CHALLENGES IN ACCESSING ELECTRONIC INFORMATION RESOURCES BY STUDENTS WITH VISUAL IMPAIRMENTS IN KENYATTA UNIVERSITY POST MODERN LIBRARY

BY

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DECLARATION

I confirm that this project is my original work and has not been presented in any other university/institution for certification. The project has been complemented by referenced works dully acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works - including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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I confirm that the work reported in this project was carried out by the candidate under my supervision as university supervisor.

Signature ……... Date ……..……..

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DEDICATION

I dedicate this work to mum and dad for denying themselves the good things in support of my well being and education; and to my dear brothers and sisters for always wishing me well.

ACKNOWLEDGEMENTS

I acknowledge the almighty God for giving me the precious gift of life and the strength to pursue my studies to this level.

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ABBREVIATIONS AND ACRONYMS

AT	Assistive Technology
GUI	Graphical User Interface
IR	Institutional Repository
KU	Kenyatta University
OCLC	Online Computer Library Centre
PDF	Portable Document Format
SPSS	Statististical Package for Social Sciences
UN	United Nations
USA	United States of America
VI	Visually Impaired

ABSTRACT

The increasing provision of Web-based information resources has moved from a simple text interface to dynamic and interactive designs. While this move has provided people with a more creative and flexible experience, there are dangers that some people will be excluded because they cannot use standard methods of access. In this light, this study came timely to explore the challenges that students with visual impairment faced in accessing electronic information resources. Technological, institutional and personal factors were examined closely to find out their related challenges in accessing e-resources by students with visual impairment. The study's specific objectives were; to examine factors that affect information seeking by students with visual impairment, to identify the challenges that students with visual impairment face in accessing e-resources, to find out how the use of adaptive technology affect students with visual impairment in accessing e-resources and to describe the training offered to students with visual impairment in accessing e-resources. The experiential learning theory proposed by Carl Rogers in 1986 was used. The study adopted a descriptive survey research design to describe the challenges that students with visual impairment faced in accessing electronic information resources. The study was carried out at Kenyatta University Post Modern Library. The population comprised of 80 students and 5 staff members. The sample consisted of all the total population. Questionnaires were used to collect data from the students while personal interviews were conducted for the staff. A pilot study was conducted before the actual study to pretest the tools thus ensuring their reliability and validity. The data collected was analyzed using both quantitative and qualitative methods. For Quantitative methods, descriptive statistics was used. Specifically, Statistical Package for Social Sciences (SPSS) was used to generate frequencies and percentages. After data analysis; tables, graphs and charts were used to present quantitative data while qualitative data was presented in textual mode. The study established that most of the students were not able to retrieve and use e-resources though their own efforts, most students with visual impairment used other students to read for them, more than half of the students found it difficult to use e-resources, more than half of the students had not received any user education on how to access e-resources and that staff serving users with visual impairment had average skills in assistive technology (AT). The study concluded that: students with visual impairments lacked independence in using e-resources, assistive technology is a key aspect in the access of e-resources by users with visual challenges and that literacy levels in AT and e-resource for students and staff is a key challenge. The study recommended library management to encourage independence of learners through equipping them with self reliant skills like information literacy and AT skills, Organize training and induction forums for staff and students on AT and e-resources and provide adequate AT devices. Further research was also highly recommended.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter introduces the study and covers the following sections: background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, assumptions, limitations and delimitations, theoretical framework, conceptual framework and definition of operational terms.

1.2 Background to the study

Today, we can say that almost everything is having "electronic" prefix and the way to access information has changed substantially because of the many factors like fast advancements in computer technology and internet which is getting more and more widespread every day. Although some people stick to printed resources, the fact that electronic resources offer innovation and irresistible options in terms of cost and time is obvious.

Johann Gutenberg's invention of printing machine in 1450s brought about fast advancement in book industry. By time, computer joined into the process and the book industry took its share from electronication. The electronic book (e-book) concept came forth as a result of this development process and was first released to market place in 1990s (Gregory, 2008). Electronic books, first launched in the USA and given the name e-books, have been getting increasingly popular in the world. e-books can be defined as books prepared to be read via computers or e-

book readers as they have some additional features besides printed books as: visuals, sound effects and interactive links (Assist & Ongoz, 2010).

Reviewing the recent past, it can be seen that sharing method of resources of academic researches were printed references. However today lots of resources like; books, journals, encyclopedias, theses, scientific articles and reports are open for access in electronic databases in digital media (Assist & Ongoz, 2010). In recent years, the information superhighway, the Internet, has become a global gateway for information dissemination with the ability to share worldwide collections of information (Ekwelem, 2013).

Considering the growing activity in designing digital libraries, portals, intranets, repositories and databases and libraries promoting the use of web 2.0 technologies, it seems timely to note concerns to ensure that information is available to all. Concerns to design accessible web pages for visually impaired users should especially be headed (Kleynhans & Fourie, 2013).

Loss of vision seriously inhibits persons with visual impairments from accessing very useful information especially those available in print (Wusasa, 2013). As more people with disabilities attend higher institutions, it is incumbent upon library management to provide the same level of service to them as is provided to users without disabilities (Ekwelem, 2013).

From a global perspective there have been some concerns about persons with disabilities. The UN Convention on the rights of persons with disabilities, article 21 asserts that “State Parties shall take all appropriate measures to ensure that

persons with disabilities can exercise the right to freedom of expression and opinion, including the freedom to seek, receive and impart information and ideas on an equal basis with others and through all forms of communication of their choice ..." (Javier & Calvo, 2014)

In Kenya, persons with disabilities are also considered in national provisions of the law. For instance, Article 54 of the constitution of Kenya states that a person with any disability is entitled to reasonable access to all places, public transport and information, and to access materials and devices to overcome constraints arising from the person's disability.

Libraries are service organizations which give services without discrimination to their numerous users, including persons with disabilities. Digital libraries should be especially well-suited for the disadvantaged (Higgins, 2013). Persons with disability are found aware of latest technologies and rely on training to utilize its benefits (Kumar & Sanaman, 2013). The development of assistive technologies have provided great opportunities for people with disabilities to transform their way of life in a productive way, efficient and result oriented way (Butucea, 2013).

The Kenyatta University Post Modern Library is an academic library of Kenyatta University which is situated in Kiambu County, about 20 kilometers from Nairobi's city center along Thika Superhighway. It is the largest academic Library in the country. The Library provides access to both print and electronic resources including e-journals and e-books databases and other locally digitized materials. The KU Post Modern Library is now fully automated and moving

towards fully digitizing its collection. Open Access resources compliment the library's e-resources collection and the library also has local digitized materials which include the Institutional Repository (IR) and online databases of e-theses and past examinations. The library has a well established section for users with special needs which caters for users with visual, hearing, learning and physical disabilities. It is therefore important to ensure that such electronic information resources are accessible to all categories of users including students with disabilities.

According to the dictionary for library and information science, the term accessibility refers to the ease with which a person may enter a library, gain access to its online systems, use its resources and obtain needed information regardless of format. In a more general sense, accessibility refers to the quality of being able to be located and used by a person. In the web environment, accessibility refers to the quality of being usable by everyone regardless of person's disability.

With the library being a key provider of information especially to students with visual impairment, there is need therefore to keenly study the factors that hinder access to information especially those in electronic format by this special category of users.

1.3 Statement of the problem

Persons with visual impairment have the same need to have access to all kinds of information as everyone else and for the same good reasons – leisure, education, employment, etc. (Javier & Calvo, 2014).

Whereas accessing electronic information resources offers opportunities to obtain accurate and timely literature, observation shows that there is low usage of these resources by students with visual impairment in Kenyatta University. In addition, they spend more time on the computer trying to retrieve a single information resource.

If this situation prevails, the students with visual impairment will continue lagging behind in the moving information world where knowledge is easily generated from the available electronic resources. They will not be able to access electronic resources which would be a rich bank of worldwide information in all fields of study.

The task of this study was therefore to identify the challenges that students with visual impairment faced in accessing electronic information resources. The ability to show the challenges these students faced was to help the library management to consider ways of increasing accessibility to e-resources which would enhance access to information.

1.3.1 Purpose

The purpose of this study was to investigate the challenges that students with visual impairment face in accessing e-resources.

1.3.2 Objectives

The following were the objectives of the study:

1. To establish the factors that affect information seeking behavior by students with visual impairment.
2. To identify the challenges that students with visual impairment face in accessing e-resources.
3. To find out how adaptive technology affect students with visual impairment in accessing e-resources.
4. To describe the training offered to students with visual impairments in accessing e-resources.

1.3.3 Research questions

The research was based on the following questions:

1. Which factors affect e-information seeking behavior by students with visual impairment?
2. What kinds of accessibility barriers, are encountered by students with VI in retrieving and using e-resources?
3. How does adaptive technology affect access of e-resources by students with visual impairment?

4. How do students with visual impairment receive training in accessing e-resources?

1.4 Significance of the study

The findings of this study would enable the library management to make informed decisions in the build-up and organization of electronic information resources especially in this age of digitization.

Library users with visual impairments could also benefit in the long run from this study since the findings of the study would lead to suggestions or possible solutions to the identified challenges thus making their information needs to be met with less hustles.

The study becomes of great importance to future researchers and scholars as it forms basis for more research. In addition, it would act as an eye opener for new researchers in the field of information needs for users with special needs.

1.5 Limitation and Delimitation

1.5.1 Limitation

This study focused solely on students with visual impairments and therefore lacked a control group of sighted students against which the results of students with print disabilities could be measured.

The sample was limited to the library users with visual impairments at Kenyatta University. Therefore, findings could not be generalized to the entire population

of students with visual impairments in Kenya, even though it would not be out of place to speculate that the situations could be similar nation-wide.

