computer and read them easily but the problem is that not everything is accessible as digital resources but if they are so I can use them without over dependence on other people”.

4.3.2 Educational and social status

One of the respondents #3 reported that from the time computers and internet access started, the educational status of the visually impaired has improved and changed completely because nowadays the blind can follow class courses at the same time with the sighted students. The respondent also said that her education has been made much easier by having access to electronic resources. She further said that much as she still uses NLB, she does not over depend on it like before where she had to go through many steps of ordering for all her course materials from NLB. The respondent added that this often took time to get her reading literature. Similarly, all other respondents said that if they had no access to electronic resources it would be almost impossible for them to study some of the topics. They generally said that accessing digital library resources increase their knowledge in different topics of study. The respondents further said that when they have access to the library digital resources as blind people they feel they are benefitting the same way as those students or other library users who are not blind. Thus, this enhances a feeling of information inclusion.

However, all the respondents insisted that what they access is not enough and that is why they look for other sources of electronic resources and course literature elsewhere other than the university library because the university library does not provide enough services to them. Otherwise if they have full access, they argued, the benefits would be the same as for sighted people, for example getting up-to-date and a variety of electronic resources. Some of the respondents however, reported that much as they do not have access to all the electronic resources from the university digital library, the resources they access helps them in getting literature that the Norwegian library for Braille and talking books does not provide. The respondents said that NLB only provides part of the class literature therefore the services they get from the university library especially with the assistance of the library staff are essential and help them to access the same information the sighted students have access to. This enables them participate and follow the progression of their studies in the same manner like any other students.

Last but not least, respondents said that digital library resources do not only give them freedom and increase their education status but also save from the stress of entering the challenging library entrance door without anyone to help them. Therefore, with digital possibilities blind users can use the virtual library wherever they are. Respondents explained that if the digital collections in digital libraries were all well established, the visually impaired students would not need to come to the library. This would spare the students from tiresome movements to come to the library, take stairs, take lifts, take the train, find the way, and locating the library. Students noted that all these would be solved if the university digital library is well established and designed in such a way that it provides comprehensive services to the visually impaired students.

4.4 Challenges faced by the visually impaired students to access the university digital library resources

4.4.1 Design of the university library interface

All the respondents said that their main challenge to access the university digital library resources is the design of the university digital library interface. They said that the university library interface is not designed in a way that it is readable by screen readers like Job access with speech (Jaws). The respondents emphasised that when the design is not good everything becomes hard for them to access the digital resources from the library for example searching and navigating through the library website to access their online electronic resources is very challenging. The respondents further said that they cannot view and read what electronic resources offer or available in the university digital library. Some said that when they try to get the university's digital library resources and fail, they leave the website and use their time in other things. Thus, when the website is designed to be accessed by the screen readers, it is much easier for the blind students to have access to the digital library resources independently.

It was established from the respondents that today, most university libraries offer a variety of electronic resources to its clients but if the design of the interface is not friendly to the

visually impaired students, they are denied access to the variety of electronic resources offered by the university libraries.

This can be related to the analogy of the design of the bus that (Simpkins, as cited in Lewis, 2004, p. 21) used to illustrate the understanding of disability from the points of view of social and medical models of disability (see Chapter three, section 3.4). Just like Simpkins who illustrates from the perspective of social model of disability that the poor design of the door of the bus hinders a person in a wheel chair from entering in it, if the library website interface can be regarded as the main door to the library digital resources, its poor design also hinders the visually impaired students from accessing the library electronic resources. This is in fact supported by Power & Lebeau (2009, p. 56) who point out that library websites are the digital front door to library services; they reflect the priority libraries give to their services, therefore it will be of much benefit if they are designed in a way that is accessible to the visually impaired. In the same vein, Stewart, Narendra, & Schmetzke (2004, p. 266) also point out that from the perspective of accessibility, the design of the library interface matters as much as in the online world as it does in the physical world. The same authors argue that even the most advanced assistive devices cannot overcome the barriers associated with inaccessible design of the website interface.

4.4.2 Document format delivery

PDF document format was mentioned by most of the respondents as the most inaccessible document format by the screen reader. It was noted that when PDF is not scanned in a good way (like text), it cannot be accessed by the read a loud software programs the blind people use. The respondents said that they can access PDF documents when it is text-based but if it is scanned in form of a picture or an image, the document cannot be accessed directly by the screen reader. The respondents further added that if the document is in form of a picture it is not searchable either. In case they find such documents, the documents are scanned and taken back to a PDF format that can be readable by the talking programs. Respondent #1 for example said;

“I can read PDF, Docx, or Doc or text documents or HTML. Everything works perfect, but sometimes PDF files are not readable by jaws... but I have a program in my laptop called Abby Fine reader that converts the inaccessible PDF format into Ms Word. I use that one which really

helps when there is a PDF which I cannot read... but jaws has also improved and the last version of jaws can read PDF if you have installed adobe reader”.

On the contrary, some respondents reported that much as there are softwares that help to scan the inaccessible PDF format to a format that can be accessed, the problem still remains - some figures inside the page disappear and some are jumbled words, and therefore cannot be understood and read by the screen reader. This is in agreement with Whitehouse, Dearnely, & Murray (2009, p. 177) who note that PDFs that are inaccessible are in form of scanned images of text that cannot open with screen readers and appears as a mass of jumbled text when they open.

Because of this, one cannot have access to the whole page with all the words inside the page even if he/she is using open book or Abby fine reader to scan the inaccessible PDF to something that a screen reader can read a loud.

Respondent #2 reported that whenever she gets a PDF format in form of the real picture, it is not accessible to her screen reader and the text will not even appear on the Braille display and the speech synthesiser cannot read the document a loud, this hinders her from accessing the document thus misses out data that might be essential for her. The respondent said that in case of such documents, she is assisted by the reading assistant who scans the PDF document or reads it loud for her. The same respondent reported that, by the time she started her PhD in 2004, there were not so many WebPages and PDF documents that were accessible or read via a screen reader, but now a lot of positive things have happened according to accessibility of the webpage and adaptations of screen readers. In 2007 she got a new screen reader and she is now able to read about 50% of the PDF articles. She however, said that much as there are new developments in adobe program, the percentage of accessible PDF format documents is still low. This is in line with Byerley, Chambers, & Thohira (2007, p. 522) who argue that much as Adobe Systems have made significant advances towards improving the accessibility of PDF files, PDF is still problematic because many databases contain legacy PDF, text PDF and image PDF generated with earlier versions of Adobe that are not properly tagged for screen readers to read.

4.4.3 Administrative challenges

Most of the respondents experienced as if the university library has left its role of providing information to the visually impaired in the hands of other organisations. This ~~is~~ may be mainly because the university staff are aware of the existence of other organisations like NLB which are always assisting blind students with literature for their studies yet students cannot access every information resources they need for their academics from NLB such as compendiums. The respondents said that this has led them to be excluded from accessing all the resources they need in their academics the way the sighted students do. They also reported that, when the university does not give them priorities and they are left in the hands of other organisations, they have limited academic literature that help them to follow the progress of their studies.

Much as NLB provides literature in alternative formats to the visually impaired students, it does not provide all the necessary resources, yet students need to access textbooks, electronic research articles, research reports, online databases. This is in line with (NEADS as cited in Epp, 2006, p.413) who argues that some educational producers of alternate formats concentrate on textbooks, not aware of the need for access to a much broader spectrum of resources. The same author further points out that higher education students with print disabilities need the same resources as their peers in the same courses.

Generally, all the respondents expressed dissatisfaction with university's digital library resources service delivery. They also expressed a feeling of isolation and discrimination in such a way that they are left hanging without anywhere to turn to in case they want those documents that cannot be produced by NLB and at the same time cannot be provided by or accessed from the university library electronically. They said that this prevents them from following the courses of their studies adequately. Respondent #2 for example emphasised that NLB is not able to provide the sufficient literature needed for student's studies; NLB only delivers part of what is needed in the course. She added that this makes the blind students feel segregated by the university library. This segregation is partly contributed to by the social and professional attitudes who started organisations for the blind as (Owen, 2004, p. 58) for example, puts it that the professional forefathers institutionalized "social exclusion" by

creating charity organizations such as the National Library for the Blind, beginning a long period of separation and neglect of blind readers.

4.4.4 Lack of competence

The lack of competence was categorised as librarian's competence, Visually impaired students' competence in the use of screen readers, and competence in use of the electronic and internet resources by the visually impaired students as presented below.

4.4.4.1 Librarian's competence

Most respondents said that some of the library staff do not have enough competence in searching for electronic documents even when they try to help the visually impaired students. For example it was noted from respondent #3 who narrated that she went to the library one day to consult the librarian about some information she needed for her course requirement but the library staff could not help her much in searching for the information she needed because of inadequate competence to do so.

Respondents further said that, the librarians seem not having adequate skills and awareness of the operations of some of the software programmes for the visually impaired students especially the screen readers. This is seen as a big challenge for the visually impaired students who cannot benefit much from the library staff they run to for the assistance. One respondent emphasized that some of the library staff are not aware of how the screen readers function for example which part of the webpage the screen reader can read.

Generally, it was established from the respondents that the university library staff lack sufficient competence and skills to operate the assistive technologies designed for the visually impaired students to access digital library resources. Yet, the respondents themselves are not trained enough either to operate most of the sophisticated assistive technologies and that is why they depend on the assistance of the library staff whom they perceive to have had adequate training, competence and skills.

4.4.4.2 Lack of competence by the visually impaired students to use screen readers

Most respondents said that they lack the competence to use screen readers and this affects their accessibility to the library's electronic resources. One respondent admitted that though she is using the screen readers, she is not competent enough, although she is willing and determined to learn if given the opportunity. This response is supported by Craven & Brophy (2003, p. 118) who assert that some assistive technologies such as JAWS, are a powerful screen reader that provides the user with many options in terms of Website navigation, is unfortunately an extremely complex and expensive piece of technology that requires initial training in its use if its potential is to be realized and may also require further training whenever a new version is released. Observations made by the same authors during the NoVA project confirmed that success in using some of the more advanced features provided by screen reading technology is often dependent on awareness, training, and experience of the blind users (Craven & Brophy, 2003). Similarly, Pilling, Barrett, & Floyd (2004, p. 32) also argue that lack of support and training in the use of assistive technologies are identified as additional barriers to access electronic resources by the visually impaired.

Interestingly however, respondent #4 said that he is quite comfortable with his screen reader, and that he is able to access the electronic resources once they are designed in a way that can be accessed by the visually impaired, therefore to him it is not a challenge to access the digital library resources once they are put in the right way that favours his screen reading software. The same respondent explained that he got the training on how to use his screen reader from the manufactures of his screen reader and that is the reason he is quite conversant with how to operate it. He said;

“When I got my new screen reader, I had to undertake a course.... I talked to the firm that delivered my equipment because with my technology (windows eyes) you need to have special skills to use it for example how to use short cuts and commands... so I did the course and that is why I am conversant with using my screen reader”.

4.4.4.3 Lack of competence in the use of electronic internet resources

Some respondents reported that they lack the competence on how to use some of the electronic resources from the internet and this also hinders them from accessing the university digital library resources. Respondents explained that when they start are at higher education, they get some information and knowledge through attending library information retrieval courses or sessions on how to use the digital library. However, the information they get from the university library is not comprehensive and it is usually generalized. So the visually impaired students cannot depend on it to access electronic library resources on their own. One respondent said that there was one lesson she attended but she could not understand and grasp most of the content, so she did not benefit at all. She therefore thinks the university library should have a special course specifically for the visually impaired on how to use the library's digital resources if they are to be able to utilize the library in a satisfactory manner.

Similarly, another respondent reported that she tries to access the university digital library resources alone but with difficulties because to find the electronic articles she has to go into the database where all the articles are stored and do research in that database and this work is very difficult for the blind student because of lack of competence to search and access electronic internet resources. It is because of lack of competence, that she often depends on the assistance of the library staff who assist her in searching for electronic literature. Respondent # 2 for example said;

“...but you see part of this situation, my knowledge in use of the internet is not very high, so my competence is not so good and therefore the challenge is that I have to always seek help from the librarian who has competence in using all the internet searches”.

Some respondent narrated that one time they needed an electronic document and there was no one to help them both the librarian and reading assistant, so they (visually impaired students) tried to look for the document on their own but without success. They therefore gave up on it.

From the above responses, it seems that the visually impaired students still lack sufficient competence to use various electronic internet resources and this affects their normal study progress.

4.4.5 Accessibility of WebPages

It was reported by respondents that when users search the electronic library resources from the internet, they get a lot of information with many links scattered all over and therefore getting what one needs sometimes becomes hard. Consequently, therefore a user may end up not getting information he/she is looking for, moreover after spending a lot of time. Making navigation from one web site page to another proves rather difficult. For a blind user, this is too difficult especially when the website is not arranged according to the accessibility guidelines. The respondents reported that the university library seem not be following the standards and guidelines on website accessibility by WAI and that is why the blind students find it difficult to access the library WebPages. Some respondents said that some of the WebPages do not provide adequate links that enable the blind user to skip from page to another. This is in fact in agreement with Tatomir & Durrance who argue that, lack of skip navigation links and jump-to links that direct users to the most important page elements present barriers to adaptive technology users who cannot simply scan quickly over a page. Thus pages lacking skip navigation/jump to links create serious barriers to use, making it difficult and time consuming for adaptive technology users to interact with the resource. The authors added that users can easily become lost on a page and have to return to the beginning of the web page and re-read all previous sections of that web page in order to find the place where they became lost (Tatomir & Durrance, 2010, p. 582).

With the increased awareness and accessibility policies that have been in place, it is regrettable that the issue of website accessibility has not been fully addressed and followed by the university library. This is probably due to the way the university library website is developed and maintained at the development stage. This point is further supported by Brophy & Craven (2007, p. 955) who stress that unless accessibility is built into the design of a site, even the most up-to-date assistive technologies will still be unable to access it. The inaccessibility of the library website shows that, the university probably does not give much attention to accessibility issues, yet it is a very big barrier for the visually impaired to access electronic library resources. This challenge is a creation of the university library developers. This is in conformity with the social model of disability which asserts that the barriers faced by the disabled have nothing to do with individual disabled people's bodies, instead they are created by people so it is possible to remove them (Carson, 2009, 4).

4.4.6 Database design

Most of the respondents said that some electronic databases are not designed in a format that a screen reader can access. One example mentioned was a situation where the visually impaired students can listen and know that the document is there but because the database is not friendly to them, they cannot access the electronic resource from that database. The challenge is that database designers do not follow Web accessible initiative and Web Content Accessibility Guidelines (WCAG) issued by the worldwide web regulations on how to make pages and electronic documents generally accessible. One respondent reported that one time he wanted a digital version of a document on history to use in his studies, it was in the database but he could not have access to it because the database was in a format which he could not reach, therefore he had to give up on the idea of accessing that document and found something else. The respondent further reported that the document was there but the screen reader could not have access to it. Respondents suggested that the university library should always take into consideration the needs of the disabled students especially people who are visually impaired when designing or subscribing to the data bases such that they are compatible with assistive technologies the visually impaired students use to access digital library resources.

4.4.7 Compatibility challenges in the use of Assistive technology

All the respondents said that sometimes reading programs hinder their smooth access to the digital library resources. Respondents for example reported that the screen readers are developed to function with specific programs for example windows, internet explorer and with cooperation with Microsoft words. There is however, a limitation of incompatibility with other environments. Respondents #4 mentioned an example of windows eyes screen reader which he is using but it is not compatible with lotus. There are therefore many programs which are not compatible with others and this limits access to a wider range of library resources. However, the same respondent said that some other programs are compatible with each other for example windows eyes and firefox.

In addition, other respondents reported that, the new versions of the softwares always come with differences and this requires a lot of time to learn their operations. The respondents said that a blind student must read more about the new versions of the software in order to be able to utilize it. Respondent #3 explained this situation using an example of Microsoft windows;

“...this situation can be compared to when one is using Microsoft Word 2003, it is completely different from Microsoft Word 2007 and people have to learn how to adjust and get acquainted with new changes and modifications, and this applies to screen readers too”.

4.4.8 Graphic design of WebPages

Most of the respondents said that some websites and electronic resources are mostly designed graphically and they are not accessible when the blind person is using screen reading software. Respondents said that the icons on some websites cannot be read by the software because they are like graphics therefore they appear like pictures, when using a screen reader some of the graphics are not available and cannot be read by the screen reader.

4.4.9 Inadequate library facilities and staff services

The respondents reported that there are inadequate library facilities and staff services in the university library. The number of staff members seems to be insufficient to serve fully the increasing information needs of the visually impaired students. As mentioned above, since the visually impaired students cannot access the university digital library resources independently, thus inevitably need the assistance of the library staff, lack of sufficient number of staff to give each student a considerable time to access the library resources affects the readiness of the visually impaired students to pursue their studies smoothly.