1.5.2 Delimitation

The study only focused on the population of library users who are students and have visual impairments. The fully sighted students who also use the electronic information resources did not form part of the study. The post modern library has other formats of information resources. However, the study only focused on electronic information resources since they are considered to benefit the students with visual impairment a lot once the challenges of access are found and alleviated. Several factors could be studied in a library environment but this study only concentrated in those factors limiting access to e-resources by a special group of users, specifically students with visual impairments. In the current world of inclusion, several institutions offer services for visually impaired but this study was specifically conducted at the Kenyatta university library since it has a well established section for users with special needs where those with visual challenges constitute the majority.

1.6 Assumptions

The researcher made the following assumptions to guide the study:

1. Kenyatta university post modern library has electronic information resources.
2. Students with visual impairments have information needs.
3. Students with visual impairments use e-resources

4. There are challenges affecting visually impaired students in accessing e-resources.
5. Adaptive technology is used at the Kenyatta University Post Modern Library and that it affects retrieval of e-resources in some way.

1.7 Theoretical and Conceptual framework

1.7.1 Theoretical framework

The study adopted the Experiential Learning theory proposed by Carl Rogers (1983). The theory distinguished two types of learning: cognitive (meaningless) and experiential (significant).

According to Rogers, learning is facilitated when: (1) the student participates completely in the learning process and has control over its nature and direction, (2) it is primarily based upon direct confrontation with practical, social, personal or research problems, and (3) self-evaluation is the principal method of assessing progress or success.

In his theory, Rogers emphasized the following:

- Significant learning takes place when the subject matter is relevant to the personal interests of the student
- Learning which is threatening to the self (e.g., new attitudes or perspectives) are more easily assimilated when external threats are at a minimum
- Learning proceeds faster when the threat to the self is low

- Self-initiated learning is the most lasting and pervasive.

This theory was applicable to my study because information seeking is part of the learning process. The process of seeking information generates knowledge by providing access to the bank of knowledge found in information resources which includes electronic resources.

In order to make this information meaningful to the learner, self initiated information seeking behavior should be employed. The student should participate fully in the process of searching for information and have control over the type of information sought and the entire searching process. Librarians should only facilitate this process by providing the right search strategies to the learners and equipping them with valid information literacy skills.

Students with visual impairments also have similar information needs as the other sighted students. They should therefore be able to search for information independently.

The right equipments should be provided to them, adaptive technology as well as information retrieval skills and skills on the use of adaptive technology. By doing this, the external threats to information access are minimized.

1.7.2 Conceptual framework

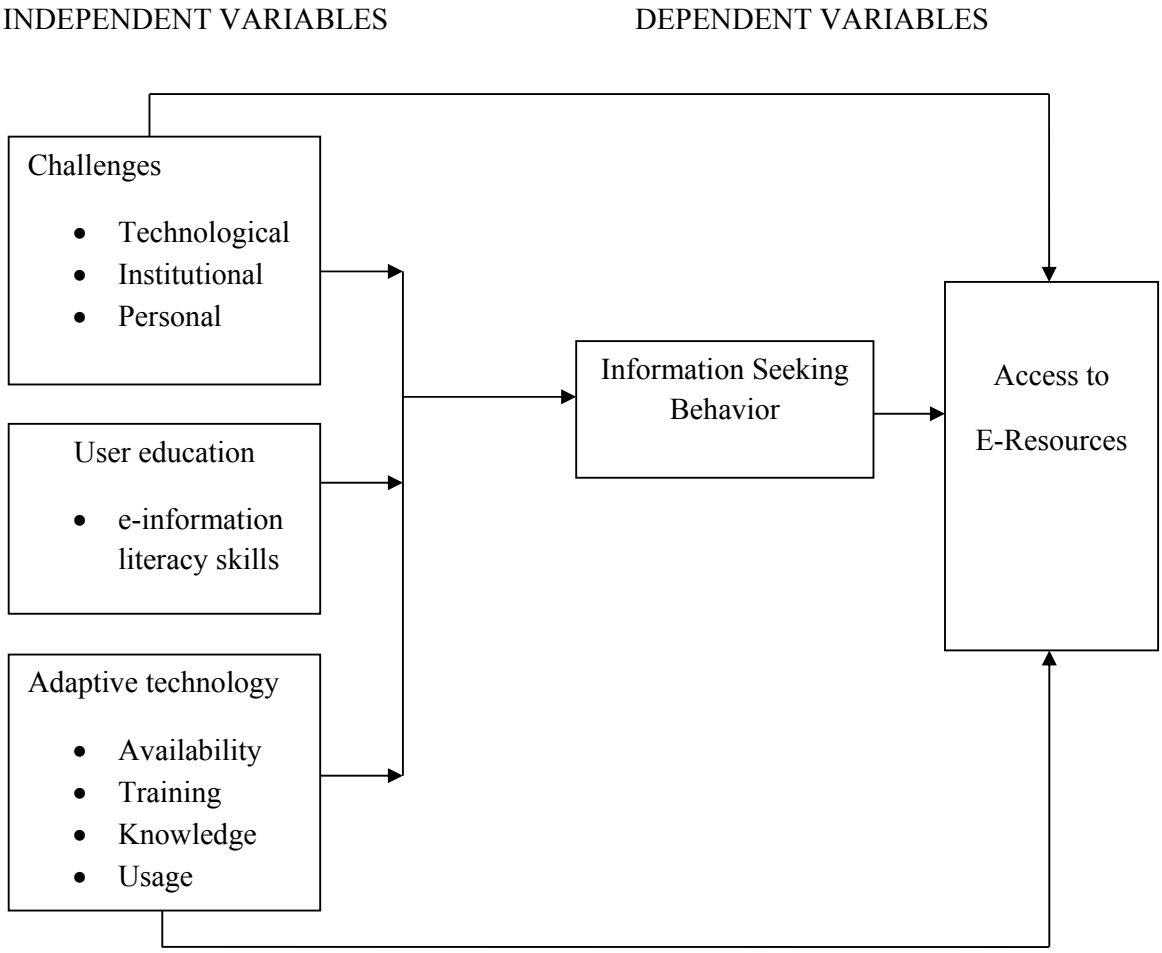

Figure 1. 1: Conceptual framework

Source: Researcher, 2014

1.8 Operational definition of terms

Access: Obtain, or retrieve.

Accessibility: the ease with which a person may enter a library, gain access to its online systems, use its resources, and obtain needed information regardless of format. The quality of being able to be located and used by a person. The quality of being usable by everyone regardless of disability.

Electronic resource: Any information source that the library provides access to in an electronic format.

E-information: Information obtained from electronic resources.

E-book: Is a book-length publication in digital form, consisting of text, images, or both, readable on computers or other electronic devices.

E-journal: A newspaper or magazine that deals with a particular subject or profession that can be accessed via electronic transmission.

Visual impairments: Limitations imposed by visual loss or reduction on a person's ability to interact with environment. It includes total blindness and low vision.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter contains a review of related literature under the following Subheadings: Electronic resources and access to them, Information seeking behavior of students with visual impairment, digital library, adaptive technology, information literacy and the challenges of access to e- resources. The aim of this review of the literature is to establish the research gaps some of which the current study seeks to address.

2.2 Access to electronic resources

Tenopir et al. (2009) as cited in (Nández & Borrego, 2014) showed that scholars' use of electronic information has increased substantially over time as academic libraries transit from print to electronic collections. Nandez &Borrego in their 2014 study noted that the adoption of electronic information in academic setting has been extremely successful.

Doiron (2011) as cited in (Chaudhry, 2014) pointed out that reading materials in new electronic format is opening up new opportunities to bring reading to more people and suggested that schools and libraries should take advantage of this situation to promote reading.

The use of the internet is becoming an essential part of day-to-day living. This has two implications for people who are visually impaired or blind. First, access to the internet using contemporary technology may present barriers, thus

excluding them from fully contributing in society. Second, once accessibility barriers have been overcome, the internet offers a quick access to information that was not readily accessible before (e.g. electronic versions of newspapers, job applications). For these reasons, there has been a great deal of research into how people with visual impairments access the internet, what they use the internet for and the barriers that they face (Hewett, Torgerson, & Douglas, 2014).

The increasing provision of Web-based information resources has moved from a simple text interface to dynamic and interactive designs. While this move has provided people with a more creative and flexible experience, there are dangers that some people will be excluded because they cannot use standard methods of access. Research has shown that people with disabilities are most at risk of being excluded from access, and in particular people who are blind or visually impaired and who use assistive technologies such as screen readers (Brophy & Craven, 2014). With initiatives such as the Millennium Development Goals and Education for All by the United Nations (United Nations, 2011) learning materials must be available as open education resources to achieve the goals. In his study (Brophy & Craven, 2007) notes that the accessibility of Web-based information can be improved in two principal ways: through the use of access technology and through adopting good practice in interface design.

2.3 Information seeking behavior

With the rapid development of information technology and near-universal access to the Internet, people are increasingly doing more of their reading and

information gathering on computers rather than in printed books (Chia-chen & Chen, 2014).

An extensive search produced only one study on the information behavior of students with visual impairment. Saumure and Given (2004) as cited in (Dermody, 2011) indicated that information seeking behavior of students with visual impairment required additional time to ensure the material was accessible. Unlike students who were not visually impaired, students in Samure and Givens study indicated they had to go back and forth with their disability office to ensure the article or book was accessible, and that they relied on interpersonal contacts like librarians, friends and counselors to ensure they could access information. Therefore the students lacked independence in their information seeking behavior. Students also indicated that they looked for readily available resources on the internet. Relying on accessible information reduced the amount of resources they could have used for their research (Dermody, 2011). This study sought to explore the information seeking behavior of students with visual impairment in Kenyatta University when they are searching for information in electronic format.

2.4 Digital library

Digitization is one initiative that has changed the entire concept of libraries and the ways in which scholars, students, and users in general access and use scholarly information. Digitization is the process of transforming the information from documents such as a printed book, picture or video into bits (Paul & P. Singh, 2014).

The primary goal of libraries is to increase their global visibility and the ultimate purpose of digital projects is to provide greater access to their collections to promote research activities. A research carried out by (Paul & P. Singh, 2014) summarizes that increased accessibility is the most preferred objective of digitization and that content value is its most preferred criterion.