Respondents also reported that that there is a special lockable room in the university main library which is managed by the university’s accessibility services department. The room is accessible by the use of pin code which is issued out by the accessibility department. There are computers inside the room which have screen readers installed on them, and a student can go there and use them to access electronic resources and also print out documents. However, respondents said that the biggest problem with the university is that the information about

accessibility is not freely available to all students with disabilities, unless one asks about it. This special room is most of the time locked, therefore even if they want to access it, it may not be possible without someone to issue the pin codes. Respondents argued that if the room is kept open then the visually impaired students can access it and use the computers installed with the adaptive technologies to access some of the electronic resources offered by the library. Besides, the respondents revealed that it is the only room in the whole university that has the screen readers and other special equipment yet the sighted people have computers all over the university buildings. For the blind students, this is regarded as unequal distribution of study resources - computer facilities and it is seen as unfair treatment to them.

Respondents further said that there is lack of adequate number of computers with installed assistive technologies at the whole university. This is a challenge since it affects their ability to use the digital library resources wherever they are at the university campus mostly during their free times from classes. They explained that most of the computers in university computer laboratories do not have adaptive technologies installed in them. So they are confined to a few places at the university where they can access the helpful computers. Consequently, every time they are at the university they have to carry their laptops and the laptops cannot allow them print from other university printers apart from the ones designated for them to use. This is a big challenge to them in that even if they wanted to go, sit, print and read from the university computers especially those many computers in the library they cannot because the computers are not installed with the assistive technologies they use. This discourages them from going to the university library because they feel that they are not catered for by the university library like their sighted fellow students. One respondent said;

“Apart from the special room, the university does not have any other facilities for the visually impaired, so even if I go to the library without any appointment, I will be wasting my time. Therefore, i would prefer staying in my room and search elsewhere on the internet for electronic resources”.

4.4.10 Legislative and ownership barrier

Respondent #4 said that all PDF files that are closed for copying cannot be read a loud by the screen readers. He reported that one of the reasons for putting digital documents in PDF is copyright protection but sometimes this protection makes it hard for screen readers to read text a loud. The respondent said that the visually impaired students are the most victims of this copyright protection.

4.5 Suggestions on how the library could be improved from respondents (blind students) point of view

The respondents were asked to give their recommendations, suggestions on how they think the library should best serve them and the following recommendations were given.

4.5.1 Design of the website

The respondent noted that the first thing the university library needs to change the design of the library webpage, bring all the necessary links and have them in one main page and not above the page.

Respondent # 3 and #1 said that librarians can be helpful but website designers at the university and the university library should cooperate. This will help with the accessibility of the library's website content and such things so that there is more possibility to make the university's digital library resources accessible by the VIP. This is in conformity with World Wide Web Consortium (W3C) which observes that web accessibility depends not only on accessible content but also on accessible Web browsers and other user agents.

The respondents further said that the university library website designers should refer to web accessibility guidelines to be able to design the library website and other pages. The current guidelines can be found at <http://www.w3.org/WAI/users/Overview.html>.

Additionally, according to W3C, when accessibility principles are followed users can easily navigate and determine where they are. W3C further argues that content that is well organized help users to orient themselves and to navigate effectively. This is because for example;

Pages have clear titles and are organized using descriptive section headings

There is more than one way to find relevant pages within a set of web pages

Users are informed about their current location within a set of related pages

Meeting accessibility requirement related to seizures for instance helps people to navigate through web pages in different ways, depending on their particular needs and preferences. For example, while some people may rely on hierarchical navigation structures such as menu bars to find specific web pages, others may rely on search functions on websites instead. Moreover, some people may be seeing the content while others may be hearing it, or seeing and hearing it at the same time. Some people may be using the content with only a mouse or a keyboard, while others may be using both. This can be found at <http://www.w3.org/WAI/intro/people-use-web/principles>. (Accessibility requirements related to seizures) Accessed on May 25.2011

Therefore, designing the library website following this requirement for example will help cater for a variety of users with disability and not only the blind.

4.5.2 Insufficient library instructions and staff skills

It was noted from respondents that visually impaired students need courses in the use of screen readers and the use of the internet and digital library resources. The respondents reported that the university library should give them special courses on how to access the digital resources.

It was further noted from the respondents that university librarians need some basic skills too on the basics of using screen readers. Respondent #1 said that;

“Am not saying that they should have to be advanced but they need some basics at least they need to know how its operated for example they need to know how these programs work in terms of which part of the webpage can be read by this software like that or how it operates so that they are able to help the blind access the library’s digital resources”.

4.5.3 Student staff personal contact

Respondents suggested that the university library should have a contact person with personal contacts with blind students so that each student has at least personal contact at the library so that both staff and respondents have cross dialogue about services and how to use the library. Some respondents said that the use of email is very important tool, contact by email is very necessary and should be emphasised. For example respondent #2 said that often the library staff at the university sends a list of the search results from the research she has done to her email and this is very good because she says she can sit in her own office, read it on her Braille display and select what kind of books she wants to read per time.

4.5.4 Collaboration

Some respondents said that as the university library works on the accessibility of its digital library resources, there is need for collaboration in order for the university to provide better library services to the visually impaired students, they suggest for a closer collaboration between the university and the Norwegian library for Braille and talking books (NLB) so that the literature from NLB is adopted according to the level that is needed for students in higher education. Respondents continue to say that likewise, the library for Braille and talking books should have a good collaboration with the university library; this can be an alternative solution for visually impaired to access adequate literature for their studies as the university library works on the accessibility of electronic library resources by the blind. Additionally, the university should collaborate with other organizations too with special competence in serving the blind for example how to use a screen reader and in study skills for VIP.

Respondent #2 said that;

“I think a better link between libraries and other organisations serving the blind should be a good improvement for the students study situation. May be they have collaboration on a general level but not very much or close collaboration I think. That is my opinion”.

4.5.5 Library university responsibility

One respondent recommended that the university library should think of taking the responsibility of serving the visually impaired more seriously as their users and not leaving the responsibility in the hands of organizations for the blind because these organisations cannot entirely provide much resources for the student’s studies. One respondent said that;

“I do not get the compendiums, the faculty is the one supposed to produce them, sometimes I get a print copy of the compendium and the NLB produce it in readable format”.

Respondents continue to say that, the university library should have the responsibility to provide access to information to VIP like any other students. For example If there is an electronic PDF document that is not accessible, it should be natural that the university help VIP students get PDF version that can be accessed by the screen reader.

4.5.6 Inadequate library facilities

The respondent further suggested that the university should at least install screen readers in other computers in the different buildings of the university because there are computers in each building and accessible for everyone except for a person who is visually impaired because they lack screen readers.

PART TWO: Presentation, discussion and analysis of data from library staff.

4.6 Introduction

As mentioned at the beginning of this chapter, library staffs were interviewed and the following section provides the presentation, discussion and analysis of the data collected from them. It should be recalled that codes for the library staff were made as follows. Respondent 1 was coded as interviewee #1 and respondent 2, was coded as interviewee #2. The categories that emerged from library staff include the following; services to the visually impaired students, challenges of providing digital library resources to the visually impaired students, and recommendations from library staff.

4.6.1 Background information of library staff

Of the two interviewed library staff, one is a librarian in charge of serving both the visually impaired students as well as sighted students in the library, while the other is responsible for the development of library digital services at the university library. Interviewee #1 has served visually impaired (those who are totally blind) students for a period of 8 years. She has served under graduate, and Masters' students for 3 years, and the PhD students for 5 years. She said that all visually impaired (totally blind) in different years depend mainly on Braille and screen readers. She however, expressed concern for the increasing rate of dropping out of school by the visually impaired students. She said;

“..it is unfortunate that students keep on dropping out so I keep forgetting those who drop out... may be they do not get better services here, ...and that is beyond my control, it is the university administration concerned...”

The respondent said that, students tell her whenever they think of dropping out. Among the reasons they tell her is difficulty in accessing literature. She explained that students need mainly two groups of literature- on class schedule, students need literature for their course

requirements and examinations, while on the other hand, they need literature on research for those at the level of writing their theses or researchers both groups need to go outside and search for literature specifically what the students want. Accessing both forms of data is a very big challenge to the visually impaired students especially when the library facilities are not sufficient. She however, noted that unlike some years back, today, services for the disabled and most especially the visually impaired library users are getting better.

It was important to interview this respondent because she has served the blind students for many years and her responses were based on her experience in serving the visually impaired students.

Interviewee #2 has not served visually impaired students but currently he is serving or working with a dyslexia student in a project testing how an ipad can be used to access electronic information by people with learning and reading disabilities. The interviewee #2 works with a group of librarians called digital services which aim at giving electronic library services to all library users including the visually impaired. Interviewee #2 said that the goal of their department is to give access to digital library services to everyone. Since interviewee #2 is among the library staff providing electronic services to all, his input to this research was considered important because the study is related to provision of digital library services to the visually impaired people which are one category of library users. Therefore, his responses were also based on his experience in the provision and management of electronic and digital library services.

4.7 Services to the visually impaired students

4.7.1 Training in serving the visually impaired persons (VIPs)

Both respondents reported that that they have not acquired any special training or course in serving the blind but they have attended conferences which focus on how to serve the visually impaired. They have also visited institutions that do specialised services in helping people with visual impairment. Interviewee #1 further said that she has been introduced to the special equipment by some organisations used by the blind, but she has not been trained in how to use it. She was given contacts of the experts whom she can contact if she needed to learn how to use it, however she did not contact them due to lack of time.

Both respondents said that the university should be the one to ensure library staff undertakes training courses (continuous training) so that they are able to serve best all the library users especially those with special needs like the Visually impaired students. Interviewee #1 for example reported that she has not studied any course on how to serve the visually impaired but when she saw the need she struggled alone, read about it and attended conferences on her own. This response is in agreement with the study conducted in United Kingdom by Epp(2006, pp. 413-414) which show that librarians struggle alone to cope with a somewhat hostile institutional environment where equality of access to information for disabled users is seen by management as a nuisance or even a waste of time. In the same study, the respondents (librarians) emphasised that the university should do training to both students and staff on how to access and provide digital library resources to all the users. Emphasis was put on first priority and giving more time to the library staff who serve the visually impaired library users.

It was noted from interviewee #1 that she will be retiring soon, and so she suggested that the person replacing her should be well trained to effectively handle the challenges faced by the library staff in serving the visually impaired students and at the same time address the increasing needs of the students with study disabilities. She also said that, that person should be committed and passionate to serve the visually impaired library users.

It was noted from both respondents that the university should put emphasis on training and capacity building of the library staff with regard to the use of more sophisticated assistive technologies that the visually impaired students use. Library staff also need to be equipped with adequate skills on how to use different databases and how to search for information the visually students want. In this way, it will be much easier for both the visually impaired library users and the library staff to work together in a situation where the students cannot access the digital library independently.

4.7.2 Method of contact with visually impaired library users

Both respondents said that they get to know the visually impaired students from the department of accessibility at the university. When the visually impaired students are admitted to the university, they are provided with the email addresses of the contact persons (the library staff) whom they should contact for assistance in case they need.

Respondent #1 said that;

“Most of the blind students get to know me through the accessibility department, the special department we have at the university and that is where they get our contacts...the department gives them my name, email address, telephone number and from there they start communicating with me, booking appointments...”

4.7.3 Ways of serving the visually impaired with library digital resources

The respondents said that the library staff gets references or topics from the students and they search for the articles in the databases for them. Interviewee #1 said that, she actually does a lot of work for them, she has to search for a wide range of articles and she reads the results of the search to the students to give an opportunity to select the best they want. This is part of her normal job in addition to serving other sighted students who may also need to get electronic articles. The respondent however, said that unlike sighted students who use normal computers to search and read the searched reading materials, most of the visually impaired students normally sit and read the selected articles using their special equipment and not library computers because the library does not have adequate computers with screen reading software. The respondent added that she knows the actual databases where she can search for the topics the students present to her and then she sends the results or links to the email addresses of the concerned students who choose what they are more interested in. Interviewee #1 said;

”It is my duty as a librarian and I use my skill to find the text based in an electronic format. Therefore, when students send their interests I look for the text and send them links in electronic form so that they read on their own”.

The same respondent added that if the university does not have the electronic document or does not subscribe to the journal article, the library staff orders for the link through telephone calls or emails from other libraries on behalf of the visually impaired students.

Interviewee # 1 said;

“I tell them (staff of other libraries) that I represent a blind student and then I request the library to send me the link of the electronic article to my personal email address and then I send this electronic link to the concerned student and he or she uses his/her equipment to / computer read it”.

The respondents further said that sometimes visually impaired students do not need to come to the library to search for the reading materials but instead they send emails of what they want or make phone calls from their homes to the library staff who search for them and send the feedback to them by email. Sometimes, students can also send concrete journal title reference articles to the librarian by email. The librarian searches for the full articles and picks out what he/she thinks is relevant and sends the search results back to the student. If the student finds that the articles are relevant, he/she communicates to the librarian to send the electronic text to them. Interviewee # 1 said that if the document is not in electronic format she finds it in printed edition and then copy and sends it to NLB through accessibility department of the university to be adopted into DIASY format. He however, said that this process is time consuming.

Interviewee #1 further said that those students who decide to come to the university library, usually make an appointment with the library staff, then they come and sit in the librarian's office and they are later assisted by the present librarian in searching for the articles they want.

From these responses, it is noted that the visually impaired students largely depend on the assistance from the librarians for most of their searches. The responses also imply that for the visually impaired students to get better services, there must be good student-librarian relationship and cooperation. The responses sound positive with a sense of dedication on the part of the library staff to serve the visually impaired students. However, the responses sound contrary to those of the visually impaired students who expressed dissatisfaction with the way they are served and treated in the university library. However, this does not rule out the possibility of poor library services since the Interviewee #1 admitted that poor services could be a major reason for the increased rate of school dropout among the visually impaired university students.

4.7.4 Library facilities for the visually impaired.

In agreement with the responses of the visually impaired students, the library staff respondents confirmed that the library has a special room with computer equipment installed with screen readers and other assistive technologies which the visually impaired students use.

However, Interview # 1 said that the special room is controlled and managed by the special (access) department of the university not the library staff. She also reported that sometimes the special room is locked and not accessible by the visually impaired students. She however, said that in case of such a situation, she usually provides an alternative space and very often her office where she can help the students to search the documents they want using her computer or student laptops with certain installed programmes. With their laptops, she said, the students can organise their documents in folders and it is easy to find those folders whenever they want to use them.

Respondents said however, that the special room has a conducive environment for the visually impaired students because it is well organised, it has computers installed with assistive technologies that students usually need to access electronic and digital library resources. Respondents however, mentioned that the challenge is that even when the visually impaired students find the room open, they need someone to connect for them the computers. This is a challenge for the blind students especially when there is no librarian available at that very moment to serve such students in cases where the former is engaged in serving other library users. Respondents further agreed with visually impaired students' responses that the special room does not have adequate computer facilities to accommodate the existing number of the visually impaired users.

4.8 Challenges faced by the library staff in providing digital library resources to the visually impaired library users

4.8.1 Library user interface

Both respondents reported that the interface of the university library is the most challenge that the library has in providing digital library resources to the visually impaired. They said that the interface program is made by exlibris from Israel, and therefore the university library can make minor changes while the major are a preserve of exlibris. It was established that even if the librarians responsible for digital services know the rules and guidelines of W3C, they have to depend on the developers for any modifications to be made. Thus, it renders library staff to incapable of making changes if needed so as to solve a given problem being

faced by the visually impaired students at a particular time. The respondents added that there is not enough collaboration and cooperation between the university library and interface designers.

Like the visually impaired students, library staff also said that the library interface is very difficult for the blind to navigate through. They said that as library staff they have no capacity to change / modify it to simpler way favourable to the visually impaired students. Interviewee # 2 explained that even when the server is at the university and the librarians make the updates, it is very difficult to keep all the changes in the application. The challenge the library staff has is that even when they update and make some changes, whenever exlibris makes some other modifications, these updates over-write all the changes and put the old interface again and this makes the library staff to loose all the changes they had made. The same respondent further said that it can be possible to make another interface as a solution but the problem is that it involves a lot of expenses and regular updates to keep up with it.

Interviewee #2 also noted that his experience in working with a group of librarians to provide electronic resources to Universities in Oslo called UNIPORT; a consortium of university libraries in Oslo, Bergen, Tromsø, Trondheim and the Medical Library at Oslo University on the operation and development of library portals for e-resources shows that Portal solution is based on products ExLibris MetaLib, SFX and bX and operated or developed by the University Library in Oslo. This group does not consider the accessibility issues of the electronic resources by the visually impaired as a priority. This prevents the visually impaired to be provided with the digital library resources easily and in the same manner the sighted students do. Thus university libraries have not provided a good environment or solution for the challenges the visually impaired face. This further rhymes with the social model of disability which states that an unequal relationship within a society occurs between people who are impaired and those who are not when the needs of people with impairments are often given little or no consideration (Carson, G 2009, p.4).

Generally, from these responses, it is established that unless the university library pushes the developers of the interface to follow accessibility guidelines and standards developed by W3C, blind users might continue to find it hard to access, search and navigate through the university digital library resources. This affects the provision of better electronic services by the university library to the visually impaired user community of the university.