While there is no universally accepted definition of a digital library, it is useful to think of it as a series of interrelated services built on digital information content. The key user-related processes have been variously defined, perhaps most commonly as resource discovery, location, request, and delivery. In order for resources to be discovered and used they must be described (that is, metadata created) and organized. Services are then built on this organized content. In order for the effort expended to be worthwhile, these services must be used, and for that to take place there must be some kind of user interface (Brophy & Craven, 2014)

Digital conversions have specific characteristics which make them more popular in this information intensive environment when users want to get all information related to their area of study (Paul & P. Singh, 2014). As discussed by Singh (2008), some of the important characteristics of digitization which motivates libraries to initiating digital conversions are:

- *Information accessibility:* Digital resources can be accessed from anywhere, anytime (24/7) with network (intranet or internet) connectivity, thus saving time.
- *Improved searching:* Digitized information facilitates improved access with

various simple advanced searching techniques and retrieval facilities. Also, digital information can be accessed simultaneously by many users at a very low cost.

- *Timely access:* With the emergence of web and digital technology, the publishing time-lag has been reduced substantially, which was earlier incurred by postal deliveries and peer-reviewing. Authors can now directly host their articles on the web for instant public use.
- *Improved access:* Digital resources have broken the barriers of time, space, and culture. It facilitates fast and seamless access to geographically distributed resources resulting in their greater use by end-users.
- *Improved display:* Digitization allows the integration of graphic and multimedia formats in user interfaces for the efficient and user-friendly display of information. The information can be arranged in any fashion, depending on the needs of the users. Hypertext display and accessibility features are generally improved with digital forms of input information.
- *Potentiality of quality copying and speed:* With digitization, any number of copies, with high or low resolution, can be generated with the touch of a button without loss of quality. It can enhance legibility and remove visible flaws such as stains and discoloration.

The other discussed advantages of digitization include preservation of resources, space saving and sharing of resources. However, digitization of resources to suit users with visual impairments has not been explored through research.

The interface of choice for nearly all digital libraries is the World Wide Web (www). Although significant changes are taking place in Web technologies, 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 (Brophy & Craven, 2007). The graphic display may pose several challenges hence the need to explore how users with visual impairment view them as they search the web.

The design of a digital library should not only meet its key business requirements, but also have to deal with the cross domain, heterogeneity, and uncertainty of data resources (Borjigin, Zhang, Xing, Lan, & Zhang, 2013). As highlighted by Paul & Singh (2014) the goal of digital libraries is to provide greater access to their collections to promote research activities. However, the area of accessibility to the digital library by the special group of users with visual impairment has not been touched on through research. Therefore the necessity of this study was inevitable especially in this digital era of the information society.

2.5 Adaptive technology and accessible web design

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. 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. These computer-related aids and equipment are

commonly known as “assistive,” “adaptive,” “access,” or “enabling” technology. Often people will use a combination of the above technologies to enable them to read electronic print. For example, they may use speech output predominantly, with Braille output to verify unusual spellings or language. Magnification may be used to explore a page, with speech output to read out more text-rich parts of the page (Brophy & Craven, 2007).

Provision of assistive equipment (adaptive, enabling, or access technology) will enable a user with visual impairment to access on-screen information receiving output in a way that is appropriate to their needs. However, in addition to this, the information provided on screen must be presented in a way that can be interpreted by any kind of access technology. This is what is referred to as “accessible Web design,” “design for all,” or “universal design.”(Brophy & Craven, 2014).

A study carried out in Canada by (Dermody & Majekodunmi, 2011) established out that there is no doubt that technology has opened the door for students with disabilities. They noted that from screen readers to augmentative communication programs, persons with disabilities can attend classes, participate in discussions, and read and write assignments independently. However the study also showed that technology can also be a barrier. For instance, the advances in Web 2.0 and the new virtual learning environment does not always take into consideration whether or not it is compatible with the assistive technology students rely on (Dermody & Majekodunmi, 2011).

According to (Brophy & Craven, 2014), "Design for all" in a library environment basically means that library information technology (IT) systems and interfaces must be designed in a way that enables them to be read and interacted with easily by all users of the library, whether they are physically visiting the library itself or accessing it remotely and regardless of any disability or access preference they may have.

This study sought to find out the situation at Kenyatta University Post Modern Library, in availability of adaptive technology and its use.

2.6 Information literacy

(Dermody, 2011) indicates that there are various studies on the importance of information literacy instruction and its impact on the research skills of university students (Zoellner, Samson and Hines, 2008; Mittermeyer and Quirion, 2003; Valentine, 2001; Nowicki, 2003). Studies by Mittermeyer and Quirion (2003) and Nowcki (2003) demonstrated that students as a general population have significant limited knowledge of the basic elements of research and database searching. Head and Eisenberg's (2009), study indicated that students draw on the same few information resources and preferred sources for their "Brevity, consensus, and currency over other qualities and less so for their scholarly authority". Studies like Zoellner et al. (2008) indicate the importance of instruction and how it can increase the confidence of students in conducting research, but there is no study on whether library instruction tailored to the unique needs of students who use screen readers will increase their confidence and improve their search strategies. Through further investigation and

consultation with students who use screen readers, (Dermody, 2011) observed that academic librarians can play an important part to minimize barriers in database searching. Saumure and Given (2004) indicated that students with visual disabilities rely on librarians to retrieve and locate materials in the library. The article by Power and LeBeau (2009) supports this and suggests that academic reference librarians can provide students who use screen readers training sessions on how to navigate library databases. This study sought to find out how the situation is at Kenyatta University Library.

2.7 Challenges of access

Various studies indicate that students with disabilities experience unique challenges when accessing library resources (Riley, 2002; Byerley and Chambers, 2002; Coonin, 2002). Students who rely on screen readers experience barriers accessing information due to their rich graphical interfaces and complex web designs of proprietary online databases (Horwath, 2002). Bowman (2002), and Byerley and Chambers (2002) tested the accessibility of specific electronic databases with screen reading software and found they were not user-friendly. Horwath (2002) surveyed users who were blind or visually impaired on the usability of four databases and found that the design had the greatest impact on the accessibility of the databases. Byerley and Chambers (2002) examined the accessibility of two databases (OCLC First search and Expanded Academic) by blind students using screen readers. Web content accessibility guidelines were used as a measurement of accessibility. They found again that design elements in both databases compromised the accessibility of the databases (Dermody, 2011).

A more recent study by Byerley, Chambers and Thohira, (2007) examined the accessibility of online databases from the database vendors' perspectives. They found that vendors rated their products as mostly accessible. The study determined that although most vendors test their products for accessibility, only a few conducted usability tests with persons with disabilities using adaptive technology. This 2007 study from the vendor's perspective influenced the authors to conduct their own test using students with print disabilities.

Technology is both an enabler and a barrier for students with print disabilities. While screen readers enable students to navigate their on-line environment, they are limited on how they can interpret a busy website. While database and website design is evolving to the benefit of users who have vision, the contradiction is that their enriched features which create greater accessibility to information also creates barriers for students who rely on screen readers (Dermody, 2011). According to Dermody, database vendors are aware of the barriers their databases pose to students who rely on screen readers. The 2007 study by Byerley et al., indicated that only five of the 12 vendors (EBSCO, Elsevier, JSTOR, LexisNexis, ProQuest) surveyed conducted usability testing with people who have visual disabilities. However, Byerley et al. (2007) indicated in their study that vendors are not addressing accessibility in their marketing efforts.

Assistive technologies used by individuals who are blind are costly and accessible materials, such as popular books and textbooks, are slow to be developed (Stephanie, Laurie, & Maatta, 2014). In their study, they asserted that

without accessibility features, including voice-over or text enlargement, these e-readers are rendered inaccessible for individuals who have low or no vision.

In a study carried out by (Dermody, 2011) the students were forced to abandon articles because of technological barriers and this limited the amount of resources they could use to write their assignments. Only the intervention of a librarian or peer would have allowed them to continue in locating the full text and reading the article. Their self efficacy as independent learners is challenged every time they encounter an unreadable PDF or take up to eight hours to find four articles.

2.8 Summary

Through a keen review of the related literature, this chapter has brought insight into the study since the key elements of concern have been revisited. The literature reviewed showed that there are many gaps in research and knowledge pertaining accessibility of electronic resources by students with visual impairments. An exploration of the specific challenges that these students face has been done through the past studies. However, most of the studies are those that were done in other countries outside Kenya like Nigeria and Canada. This therefore necessitated a more expansive study carried out in Kenya and more specifically at Kenyatta University Post Modern Library, which explored the specific challenges that the students with visual impairments face in order to improve its services to them. This study sought to add knowledge on these challenges with a specific focus on website access.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes and justifies the research design and methodology chosen. Specifically, it highlights the research design, variables, location of the study, target population, sample size and sampling techniques, research instruments, pilot study, validity and reliability, data collection techniques, data analysis, and logistical and ethical issues.

3.2 Research design

According to Kumar (2005) a research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems.

The study adopted a descriptive survey research design. A descriptive research design deals with conditions, practices, structures, or processes that evidently portray the trends that exists or opinions held (Saunders, Lewis and Thornhill, 2009). According to Amin (2005) the aim of descriptive survey design is to describe the characteristics of a population or situation. Therefore, a descriptive survey design was found suitable for this study because its main purpose was to describe the challenges that students with visual impairment faced in accessing electronic information resources at Kenyatta University's Post Modern Library.

3.2.1 Variables

In this study, a dependent variable and a number of independent variables were investigated as follows:

a. Dependent variable

The dependent variable was the access to e-resources. This was investigated to find out what variables influenced or determined it.

b. Independent variables

An independent variable is one that influences the dependent variable in either a positive or negative way. In this study, a number of independent variables that influenced access to e-resources (dependent variable) were studied. They included: use of adaptive technology, Training in accessing e-resources as well as the technological, personal and institutional related challenges. These independent variables were investigated and their influence on access to e-resources established.

The challenges examined in this study were only those that students with visual impairment faced in accessing e-resources in Post Modern Library only. Those challenges that they faced while accessing other resources in Post Modern Library or in other libraries such as departmental libraries were not explored in this study.

3.3 Location of the study

The study was conducted in Kenyatta University. This study location was chosen by the researcher because it is an inclusive university and its post modern library has a section that is specific to students with visual impairment. It was also considered because it provided access to both print and electronic resources including e-journals and e-books databases and had embarked on the process of digitizing its local resources in order to increase their accessibility to all library users (including those with visual impairment). There being other Universities both public and private in Kenya, Kenyatta University was purposively selected since it had the largest population of students with visual impairment.

3.4 Target population

The target population for the study was all the students with visual impairment in Kenyatta University and staff members who served or offered information literacy skills to the users with visual impairment. There were 80 students with visual impairment and 5 staff members who offered information or served students with visual impairment at Kenyatta University's post modern library. Students with visual impairment were targeted because they were the ones who experienced the challenges in accessing different electronic information resources in post-modern library. Staff members were targeted because they were the ones who assisted students with visual impairment in case they met a challenge and they are the ones who trained them in information literacy.

3.5 Sample size sampling techniques

3.5.1 Sample size

According to Fraenkel and Wallen (2009) for the purpose of external validity of the research, the sample should be as large as possible depending on the time for the research and its purpose. Similarly, when the population is not too large, it is better to work with the entire population. Therefore, for the purpose of external validity of this study, all the 80 students with visual impairment who used KU library and all the 5 staff members who served them formed the sample of this study.

3.5.2 Sampling techniques

Purposive sampling technique was used to select all respondents for this study. According to Patton (2002) purposive sampling is a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher. Therefore, the researcher will purposively include all the population in this study.

3.6 Research instruments

A questionnaire was used to collect data from students with visual impairment. The questionnaires used were entitled: student's questionnaire on challenges facing students with VI in accessing e-resources. This questionnaire was made of both open and close-ended questions and it was made of three sections: Section A was about the demographic information of the student, section B about

information on challenges they faced in accessing information, and section C was about their suggestions for improving their ability to access e-resources. Moreover, structured interview was used to collect data from 5 staff members on how they assisted students with VI in accessing e-resources.

3.7 Pilot study

The questionnaire for this study was pre-tested on 4 students with VI who were not part of the main study. The pilot study was carried out at Kenya Institute of Special Education. The researcher herself distributed the questionnaires to these 4 students who were purposively selected. The pilot study enabled the researcher to: identify ambiguous and vague question items, make wording clear, rephrase sentences, provide enough space for answers, and revise the layout of instruments if necessary before starting the actual data collection process. The questionnaire was there after adjusted accordingly.

3.7.1 Validity

Amin (2005) defines validity as the appropriateness of the instrument in measuring whatever it is intended to measure and on the other hand, he defines content validity as the extent to which the content of an instrument corresponds to the content of what it is designed to measure. In this study, content validity was achieved by ensuring that the research instrument adequately covered the area being studied. This was done through expert judgment technique where the instruments were given to 2 experts from the department of library and information science of Kenyatta University to judge whether all items in the

instruments were really related to and representative of the intended objectives and research questions. Their opinions and judgments were incorporated before administering the instruments for data collection process. The research instrument was then tested prior to the actual study and questions reviewed as necessary. Finally, construct validity was achieved by ensuring that all the terms used were operationally defined. This was established after the pilot study.

3.7.2 Reliability

According to Amin (2005) reliability is the degree to which the instrument consistently measure whatever it is measuring and on the other hand, Amin defines stability reliability as the degree to which the results of the same test by the same individuals are consistent over time. To ensure the stability of the questionnaire, it was administered twice to 4 students with VI who were purposively selected from Kenya institute of special education, a location that was not used during the main study. After a period of two weeks the same questionnaire was given to the same respondents and Spearman rank order of correlation coefficient (Rho) was computed to determine the correlation between the results of the two administrations of the questionnaire. Orodho (2009) stated that an instrument is considered reliable if the calculated correlation coefficient is 0.75 or above. The reliability coefficient that was obtained from the pilot study was accepted since it attained a coefficient which the researcher considered reasonable based on Orodho (2009).

3.8 Data collection technique

To collect data with the questionnaire, personal administration with on-the-spot-collection method was used. Using this, the researcher herself delivered the questionnaires in person and she waited for the respondents to complete it to go back with it. This helped the researcher to avoid any possible loss of questionnaires and ensure accurate responses because explanations could be provided. In addition, using a recorder, the researcher herself conducted the interview with all the 5 staff members who served or provided information to students with visual impairment.

3.9 Data analysis

The data collected was analyzed using both quantitative and qualitative methods. For Quantitative methods, descriptive statistics was used to analyze quantitative data, specifically, Statistical Package for Social Sciences (SPSS) was used to generate frequencies and percentages which described the challenges that students with VI face in accessing e-resources in Post modern library. For qualitative methods, thematic analysis approach was used to analyze qualitative data which was generated by open questions in the questionnaire and by interview with staff members. Qualitative data was sorted out, classified and categorized under major themes identified. After the analysis of data; tables, graphs and charts were used to present quantitative data while qualitative data was presented in textual mode.

3.10 Logistical and Ethical considerations

Before collecting data from the respondents of this study, the researcher ensured that all instruments were valid and reliable to generate useful information for the study. The researcher also provided Braille and soft copies of the questionnaire for students with visual impairment before starting data collection exercise. Further, the researcher sought for permission and clearance from all relevant authorities by following the right chain of command. Specifically, the research sought for permission from the National Council for Science, Technology and innovation. The researcher also avoided plagiarism by acknowledging the authors quoted in the study. In addition, the researcher sought for informed consent from the respondents before issuing the questionnaires or conducting the interview. Participants were informed of the purpose of the study. The researcher respected the principle of anonymity and ensured confidentiality of information gathered from the respondents. Finally, the researcher maintained integrity by presenting findings objectively and honestly without manipulating results.

CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the findings, interpretations and discussion according to the objectives and research questions that guided this study. The study sought to achieve the following objectives:

1. To establish the factors that affect information seeking behavior by students with visual impairment.
2. To identify the challenges that students with visual impairment face in accessing e-resources.
3. To find out whether adaptive technology affect students with visual impairment in accessing e-resources.
4. To describe the training offered to students with visual impairments on accessing e-resources.

The research questions that guided this study were as follows:

1. Which factors affect information seeking behavior by students with visual impairment?
2. What kinds of accessibility barriers, if any, are encountered by the students with VI in searching and retrieving e-resources?
3. Does adaptive technology affect access of e-resources by students with visual impairment?

4. How do students with visual impairment receive training in accessing e-resources?

The presentation of the findings was done in accordance with the above research objectives and questions using graphs, tables and text. Descriptive statistics such as percentages and frequencies were used to summarize quantitative data while thematic analysis approach was used to summarize qualitative data.

4.2 General and demographic information

The general and demographic information obtained through data collection is presented as follows:

4.2.1 General information

The study sampled 80 students with visual impairment in Kenyatta University and 5 staff members who served them in the Post Modern Library. Data was collected from all the staff through individual interviews. Out of the 80 students sampled, 76 were issued with the questionnaires since. The four students were not in session during the time of data collection. Out of the total questionnaires issued 72 were collected. This represented a 95% return rate.

Data collection was successful although the researcher faced some challenges due to the nature of the respondents. The research tools were to be presented in various formats like Braille, soft copy and extra large print for those using magnifying lens which was expensive. Data collection also required a lot of patience from the researcher in explaining to the respondents the why and by

who questions as well as explaining the difficult concepts which consumed a lot of time.

4.2.2 Demographic information

The researcher found it very necessary to collect data related to the demographic information of the respondent. This is because when such data is analyzed and interpreted, it can bring some insight in the course of the study. Demographic information also helps to avoid unnecessary assumptions during the study. Demographic information was presented as follows:

Sex of the respondents

It was found important to describe the sex of the respondents of this study since sex is a key characteristic of a respondent. Table 4.1 gives the summary of students by sex.

Table 4. 1: Sex of respondents

Respondent	**Frequency**	**Percentage**
Male	40	55.6
Female	32	44.4
Total	72	100

From the table 4.1, it is clear that the majority of the respondents were males. Specifically, males were 55.6% of the respondents while the females were 44.4%. This may be attributed to the fact that males are considered the stronger gender in the tradition society and therefore are expected to fight harder in all

situations. It is not surprising therefore to find out that the majority of students with visual impairment at tertiary level of education are males.

This finding concurs with that of a research presented in a March, 2008 report by the Kenya National survey for persons with disabilities whose findings indicated that there was a higher proportion of males than females at all levels of education.

Age of the respondents

Another key characteristic of the respondents is their age. This study sought to describe the age of respondents since was assumed to bring some light in the achievement of the study objectives. Figure 4.1 shows the distribution of the respondents by age.