4.8.2 Electronic databases and document formats

The respondents said that the university digital library has subscriptions to many electronic databases and these are designed differently. They said that some databases may not be easy for blind students because they involve many links that require multiple clicks which is disturbing to the visually impaired students, this is agreement with Dermody & Majekodunmi (2011,p.155) who notes that for every extra button that can be clicked by people using screen readers, the likelihood that people will get confused increases and for screen reader users, the more busy the database interface, the risk of not being able to keep pace. Interviewee #2 mentioned an example of world-cat, the world's largest library catalogue which is a very big database and cannot be easily searched by both blind students and library staff without special skills of searching electronic resources. He explained that the database has so many links that may not be possible to navigate through by the blind students who are using a screen reader without any support from the library staff.

Additionally, it was noted that from the journal databases the library subscribes to, some articles in the journal databases are not searchable and cannot be read by the screen reader software. Respondents explained that when the text in articles for example is extracted and scanned in a PDF format that is in form of a picture or image, it is not possible to use the text to speech. They further said that when they face such formats in articles, they go through a lot of huddles and hustles to turn the text back to a PDF that can be read by the screen reader and this consumes a lot of time. Additionally, when such a challenge is faced the library staff have to look for alternative electronic documents for students, this slows down the services of providing digital resources to the blind

Generally, this seems that library staff at the university library responsible for the selection and procurement of online databases may not be considering accessibility issues when selecting online resources. This is supported by Byerley, Chambers & Thohira who assert that, vendors are not addressing accessibility in their marketing efforts. To some extent, the blame for this rests with librarians themselves – especially those charged with the selection and procurement of databases. If librarians do not consider accessibility guidelines and standards when selecting online resources, and if they do not give the impression that

accessibility counts, then the vendors take advantage of it to not to consider it a selling point (Byerley, Chambers & Thohira (2007, p.525).

4.8.3 Work overload and time consumption

In agreement with visually impaired students' responses, and also in line with the work of Whitehouse, Dearnely, & Murray, (2009, p. 175) which shows that librarians have other duties on top of supplying materials in an alternative format, library staff respondents affirmed that the challenge they face in providing the digital library resources to the blind is serving both the sighted students and the blind students at the same time. They further reported that serving blind students and searching for literature according to the blind student's interest consumes a lot of time since the library staff has to read through search results for the blind first and yet at the same time there are other students waiting to be served. Respondents said that it is not easy to serve well the interests of both groups of students and balance the interests of each group. Interviewee # 1 for example said;

"...I am working at the library reference desk with sighted students and also helping the blind to access the electronic and digital library resources at the same time. This is not an easy task for me unless the visually impaired students make an appointment or we work from my office but this also gives a disservice to other library users who may also require my service at the same time".

Interviewee #1 further said that she knows the database where to search from but the challenge she faces is that she has not been exposed to some subjects or courses which students pursue. She said that she is not an expert of every subject and that some subjects such as Philosophy, psychology, among others, are complicated to search. She explained that reading through every search results she gets for blind students to see which is useful and which is not, not only consumes much of the time but also it is a disturbing task. She went on to say that every master's student has the right to get time with academic librarians who are specialist in their subjects but librarians at this library say that they do not have time to help blind students for example to find out is this document useful or it is not?

Respondents further said that most blind students have reading assistants but the assistants are not librarians, therefore they are not capable of searching some of the sophisticated

library databases because most of the reading assistants lack the skills to use and search in those databases.

4.9 Suggestions or recommendations made by library staff for the improvement of digital library provision to the visually impaired

4.9.1 Library interface

The respondents recommended that librarians should put more effort on the universal accessibility of websites according to W3C standards. University librarians need to implore the developers of the interface for better services to the blind users. Respondent #2 said;

“The library should challenge the developers to make easier interfaces for the blind library users because it is important. As university librarians we need to cooperate because we cannot go against the developers, it is very important that we cooperate with the developers of the library website to make an interface that is accessible for every kind of library users”.

4.9.2 Electronic databases and document formats

Respondents suggested that the university staff responsible for subscribing to journal articles should always be mindful about accessibility issues if they want the digital library online resources to be accessed by all the library users including the visually impaired. They further suggested that the library should make sure the PDF articles that are in form of pictures are made in the right way so that screen readers can read them. For example it was mentioned that there is a program called acrobat not a reader which has a feature that can go through the image and make Optical character recognition (OCR). This is a program from adobe acrobat. This acrobat program goes through the image and uses OCR, put the document inside PDF so that it may be possible to change the PDF into text that can be read by the screen reader. However, respondents noted that this should not be the job of the librarian; it is the job of the publishers who delivers these articles. Therefore, the librarians should work with publishers to make PDF document format and other documents accessible to the visually impaired.

4.9.3 Contacts for library staff and website form

Respondents suggested that the library should at least put a contact library staff and online contact form specifically for visually impaired users. The respondents added that, currently the library website needs to be edited to have a contact form specifically for the blind users. Respondents revealed that there is a contact form at the university library website but it is too difficult for blind users to fill the available form because it has a lot of details. Besides, the contact form is available for all staff and it is not only one person answering queries from the students. Therefore, respondents recommended that the university library should consider putting a link specifically for blind users where they can fill and contact only one or few library staff.

Respondent #1 said;

“I am not blind so I cannot be able to say the electronic contact form is easy or not easy to use it...but I have been told very often by the blind students that it is difficult for them to use it. Therefore for blind students they should have specific link of email address and then they can have the connection with that person. That is my suggestion. Like here there is this digital connection, then there is a book for a librarian and here you can also send emails and this depends on the question you are having”.

The contact form can viewed from appendix 3 to see what the staff meant.

4.9.4 Creativity by library staff

Respondents suggested that in situations where the visually impaired cannot adequately access electronic library resources independently due to some inevitable barriers, the library need to be more creative and innovative get some local solutions. For example interviewee #2 said;

“if I should have a blind person what I do is use another application called Drop box that i can put all the search results the blind requested from the library, if the library can have a kind of package that you put this one pdf that with OCR ofcourse ready to use it and put this package with all the PDF in the drop box for the blind user , then a blind user can access it in an easy way and can access the articles with text to speech. That could be a good way to help the blind user”.

The same respondent added that both the library staff and blind student can install drop box on the computers. The library staff would organise and put documents requested by a visually

impaired student in one folder and give the password to the visually impaired student, once the student has a password, she or he can access the drop box folder from anywhere and on any platform. The respondent recommended that librarians should not wait for the large companies to solve the electronic –related problems because they will take years. Instead, it is better for librarians to be creative and work around to help these students. In addition, the respondent said that students do not stay long here to wait for the solution in future may be in two, three to five years to come. So the solution should be found now and not telling the blind to come next year, because when one needs information he or she needs it now. The respondents illustrated his suggestion by giving an example that the library staff should not wait for a company like Exlibris to make very good interface but rather the library should devise all the necessary means to get alternatives that can address the day-to-day challenges facing the visually impaired students in accessing digital library resources.

4.10 Chapter conclusion

This chapter presented, discussed and analysed data collected from in depth interviews administered to both the visually impaired students and library staff of university of Oslo library. The major themes with the subthemes were presented. The analyzed data showed some agreements and contradictions between and among different categories of respondents that is to say, among the visually impaired students, students and the library staff. In addition there seems to be a lot of agreements between the responses and the literature review as presented in chapter two).

The commonly used assistive technologies by visually impaired are JAWS and windows eyes screen readers, open book, Abby fine readers for scanning inaccessible PDF documents that are in form of pictures or images.

Additionally, the data analysed indicate that where the university library cannot adequately provide efficient library services, most students depend on other organizations such as NLB to access study literature and use other search engines like Google scholar as an alternative to access digital resources for their studies.

According to data analysis, respondents agreed that despite the fact that they have limited access to digital library resources, there are some benefits they get as blind students. It was also established that both the visually impaired students and the library staff face challenges in the access (students) and provision (staff) of digital library resources. These challenges have been presented, discussed and analysed above. Both groups of respondents (students and library staff) made suggestions and recommendations that would address the above mentioned challenges in a bid to improve digital library service delivery. These have also been presented, discussed and analysed in this chapter.

The next chapter presents the summaries, conclusion and recommendations of the study results.

Chapter five: Summary of the findings, conclusions and recommendations

5.1 Introduction

The main focus of the study was to explore the accessibility and provision of digital library resources in academic libraries, using university of Oslo library as a case study. Data was collected from both visually impaired students (access) and library staff (provision) using in-depth interviews.

Chapter five presents the summary of the findings, conclusions and recommendations.