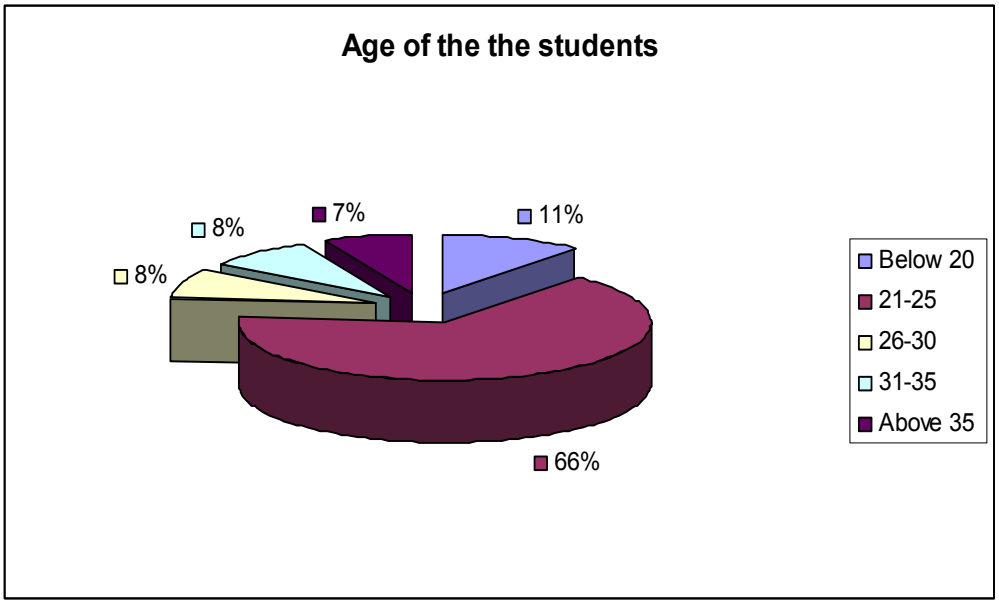

Figure 4. 1: Age of the respondents

From figure 4.1, the study revealed that majority of the respondents studied were in the age bracket of 21-25 years. This age bracket constituted of more than half of the individuals under study. This could be attributed to the double intake where students were able to join the university immediately after the release of their results for those in fourth year. This could also be due to the fact that the completion age at secondary school is about 17-20 years and if they are to take up to two years before joining the university, they will fall between the age limit of 21-25 in their first three to four years of the university education. This category of respondents could be very useful in exploring study objective number three which is about adaptive technology. This is because they are the University young stars and a group that is very much associated with technology; locally referred to as 'digital people'. These findings have policy implications to the library management in that they need to analyze the needs and expectations of young library users with visual impairments and cater for them.

Educational level of respondents

The education level of the respondents is a key aspect that the researcher found very necessary to indicate. This is because it could give important contribution in the achievement of the study objectives. The education levels of the students were as indicated in table 4.2.

Table 4. 2: Education level of respondents

Year of study	**Frequency**	**percentage**
Year 1	9	12.5
Year 2	26	36.1
Year 3	12	16.7
Year 4	15	20.8
Year 5	1	1.4
Masters	7	9.7
PHD	2	2.8
Total	72	100

From table 4.2, it is clear that majority of the respondents were in the second year of their studies followed by those in their fourth year. This may be attributed to the government efforts in support of education for persons with disabilities and the encouragements that they could have received from their former schools where they sat their KCSE prior to joining the university. These figures could help in other objectives like the user education under objective four especially from those in the fourth year since they have stayed in the university longer and have a longer experience in using the library.

Nature of visual impairment

Another important characteristic of the respondent that the researcher was keen at was the nature of the visual impairment. This characteristic was considered important in the study since it could help in discussing the challenges that

students with visual impairment face which was the main task of the research, as well as help in giving informed recommendation after the study.

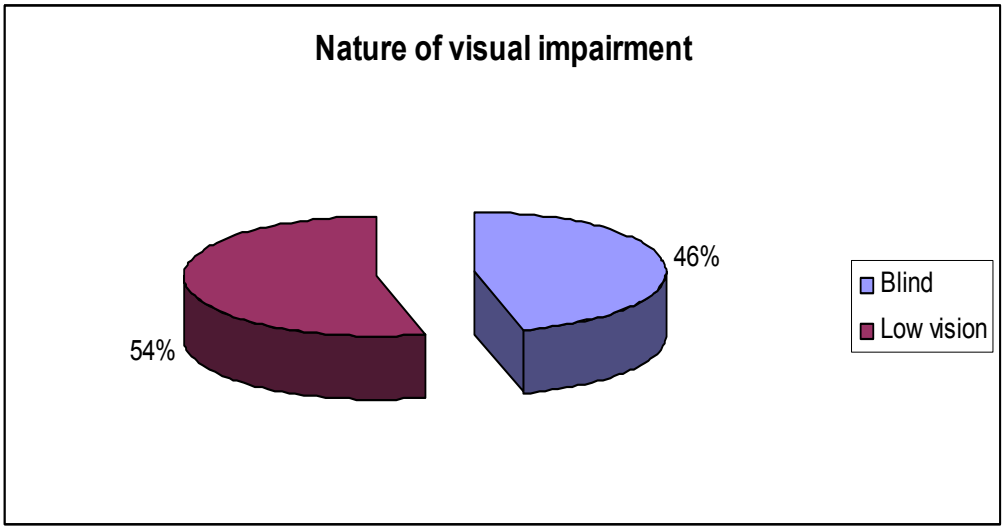

Figure 4. 2: Nature of visual impairment

The study revealed that there are as many students who are blind as those with low vision. However, from the data collected those with low vision were slightly more. This study focused on a general term 'students with visual impairment' and specifically studied only those who could not read print without either the assistance of other people or the help of some technology.

This finding concurs with that of a research carried out by World Health Organization in global data on visual impairments, 2010 whose findings indicated that the estimated number of people visually impaired in the world is 285 million, 39 million blind and 246 million having low vision ("GLOBAL DATA ON," 2010).

4.3 Information seeking behavior of students with VI

The first task of this study was to establish the factors that affect the electronic information seeking behavior of students with visual impairment at Kenyatta University Post Modern Library. Various aspects were explored and their findings presented, interpreted and discussed as follows:

4.3.1 Ability to retrieve and use e-resources

The researcher sought to know from the students whether they were able to retrieve and use e-resources without any assistance from other people. The responses are as presented in figure 4.3:

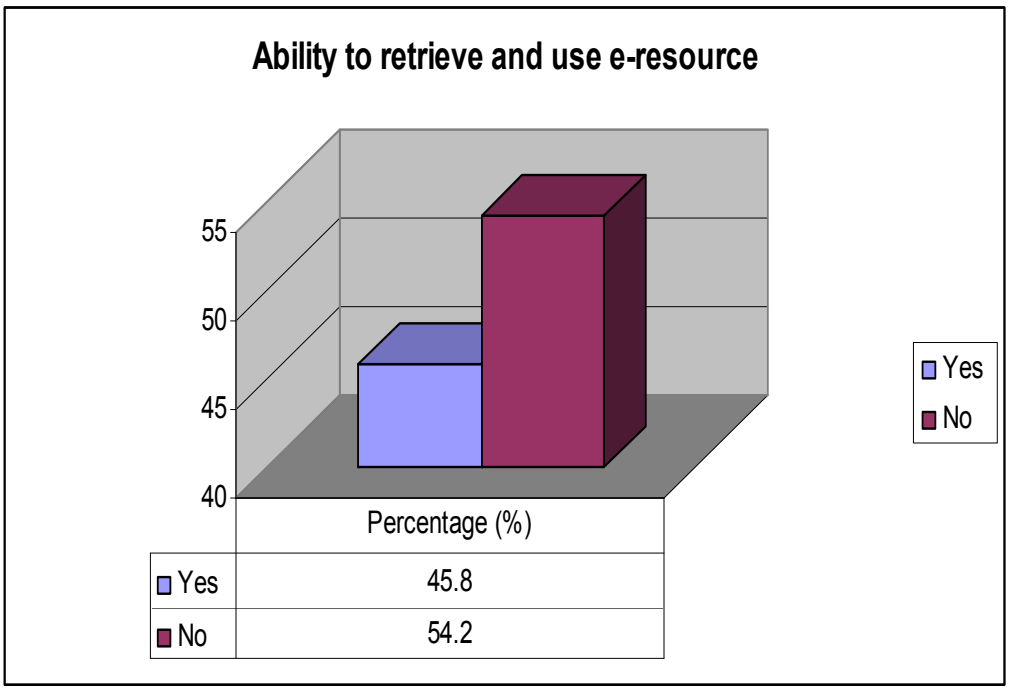

Figure 4. 3: Ability to retrieve and use e-resources

From the responses given in figure 4.3, it was clear that most of the students were not able to retrieve and use e-resources though their own efforts. This could be attributed to low literacy levels in using e-resources. The large number of students being not able to retrieve e-resources could also be due to lack of formal training on the use of adaptive technology.

These findings concur with that of Saumure and Given (2004), which found out that students with visual impairment relied on interpersonal contacts like librarians, friends and counselors to ensure they could access information. Therefore the students lacked independence in their information seeking behavior. This finding is also supported that of Brophy & Craven (2014) who discovered that people with disabilities are most at risk of being excluded from access, and in particular people who are blind or visually impaired and who use assistive technologies such as screen readers.

4.3.2 Time used to retrieve a single e-resource

The students were asked to indicate the length of time that they used when trying to retrieve a single e-resource. Their responses were as shown in figure 4.4:

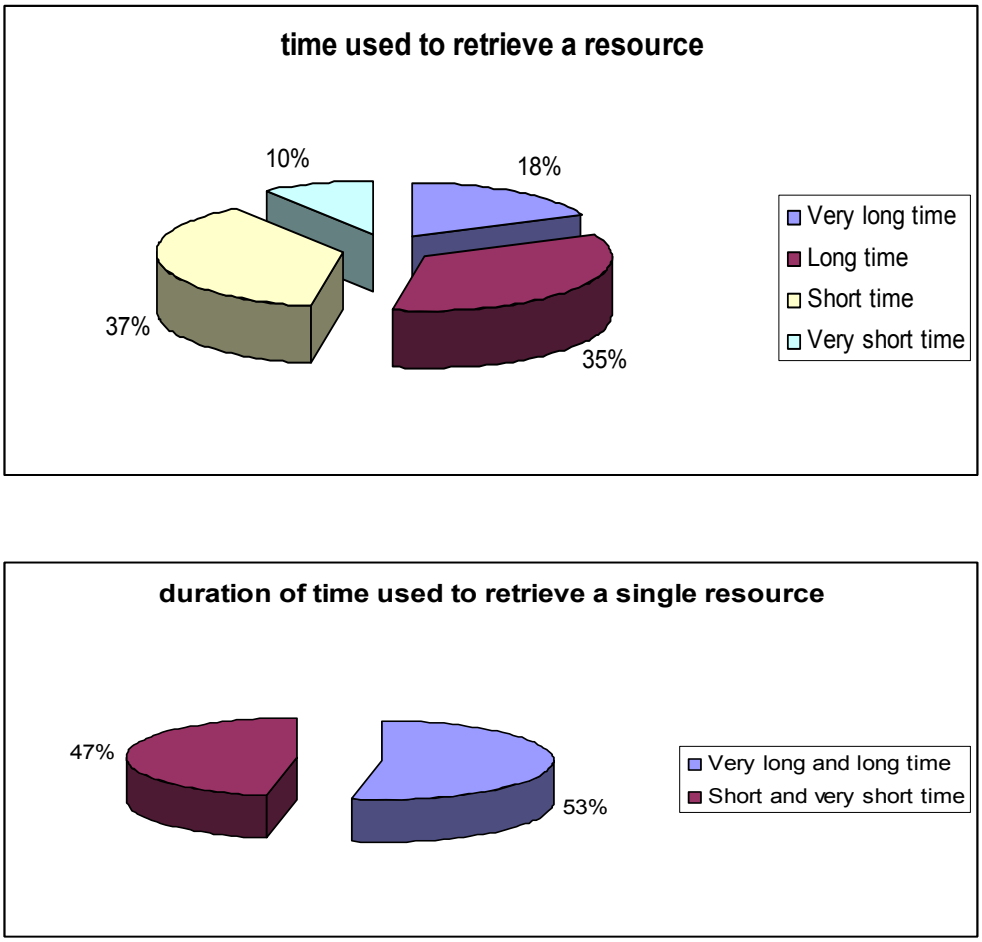

Figure 4. 4: Time used to retrieve a resource

From the responses recorded in figure 4.4, slightly more students used a short time compared to those who used long time to retrieve a single resource. However a total of those who took from long time to very long time constituted more than half of the students. The reason why majority took from long to very long time to retrieve a single resource could be attributed to the challenges of access to e-resources by this category of users.

These findings are similar to that of Saumure and Given (2004) as cited in (Dermody, 2011) who indicated that information seeking behavior of students

with visual impairment required additional time to ensure the material was accessible. The findings also concurs with that conducted by (Dermody, 2011) which showed that Students' self efficacy as independent learners is challenged every time they encounter an unreadable PDF or take up to eight hours to find four articles.

4.3.3 Reading means

After the retrieval of an e-resource, the researcher sought to find out how the students read the resource retrieved. The findings were as indicated in table 4.3.

Table 4. 3: Reading means

Reading means	**Frequency (F)**	**Percentage (%)**
Using other students	26	36.1
Using staff in the library	3	4.2
Use of screen readers	20	27.8
Use of Screen magnifiers	23	31.9
Total	72	100

A larger number indicated that they used other students to read for them. This was compared to those who used other means like screen readers, screen magnifiers and staff. However, more than half of the students i.e. 59.7% indicated that they used adaptive technology which included either the use of screen readers or screen magnifiers. This shows that the students are motivated to be self reliant. This has policy implications in that the librarian needs to ensure

provision of adequate electronic facilities as well as the required softwares for speech and magnification so as to further motivate the students as well as facilitate their easy access to the bank of knowledge in electronic resources. It is also important to note that only 4.2% of the total number indicated that they used the staff in the section to read the retrieved resource. This could have been due to the low number of staff compared to the numbers of students requiring their attention in that specific section of users with special needs.

Provision of assistive equipment (adaptive, enabling, or access technology) will enable a user with visual impairment to access on-screen information receiving output in a way that is appropriate to their needs (Brophy & Craven, 2014). The findings of this study which showed that majority of the respondents preferred using assistive technology. It is therefore important for the library management to facilitate reinforcement of this behavior which is towards independence by provision of more enabling technology.

4.3.4 Frequency in using e-resources

The students were asked to indicate how often they used e-resources in the University Library. They were asked to choose between very often, often, rarely and not at all. The findings were as shown in table 4.5.

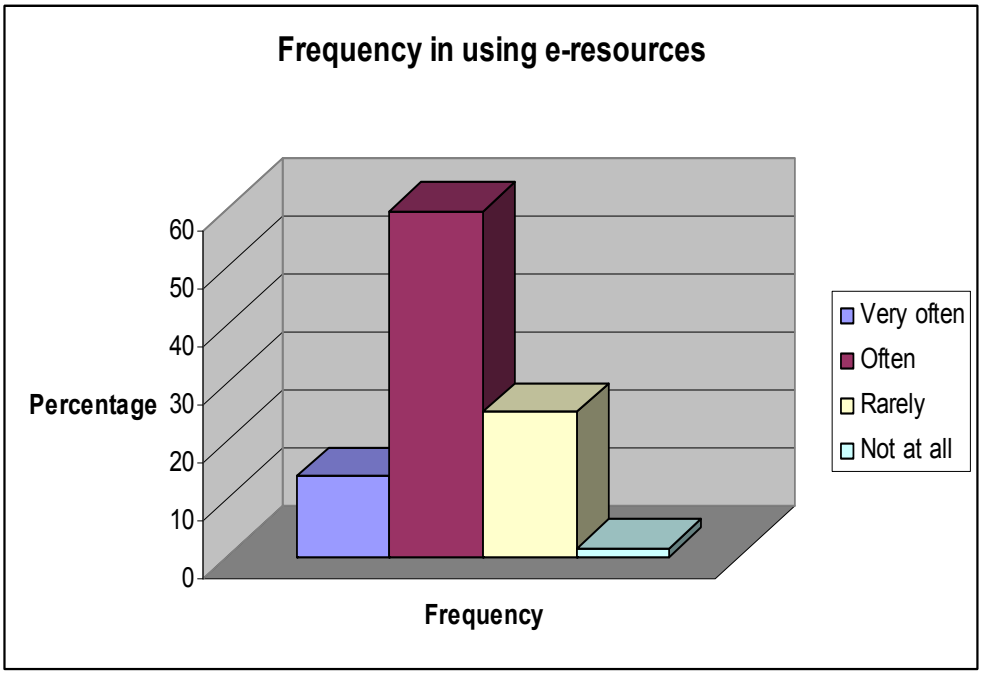

Figure 4. 5: Frequency in using e-resources

The research findings showed that more than half of the students used e-resources often. This is a good base for the library management to consider ensuring that these users are facilitated well in accessing e-resources in terms of facilities, technology and manpower. However a significant number of students used e-resources rarely, which is an indicator that there could be reasons attributed to the challenges of access. A significant number of students also indicated that they rarely used e-resources which is another indicator that students with visual impairment either do not like using e-resources or they do not know how to use them or that they face challenges in accessing them.

With the rapid development of information technology and near-universal access to the Internet, people are increasingly doing more of their reading and information gathering on computers rather than in printed books (Chia-chen &

Chen, 2014). The findings of this study therefore, confirms that users including those with visual impairment prefer using e-resources compared to other formats.

4.4 Challenges in accessing e-resources by students with VI

The second task of the study was to establish the challenges that students with visual impairment faced in accessing electronic information resources. In order to achieve this objective the researcher investigated various aspects as follows:

4.4.1 Ease in using library website

The students were asked to indicate the ease with which they are able to access and use the library website. They were given a statement that 'I am able to find everything I need from the library website' and were required to indicate whether they strongly agreed, agreed, were uncertain, disagreed or strongly disagreed to that statement. The findings were as presented in table 4.4:

Table 4. 4: Ease in using lib web

It is easy	**Frequency (F)**	**Percentage (%)**
Strongly agree	3	4.2
Agree	15	20.8
Uncertain	12	16.7
Disagree	34	47.2
Strongly disagree	8	11.1
Total	72	100

As indicated in table 4.4, majority of the students which constituted 47.2% disagreed with the statement. It was therefore clear that the library website was not very accessible to users with visual impairment which could be attributed to the design of the website or lack of good orientation in accessing the library website where important information about the library collection can be found.

A study by (Brophy & Craven, 2014) also found out that users with visual impairments face the challenge of web inaccessibility. The information provided on screen must be presented in a way that can be interpreted by any kind of access technology. This is what is referred to as "accessible Web design," "design for all," or "universal design."(Brophy & Craven, 2014). For instance, the advances in Web 2.0 and the new virtual learning environment does not always take into consideration whether or not it is compatible with the assistive technology students rely on (Dermody & Majekodunmi, 2011). This therefore important for web designers to take into consideration all categories of users including those with visual challenges when designing the websites.

4.4.2 Ease in using e-resources

In order to establish whether the students with visual impairments found it easy to use e-resources or not, the researcher posed a statement that "it is easy to use e-resources" and the respondents were also asked either to indicate the level at which they agreed or disagreed to the statement. Their responses were as presented in figure 4.6:

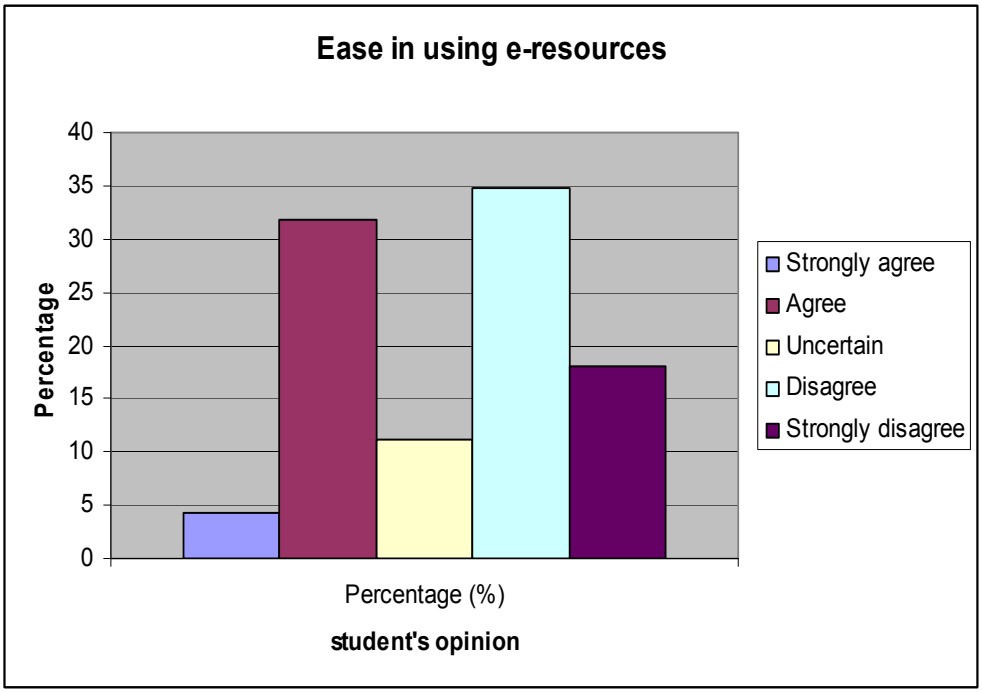

Figure 4. 6: ease in using e-resources

The findings indicated that more than half of the students engaged in the study either disagreed or strongly disagreed to the statement that 'it is easy to use e-resources'. Specifically 52.8% which constituted more than half of the sampled students indicated that it is not easy to use e-resources. This finding could be attributed to inaccessible web designs, low literacy levels in using electronic resources, lack of knowledge in using assistive technology and lack of motivation in using e-resources possibly caused by the above factors. However a small but significant number of students indicated that it was easy for them to use e-resources. This is a good indicator to the library management that it is possible for the library users who have visual challenges to use electronic resources and that those who are not able to use them can be facilitated and supported once their challenges of access are known.

The findings of this study suggest that there are various challenges facing students with visual impairments when accessing e-resources among which could be technological barriers as well as personal barriers. In a study carried out by (Dermody, 2011) the students were forced to abandon articles because of technological barriers and this limited the amount of resources they could use to write their assignments.

4.4.3 Presence of enough computers

A computer is an important electronic machine for use in accessing electronic resources. For this reason the researcher sough to find out whether the available computers in the library section for users with special needs were enough. Presented in figure 4.7 were the opinions of the students to the statement that "there are enough computers in the library section for users with special needs."

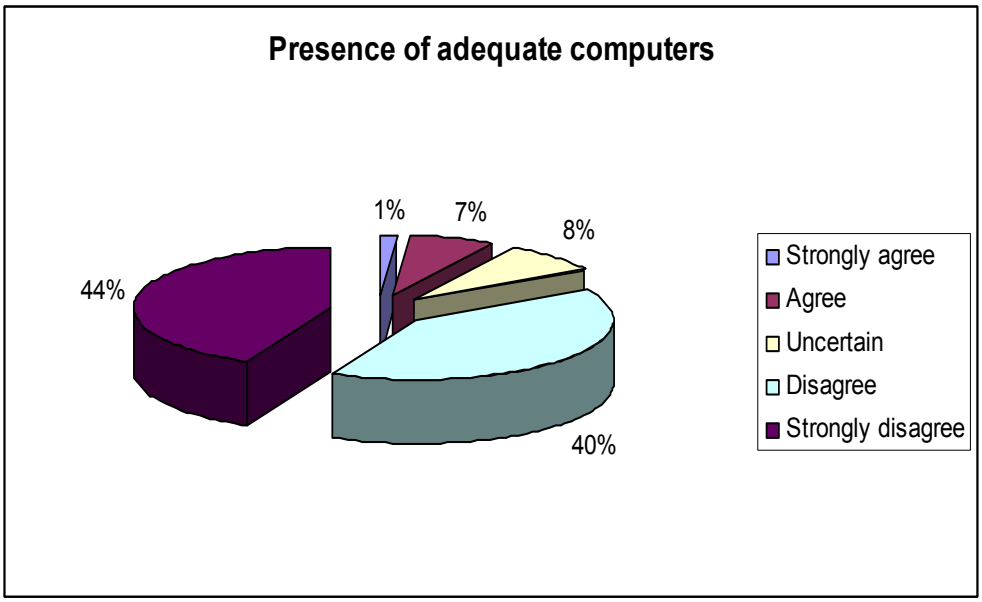

Figure 4. 7: Presence of adequate computers

From figure 4.7, it is clear that there are not enough computers in the section for users with special needs where the visually impaired constitute the majority. Both of those who disagreed or strongly disagreed constituted 80.4%. The reason for the computers not being enough could be attributed to the increased population of students using the section at the time of study compared to the population size at the time the library section was being established and fitted with computers. The low numbers of computers could be attributed to the physical space of the section having no room to add more computers at the time of the study. The inadequacy of computers could be a challenge in accessing e-resources.

4.4.4 Presence of strong and consistent internet connectivity

Internet connectivity is an important facilitator in accessing electronic resources over a network. The researcher found it necessary to find out whether the available internet connectivity was strong enough and reliable for use in searching and retrieving electronic resources from the various websites. The findings were as indicated in figure 4.8.

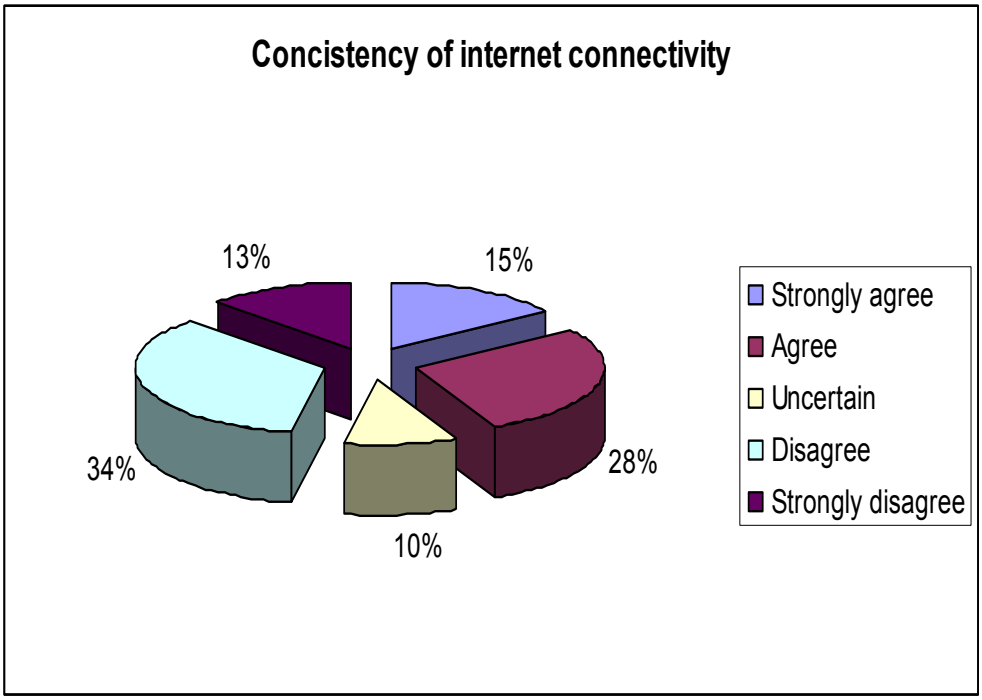

Figure 4. 8: Presence of strong and consistent internet connectivity

The number of those who indicated that the internet connectivity is good is more or less the same as number of those indicated that the internet connectivity was not good. These findings can be attributed to the fact that the strength of internet connectivity could vary from time to time due to technological connection problems or due to power surges. Some students could have used the internet during the favorable days while others could have used it during the unfavorable days of internet connectivity and strength. The above findings are a good policy indicator to the library management that although the library internet connectivity may be good, it is not always consistent for use by students in accessing electronic resources. Therefore they should come up with an internet connectivity strategy for the library to ensure consistency.

4.4.5 Number of staff in the section

The students were asked to indicate whether the staffs serving them in the section were enough to cater for their information needs while in the library. The findings were as presented in figure 4.9:

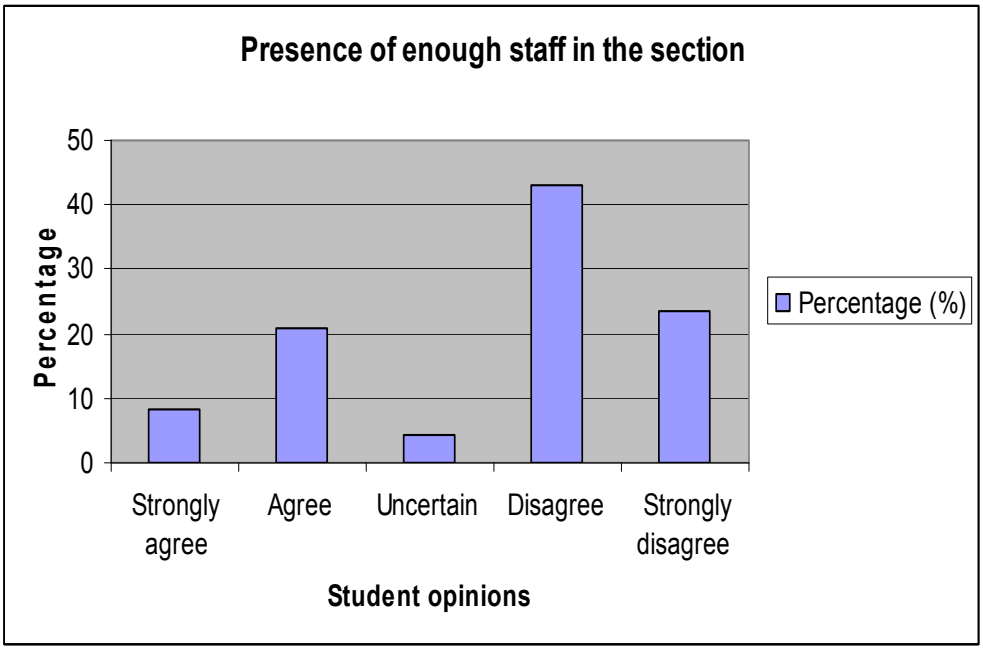

Figure 4. 9: Number of staff in the section

From the findings presented in figure 4.9, the number of those who disagreed or strongly disagreed constituted 66.7%. This is an indication that majority of the students were for the opinion that the staff serving in the section for users with special needs were not enough to assist them. This could be attributed to the increased number of students using the section compared to the time when the section was set up. It is also a strong indicator that the students using the section have not achieved high independency levels in searching for information without the help of the staff. This calls for improved user education service to users with

visual impairment especially in accessing e-resources where user independence can be easily achieved compared to use of print resources where the students may always require an extra assistance.