The visually impaired students interviewed included graduate and Doctorate of philosophy).The library staff interviewed, one has served the visually impaired students for more than 5 years .The other library staff works with a group called digital services which aim at giving electronic library services to all library users therefore; this qualified him to be among the participants since his tasks are related to the topic understudy. None of them has done any formal course on how to serve and provide digital library resources to the visually impaired students but have attended related conferences.

The study was guided by the following research questions.

5.2 Research questions

- What means and technologies do the visually impaired students use to access digital library resources?
- What are the opportunities or benefits of accessing the university digital library resources by the visually impaired students?
- What are the challenges faced by the visually impaired students in the access of digital library resources in academic libraries?
- What are the challenges faced by libraries in the provision of digital library resources to the visually impaired in academic libraries?

5.2.1 Research question one; what means and technologies do visually impaired students use to access digital library resources?

5.2.1.1 Access to the university digital library resources

From the study, it seems that; the visually impaired students partly access the university's digital library resources but do not have full access independently.

The findings further indicate that the visually impaired do not have full access to digital library resources just like sighted students because the screen readers they use to access the digital library resources and do not work well with the university digital library system.

It also appears that not all the digital formats can be accessed by the visually impaired; an example is PDF format that is in form of scanned pictures or an image, this PDF format is not searchable either. Nevertheless, formats that can be accessed include; Document extended (DOCX), Microsoft Word documents (DOC), Hyper Text Markup Language (HTML) digital resources, electronic databases and electronic articles.

Additionally, the digital library resources that can be accessed are either downloaded or are read online. The inaccessible document formats are usually scanned by the visually impaired users and turn them back to formats that can be read by the screen reader, alternatively those respondents who have reading assistants have them read the inaccessible documents aloud for the visually impaired students. However, users felt dissatisfied because this method is very slow and somehow slows their reading and studying progress.

5.2.1.2 Means through which the visually impaired students access university digital library resources

Currently, it seems the visually impaired students do not adequately access the university digital library resources. The respondents access the university digital resources through, Library staff, reading assistants and friends because students lack the ability to search the library independently. The library staff that was mentioned as the most influential person

among others mentioned above searches for the students and sends the searched results through emails to the students. However, there was an expression of dissatisfaction from respondents about the way they access the library's digital resources due to lack of freedom to search by themselves. Additionally, due to time constraints and other duties, on the librarians side, the visually impaired students do not often have the librarian help them access the digital resources every time they want. Hence, there is a feeling that often some important information is missed out. However, while some students are not satisfied by the library staff services, other students recognises the importance of the librarian because with the librarian's personal involvement, some visually impaired students report being able to access digital library resources in an effective and efficient manner.

It is also important to note also that gaining access to university digital library resources is not as straightforward for visually impaired students as it may be for sighted students, for example while the sighted students might log on the digital library and access the resources immediately, the visually impaired rely on intermediaries to select and retrieve electronic materials on their behalf.

On a general note, much as we are in the digital age where academic libraries are providing their resources electronically, it is not surprising that the structure of traditional libraries is still existing which does not adequately favour and adequately meet the academic information needs of the students who are visually impaired; For example, while the sighted students access digital resources independently of other people the visually impaired still depend on other intermediaries to access electronic library resources.

5.2.1.3 Other alternative ways of accessing study literature and digital resources

When the visually impaired cannot adequately access digital library resources from the university library it was discovered that they look for study literature and digital resources from other sources which include; Norwegian library of Braille and talking books (NLB) for study literature however, there was discontent by respondents about NLB services because NLB is slow and does not provide all the study literature needed for the student's academics and their online catalogue does not provide full text documents or articles to students Refer to

section chapter 4, section 4. Likewise Huseby (Huseby resource center for the visually impaired in Oslo) is another centre that assisted some of the visually impaired students in a similar way like the university library staff refer to chapter 4 section 4. Additionally, results indicate that some respondents use Google scholar and other search engines as other alternative sources for digital resources because the university digital resources are not easy to access. Findings further reveal that google scholar sometimes lead the students to the university library website and in this way students can partly access some electronic documents in the university library. Therefore, in this sense Google scholar acts as an access channel to the university digital resources. Refer to chapter 4, section 4.

In general the visually impaired students do not feel they can adequately access and utilise the university digital library resources just like non sighted students, thus they seek for other means of access.

5.2.1.4 Assistive technologies used to access the digital resources

Students use the commonly used screen reading softwares; JAWS software for windows, that reads electronic text a loud and windows eyes by Micro soft that reads electronic text a loud from a DOS based computer screen.

The screen readers vary in terms of work processing and access time. These screen readers also use different command keys and techniques. The findings further indicate that this affects the students access to digital library resources and therefore students would require some special training on how to use them.

Additionally, open book, Abby fine reader, easy software reader, Omnipage help students to scan pdf that is inaccessible to formats that can be read by the screen reader. However the findings reveal that Omnipage software is not often used because it is neither easy to use nor easy to set up. Infor box speech synthesiser is also another screen reader that is used to turn text into speech. Without these softwares it is hard for the visually impaired students to access the pdf that is in form of a scanned picture or image.

5.2.2 The second research question; what are the benefits or opportunities of accessing digital library resources by the visually impaired in academic libraries?

Once the visually impaired students access the digital library resources the following benefits are achieved or got.

5.2.2.1 Freedom or independence

Once the respondents get access no matter the means, findings indicate that, the visually impaired students feel a sense of freedom or independence; they can go find the materials they want, download, save the document in the folder they want and read at their own pace and even use the same materials after their studies. Hence, students have many alternatives of reading the electronic documents. This helps them to plan for their time thus doing other things and at the same time concentrate on their studies.

5.2.1.2 Educational and social status

The findings indicate that access to digital library resources has the potential to change the VIP students' education status; students are able to follow courses at the same time as sighted students since they can go further and do private reading from the online resources rather than waiting for NLB to produce for them DAISY books. Therefore by accessing online articles and online books, the visually impaired students are able to follow classes easier. However, there was dissatisfaction among respondents because what they access is not enough and that is why they look for other sources of electronic literature and study literature elsewhere other than the university digital library. Additionally, access to digital library resources help the visually impaired students to increase knowledge in different topics of study, have accessibility of the same amount of documents as their sighted counterparts. More so, access to digital library resources reportedly increases the social interaction of the visually impaired students with other students. For example they can also contribute in class discussion groups.

Much as the visually impaired respondents do not adequately access most of the electronic resources from the university digital library independently, findings indicate that the resources they access help them in getting study literature that the Norwegian library for Braille and talking books does not provide. It can also be concluded that access to the digital library resources especially with the assistance of university library staff the benefits are the same as those of sighted students, though the problem the visually impaired still face is inadequate and lack of independence to access to the university library's digital resources.

Much as the above benefits reveal that there are positive potential of digital libraries and access to digital library resources in general to improve the lives of visually impaired students, however access rate is still low.

5.2.3 Research question 3; what are the challenges faced by the visually impaired students in the access of digital library resources in academic libraries?

5.2.3.1 Design of the library interface

From the study, the design of the university library interface was the gravest challenge faced by the visually impaired students to access the university digital library resources. The university digital library interface seems not to be designed in a way that screen reading software can navigate and read text a loud. It can be further inferred that when the interface is suboptimal, access of digital library resources by the visually impaired becomes very hard for example from searching and navigating. In addition, the library interface or website is considered as a door of the digital library, this is in agreement with (Power & Lebeau 2009, p. 56) who note that library websites are the digital front door to library services; they reflect the priority libraries give to their services, therefore it will be of much benefit if they are designed in a way that is accessible to the visually impaired.

5.2.3.2 Document format delivery

PDF document format that is inform of a scanned picture or image and closed for copying is one of the greatest challenges faced VIPs since the screen reader cannot read it aloud, hence not accessible. It is true that PDF that is form of text based is accessed by a screen reader but but if it is scanned in form of a picture or an image, the document cannot be accessed directly by the screen reader and it is no searchable either. Whenever a document is in PDF that is not accessible, students use other softwares like Abby fine reader to turn it back to a format that can be accessed by the screen reader. However, much as there are softwares that help to scan the inaccessible PDF format to a format that can be accessed, the study indicate that some figures inside the page disappear and some are jumbled words, therefore cannot be understood and read by the screen reader. Therefore, the user will miss some text inside the document.

5.2.3.3 Administrative challenge

The study indicate that, as felt by the respondents, the university digital library has not given much priority or has not sufficiently minded about access of information by the visually impaired students and has left at least some of this responsibility in the hands of other organisations for the visually impaired. NLB was the ,most often mentioned organisation that help the visually impaired students to have reading literature in alternative formats for their studies , yet students revealed dissatisfaction about NLB because it does not provide enough academic literature needed by students to follow the normal progression of their studies for example. NLB service does not provide electronic resources. Students seem discontent about this because they feel the university has excluded them from accessing the university digital library resources like sighted students yet they sit the same exams therefore need the same equal access to information.

5.2.3.4 Lack of competence

The lack of competence is in three categories; librarian's competence (in searching for electronic resources and lack of basic skills by librarians to use the screen reading software), Use of screen reader competence; the study findings indicate that this affects the level of access to electronic resources) and lastly lack of competence in use of the electronic and internet resources (this is partly contributed by the university library). Refer to chapter four, section 4.4.4 for more information. However, there were mixed reactions on the use of screen readers, findings reveal that with the help of training on the use of screen, one is able to access digital resources. Nevertheless, this probably could be partly due to training the respondent got from the manufactures of his screen reader, unlike other respondents who did not get any training. This is also supported by Pilling, Barrett, & Floyd (2004, p. 32) who assert that, the lack of support and training in the use of assistive technologies are identified as additional barriers to access electronic resources by the visually impaired.

5.2.3.5 Accessibility of the library WebPages

It was found out that usually the visually impaired students get a lot of hits with scattered links and inadequate skipping links when they search the university digital library. This leads to wastage of time because the students read through the different results, moreover for blind users, they might end up getting nothing because listening to every link or content becomes hard and wastes a lot of time. This seems the university digital library web resources are not designed according to accessibility guidelines.

5.2.3.6 Database design

The respondents felt that some electronic database designers and providers seem not follow WAI and WCAG accessibility issues. Refer to chapter four, section

5.2.3.7 Compatibility challenges in the use of Assistive technology

Results reveal that sometimes screen readers may hinder their smooth access to the digital library resources. This is because screen readers are developed to function with specific program, therefore may not be compatible with some programs. More so, new versions inform of updated versions. Learning and adapting to new versions pose a challenge to access digital library resources, students require a lot of time to learn how to use the new versions in accessing the digital library resources. This of course affects the access rate of the digital library resources. For more information refer to chapter four, section 3.4.8.

5.2.3.8 Graphic design

It was indicated by the respondents that the graphical design of some electronic resources in the library are not accessible by students using screen readers. Results reveal that some icons in the digital library resources appear like graphics or pictures therefore cannot be read by the screen readers.

5.2.3.9 Inadequate Library facilities and staff services

The number of library staff to serve the visually impaired students seem to be insufficient to fully accommodate the increasing number and access information needs of the visually impaired. This may affect the readiness of the visually impaired to pursue their studies smoothly.

More so, the findings indicate that there is lack of inadequate number of computers with installed assistive technologies at the whole university. This affects the students ability to access and use the digital library resources between classes, mostly during the free times they are free from lectures. Please refer to chapter four, section 4.4.9.

5.2.3.10 Legislative and ownership challenges

It was found out from one student that due to copyright protection from authors and publishers, pdf files that are closed for copying cannot be read by the screen readers.

5.2.4 Question 4; What are the challenges faced by libraries in the provision of digital library resources to the visually impaired students in academic libraries?

The following are the conclusions of the challenges faced by library staff in providing digital library resources to the visually impaired.

5.2.4.1 Library user interface design

Just as the visually impaired students already concluded, it was further confirmed by library staff that the library user interface is the gravest challenge faced by staff this is referred to chapter four, section 4.7.1. As discussed in chapter four, section 4.7.1, allegedly the university consortium UNIPORT does not even consider accessibility issues of electronic resources by the visually impaired so much.

5.2.4.2 Electronic databases and document formats

Findings further reveal that electronic databases and document formats the university library subscribes to are designed differently and it is therefore not easy to access information being provided by these electronic databases. For instance, some electronic databases have many links that may not be possible to navigate through by the visually impaired students who use a screen reader without any support from the library staff or intermediary person, yet some library staff are not willing to help. Some journal databases the library subscribes to have some articles that are not searchable and cannot be read by the screen reader. When the text in articles for example is extracted and scanned in a PDF format that is in form of a picture or an image, it is not possible to use the text to speech. This slows down the work of librarians because they have to look for alternative electronic documents for students.

5.2.4.3 Work overload and staff time consumption

Results from the study indicate that the library staff who serve the visually impaired students have other duties to perform and yet they have to search for the visually impaired students and serve the visually impaired students too. Moreover, findings reveal that searching for the visually impaired students take a long time because the library staff first reads through the search results before giving them to the visually impaired.

5.3 Recommendations made by both visually impaired students and librarians

5.3.1 Recommendations from visually impaired students

The findings indicate that the university library should consider the cooperation with website designers to design a user friendly interface, the university library designers should follow guidelines put by W3C on accessibility. Need has been expressed for more emphasis on cooperation between the university and other organisations serving the visually impaired.

More so, visually impaired students feel that there is need for special courses to them and library staff on how to use the screen readers and how to use internet electronic resources, how to improve their information literacy and skills on how to use the screen readers. This will improve the accessibility and provision of digital library resources in a much easier way. Currently, the library staff seems to lack the basic skills on how to use the screen readers.

Furthermore, since the visually impaired cannot independently access the digital library resources, there is need for more staff student contact persons specifically for visually impaired as the university library considers working on accessibility issues of the library resources.

More so, much as NLB provides help with students, students suggest that there is need for the university to take the responsibility of serving the visually impaired students too with electronic resources because visually impaired students seem to be dissatisfied with the university not providing electronic library resources in the same way to the sighted group of students has been expressed.

Lastly, the study indicated that visually impaired students need more computers installed with screen readers.

5.3.2 Recommendations from library staff

Findings indicate that the university library should consider tighter cooperation with the library interface developers to embrace the universal design of the library website interface according to W3C.

Likewise, library staff responsible for subscribing to journal articles should consider and always be mindful about accessibility issues.

Additionally, there is need for improvement on the online contact form to accommodate the visually impaired. The university library should consider the allocation of more contact library staff to address the needs of the visually impaired students regarding access to the library's electronic resources.

Lastly, library staffs need to be creative and look for other local means of providing electronic library resources to the visually impaired as the university digital library department fixes the accessibility problems.

5.4 Conclusions on the research problem

The statement of the problem was as follows; It is imperative to note that the development of digital libraries does not guarantee the visually impaired to have full and adequate access of digital library resources in academic libraries due to some obstacles, yet the visually impaired students are expected to take the same courses and do the same exams with sighted students who may have full access to digital library resources. Owing to the fact that the visually impaired students may have access to some of the digital library resources, this study thus sought to explore the means and technologies used by the VIP to access digital library resources, the benefits of digital library resources to VIPs if any, obstacles both the visually impaired students (accessibility) and libraries (provision) face in accessing and providing digital library resources by and to the visually impaired in academic libraries using University of Oslo as case study.

The findings indicate that the university library subscribes to many electronic resources which students and other library users use but however, the visually impaired students report not to have full adequate independent access to the university digital library resources.

Without any intermediary helping them like library staff, friends, reading assistants, visually impaired students do not experience the ability to access and locate the library's electronic information and this is due to limitations of access which include among others; poor library interface design, poor document formats like PDF that is inform of a scanned picture, lack of library facilities and other factors as analysed in chapter four section 4.3. Likewise, findings further indicate that library staff also face challenges in providing digital library resources to the visually impaired as analysed and presented in chapter four section 4.5.

The findings further indicate that due to the inaccessibility of the university digital library's resources, the visually impaired seek for study literature and other digital resources from other places like NLB and Google scholar. However, the results from the study indicate dissatisfaction of NLB services because it does not provide enough study literature to the visually impaired students for example compendiums yet the university is not fully helping the visually impaired access and be provided by compendiums and other study materials like other sighted students.

It is also imperative to point out that the social model is found particularly applicable to the findings of the as the visually impaired do not have equal access to the digital library resources not because they are visually impaired but because in this case the university has not adequately responded to their needs. For example if the library website interface is not designed in an accessible way, the visually impaired will not have access to the electronic resources not because they are visually impaired but because the university has not followed the accessibility guidelines on how to make websites and content accessible to the visually impaired students. This is in agreement with the social model of disability which states that people with impairments are disabled by the fact that they are excluded from participation in the mainstream of society as a result of physical, organizational and attitudinal barriers (Carson, 2009, p.4).

5.5 Recommendations and further research

It seems that the visually impaired students do not independently access the university digital library resources due to some obstacles which include; poor interface design, poor

document formats, lack of competence, poor administration, poor data base design as presented, analysed and discussed in chapter 4.3 and 4.5

Despite the tremendous increase of electronic information available in academic libraries and the diversity of tools to locate and access this information, this increase in the amount of information available and the improvement in its accessibility has had a huge impact on academics' information behaviour (Olle´ & Borrego, 2010, p. 46), however, the findings of this study indicate that the visually impaired students are not adequately catered for in aforementioned development. They do not experience adequate value from the development of digital libraries, beyond being helped by intermediaries like library staff or reading assistants to access the electronic library resources. This indicate that they are limited to the amount of information they access from electronic resources and lack freedom of independence to directly access digital library resources. Additionally, in this digital age the visually impaired students still seem to depend on organisations for the blind to access study literature for their studies, yet these organisations do not provide every study literature or reading materials needed by visually impaired students to follow the normal progress of their studies.

The following hypotheses call for further research around accessibility and provision of digital library resources for the visually impaired students in academic libraries.

To begin with, there seem not to be enough collaboration and cooperation as it is already explained in chapter four, section 4.5.4 and section 4.7.1 between different university stakeholders with other organisations to address the obstacles faced by the visually impaired students as regards to access to and provision of digital library resources.

Basing on this, there is need for more research on the extent to which academic libraries, particularly university libraries, collaborate and cooperate with different stakeholders and other organisations to determine if this problem affects the access and provision of digital library resources to the visually impaired students in academic libraries.

This could be strengthened or weakened by (for example) a questionnaire based survey directed at a number of different stakeholders working with university libraries, to find out the degree of collaboration.

Secondly, non compliant design of web-pages or library website. There is need for more research on the extent to which the university library websites follow WAI accessibility standards.

This study did not test and analyse the accessibility of the university library interface by the visually impaired students. Therefore, more investigation is needed on the above issue. This could be done through testing and analysing several university library websites with respect to WAI/WCAG involving blind users perform search tasks of the web resources offered by the university digital libraries.

Additionally, there is shortage of competence on the part of both staff and VIP in using assistive technologies, electronic library resources. Refer to chapter four, section 4.4.4

This hypothesis could be strengthened or weakened by a survey going to library staffs of many university libraries who have visually impaired students in their libraries, both in Norway and abroad to establish the extent to which this affects the access and provision of digital library resources to and by the visually impaired. The sample population on this investigation could involve library users, staff and expert trainers with experience and educational backgrounds who not only utilize the technology but also know how to assess digital resources and how to use and overcome barriers caused by ineffective use of the assistive technologies to access the digital resources.

More so, there seem to be insufficient Library instruction. The university library's information literacy program on how university library users access the digital library resources seem not to include the VIP students. The literacy program seem to lack specialised facilities to help VIP students gain searching skills of the electronic library resources.

An investigation is needed into this matter, one way could be by use of a survey in different university libraries in and around Norway investigating both the visually impaired students and library staff(who serve the visually impaired students) . The focus of the study could be on actual needs, existing training offers, and the gap between the former and the latter.

Furthermore, lack of considerations for accessibility needs to electronic databases of VIP students. As seen from the findings, it seems the university library does not consider the

accessibility of electronic resources for the VIP students from commercial journal suppliers of electronic databases or publishers.

This hypothesis could be strengthened or weakened by an online questionnaire or surveys, informally interviewing key persons in companies who provide journal articles to university libraries as well as library staff who deal with the procurement and subscription of electronic databases on their knowledge, awareness and attitudes towards the issue.

The researcher believes that by looking into the above obstacles faced by both students in accessing and staff in providing digital library resources to the visually impaired the obstacles will be minimized..

Finally, it is hoped that the findings could be useful for academic libraries, other researchers in Norway and abroad, and all those interested in the accessibility and provision of digital library resources to the visually impaired, in Norway and abroad .It is also anticipated that this research will add to the body of knowledge.

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APPENDIX 1: Book a Librarian online form

The screenshot shows a web browser window displaying the 'Book a Librarian' page on the University of Oslo Library website. The browser's address bar shows the URL 'Book a Librarian - University of Oslo Library'. The website header includes the logo 'UiO : University of Oslo Library' and a search bar. A navigation menu contains links for Home, Subjects, Borrowing, Publishing, About the library, and People. A sidebar on the left lists navigation options: About the library, Contact, Ask a librarian, Book a librarian (highlighted), Special needs, and Suggest a purchase. The main content area is titled 'Book a Librarian' and describes the service as available to students and staff at UiO and OUS, Rikshospitalet. It lists two bullet points: 'Are you working on an assignment, a project or a thesis?' and 'Do you need help or guidance in search for printed or electronic information?'. Below this, it states that booking a librarian involves spending an hour with assistance adapted to needs, and provides the preferred time (Monday - Friday, 9 am - 3 pm). It asks users to use the form to request a booking, promising a response within two working days. The form fields include: 'Staff, UiO or OUS,' with a radio button; 'Rikshospitalet' with a dropdown arrow; 'Student, UiO' with a radio button; 'Name', 'Email', 'Phone', and 'Preferred time' with text input boxes; 'Select a library' with a dropdown menu showing 'Select'; and a large text area for 'Describe your question or information needed'. At the bottom are 'Submit' and 'Reset' buttons.

Book a Librarian - University of Oslo Library

UiO : University of Oslo Library

Search in University of Oslo Libra Search

Home Subjects Borrowing Publishing About the library People

About the library

Contact

- Ask a librarian
- **Book a librarian**
- Special needs
- Suggest a purchase

Book a Librarian

A service available to students and staff at UiO og OUS, Rikshospitalet.

- Are you working on an assignment, a project or a thesis?
- Do you need help or guidance in search for printed or electronic information?

Book a librarian and you will spend an hour with a librarian offering assistance adapted to your needs.

Please let us know your preferred date and time (Monday - Friday, 9 am - 3 pm).

Please use the form below to request a booking. We will answer you as soon as possible, and at the latest within two working days.

Staff, UiO or OUS,

Rikshospitalet

Student, UiO

Name

Email

Phone

Preferred time

Select a library

Describe your question or information needed

APPENDIX 2: INTERVIEW GUIDE FOR THE VISUALLY IMPAIRED USERS

Do you have access to digital library resources at the university?

If yes, which kind of digital library resources do you have access to?

If no, what reasons do you give for not accessing these resources?

If yes, in which ways do you access digital resources in this library?

What assistive technology do you use to access the digital library resources, and how do you find it?

What is your experience using the university digital library resources?

What are some of your information needs as regards to the access and use of the digital library?

How helpful are the university digital library resources to your studies? Or how do these resources meet your educational information needs?

What challenges do you face when accessing the digital library resources?

In your opinion how do you suggest the digital library services to be improved to suit your needs?

How can digital library services be improved to offer better services to the visually impaired?

Is there any other thing concerning the topic you would like to tell me?

Thank you for being part of this study.

APPENDIX 3: INTERVIEW GUIDE FOR STAFF

In your library, do you have visually impaired users?

How long have you been serving the visually impaired in this library?

Do you have any special training in providing information to users with visual impairment? If yes, specify... If no, how do you serve them...?

How do you communicate with the blind users, how do you identify their user needs?

What digital library resources or formats do you offer in this library?

Among the resources mentioned above, what specific digital resources does the library offer to the visually impaired?

In which ways do you provide the digital library resources in this library?

In your opinion, do the visually impaired persons have special information needs as regards to access of the library's digital resources?

What challenges do you encounter in providing electronic information resources to the visually impaired?

In your opinion, how can access to and provision of digital library resources be improved to offer better services to the visually impaired?

Is there any question or any other thing concerning the topic you would like to tell me?

Thank you for being part of this study.

APPENDIX 4: INTERVIEW INVITATION LETTER

Dear respondent,

My name is Patience Agabirwe, a master's degree student at Oslo University College pursuing International Master's in Digital Library Learning. I am carrying out a study on Accessibility and Provision of digital library resources to the visually impaired students in academic libraries: A case study of University of Oslo Library.

I have been given your email contact from the university of Oslo accessibility department to help me be part of my research study.

The study includes visually impaired students particularly those who are totally blind, pursuing master's degree or doctorate of philosophy and librarians who serve these students.

However, I do not have a visual impairment and I have no experience of serving visually impaired students in libraries. I feel it is important to ask people who are visually impaired and those who provide with them information to help me explore the Accessibility and Provision of digital library resources in academic libraries.

If you accept to be part in this study, I will conduct an interview with you at your convenient time and place. Please note that data collection starts from 1st April 2011-30th May 2011.

For any questions about the study, please ask by replying this email.

I will be grateful for your support.

Kind regards,

PATIENCE AGABIRWE

OSLO UNIVERSITY COLLEGE.