4.4.6 Challenges of accessing e-resources

The heart of this study was to establish the challenges that face learners with visual impairment with the aim of providing information to policy makers, information providers for better strategies in dealing with the challenges. The students were asked to list the challenges that they faced when accessing electronic resources. The findings were as presented in table 4.5.

Table 4. 5: Challenges of accessing e-resources

Challenges	**Frequency**	**Percentage**
Inadequate computers	20	27.8
Internet inconsistency	28	38.9
Inadequate skilled staff	5	6.9
Lack of AT skills	5	6.9
Limited space	2	2.9
Inadequate AT software	5	6.9
Lack of training on e-resources	7	9.7
Total	72	100

From the table 4.5, the findings reveal that there are various challenges that face learners with visual impairments in accessing e-resources. These are the challenges that are common to many users with visual impairments that use the

Post Modern Library. The information extracted from the data above can be possibly used by university librarian and other policy makers in designing strategies of overcoming the challenges that cut across several users even before addressing the more specific challenges as brought out in the findings as per objective 3 and 4.

The staff serving in the section were also asked about the challenges that they experienced while serving students with visual impairments specifically when accessing e-resources. Their responses are as presented below:

- Many students do not have basic computer skills thus forcing the staff to spend much time with a single student retrieving the e-resource for them.
- Inability of a staff to demonstrate the processes that they explain to the users through assistive technology. For example when offering user education on access to e-resources.
- Lack of assistive technology skills that can facilitate better assistance to students when accessing e-resources

Research has shown that people with disabilities are most at risk of being excluded from access, and in particular people who are blind or visually impaired and who use assistive technologies such as screen readers (Brophy & Craven, 2014). The findings of this study shows some agreement with various studies which indicate that students with disabilities experience unique challenges when accessing library resources (Riley, 2002; Byerley and Chambers, 2002; Coonin, 2002). Therefore it is true that students with visual impairment face challenges when accessing e-resources. Ability to show the

specific challenges faced by the library users who have visual challenges will act as a reference point for library management in ensuring provision of support to this category of users especially when accessing e-resources which could benefit the users once high independence levels of a user is achieved.

4.4.7 Suggested solutions

The researcher sought to find out from the library users sampled, their suggestions to dealing with the challenges that they had listed in 4.46 above. Their responses were as presented in the table 4.6.

Table 4. 6: Suggested solutions by students to the challenges of accessing e-resources

Suggested solution	**Frequency**	**Percentage**
Increase the number of computers with AT	26	36.1
Training organize training sessions for students with VI on e-resources	15	20.8
Internet connectivity	10	13.9
Conduct staff induction on AT	10	13.9
Increase staff	7	9.7
Upgrading of screen reading programs	4	5.6
Total	72	100

From the table 4.6, the sampled students offered various suggestions for the challenges that they had indicated in 4.4.6 earlier. From these findings, it is clear that access to e-resources can be improved mainly by ensuring adequate

provision of computers fitted with assistive technology, conducting organized and frequent trainings on how to access e-resources, improving internet connectivity and conducting staff induction on adaptive technology. Library management should therefore consider the above suggestions for improvements in access to e-resources by students with visual impairment since they are directly gathered from this specific category of users.

During the interview, the staff serving users with visual impairment in the library were also asked to suggest solutions that they thought would be of help in improving access of e-resources to users with visual impairment. The findings were as indicated below:

- Organizing meetings with students in order to understand better their information needs as well as get an avenue of knowing the specific challenges that they face while trying to access various informational resources with e-resources being part.
- By benchmarking in other advanced institutions on how to go about retrieval of e-resources by specific categories of users.
- Offering training to the students on access to e-resources.
- Provision of enough facilities like computers and assistive technology programs.
- Ensuring staff motivation.

It is therefore clear that there are possibilities of improving access to e-resources. These findings are in agreement with that of Brophy &Craven, 2007. In his study (Brophy & Craven, 2007) notes that the accessibility of Web-based information

can be improved in two principal ways: through the use of access technology and through adopting good practice in interface design.

4.5 Use of adaptive technology in accessing e-resources

The third task of the study was to find out whether adaptive technology affects students with visual impairment in accessing e-resources at Kenyatta University Post Modern Library. In order to achieve this objective, various aspects were explored and their findings presented, interpreted and discussed as follows:

4.5.1 Presence of adequate assistive technology

The researcher considered it very important to establish whether the assistive technology present in the library was adequate to cater for the information access needs of users with visual impairment. The findings were as presented in figure 4.10:

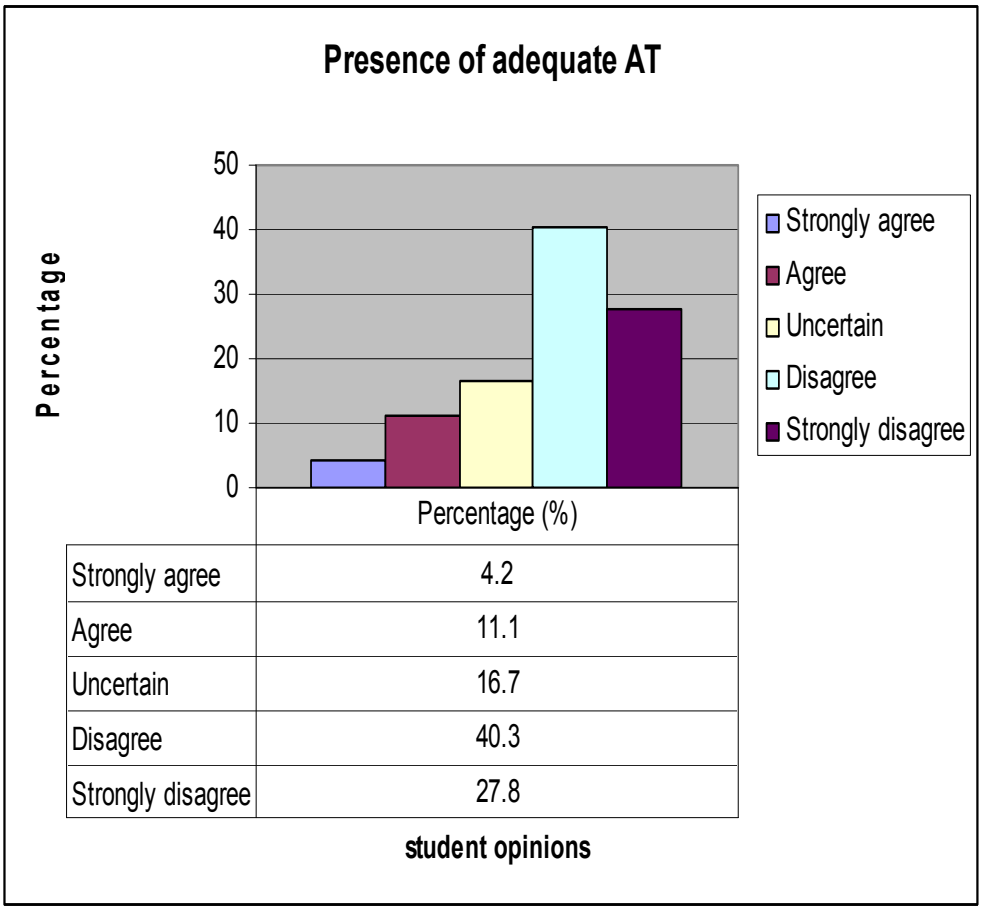

Figure 4. 10: Presence of adequate assistive technology

From the findings, there was a strong response from the students that assistive technology was not adequate to cater for their needs in accessing e-resources. The total of those who supported this by disagreeing to the statement that 'there was enough assistive technology in the library' was 68.1% constituting the majority. This is a reason good enough for the low usage of e-resources by students with visual impairment in the postmodern library. It is also a good policy indicator to the library management to ensuring adequate provision of screen reading and screen magnification software for use by the library users with visual impairment. As Carl Rogers indicates in his theory explained in

Chapter 1, provision of the necessary support can achieve independence in learning for learners with visual impairments too.

The findings of this study are not different from a study conducted earlier. Assistive technologies used by individuals who are blind are costly and accessible materials, such as popular books and textbooks, are slow to be developed (Stephanie et al., 2014).

4.5.2 Students awareness of assistive technology

With assistive technology being a good facilitator in accessing e-resources, the researcher sought to find out students awareness on assistive technology. The findings were as indicated in table 4.7:

Table 4. 7: Student awareness of assistive technology

Aware of AT	**Frequency (F)**	**Percentage (%)**
Yes	57	79.2
No	15	20.8
Total	72	100

From the findings presented in table 4.7, it was clear that the awareness level of students on assistive technology was sufficiently high. This is a good indicator that students have either heard about or used assistive technology at some point in their lives. However it should be noted that awareness may not mean ability to use. For this reason, the researcher also sought to find out more information concerning training and the ability to use assistive technology. The high awareness levels of assistive technology to the students could be attributed to the

global support for visual impairment as a condition as well as to the significant number of researches conducted on assistive technology raising the awareness levels. The high awareness could also be due to the fast advancements in technology in the current information society where information has become the key to knowledge acquisition and technology an avenue to this information, with assistive technology being part of the technological advancements.

4.5.3 Training in assistive technology

As previously indicated, awareness in assistive technology may not mean ability to use. In order to find out whether the students were able to use assistive technology, the researcher sought to find out whether the students had any training on the use of assistive technology. The findings obtained were as presented in figure 4.11:

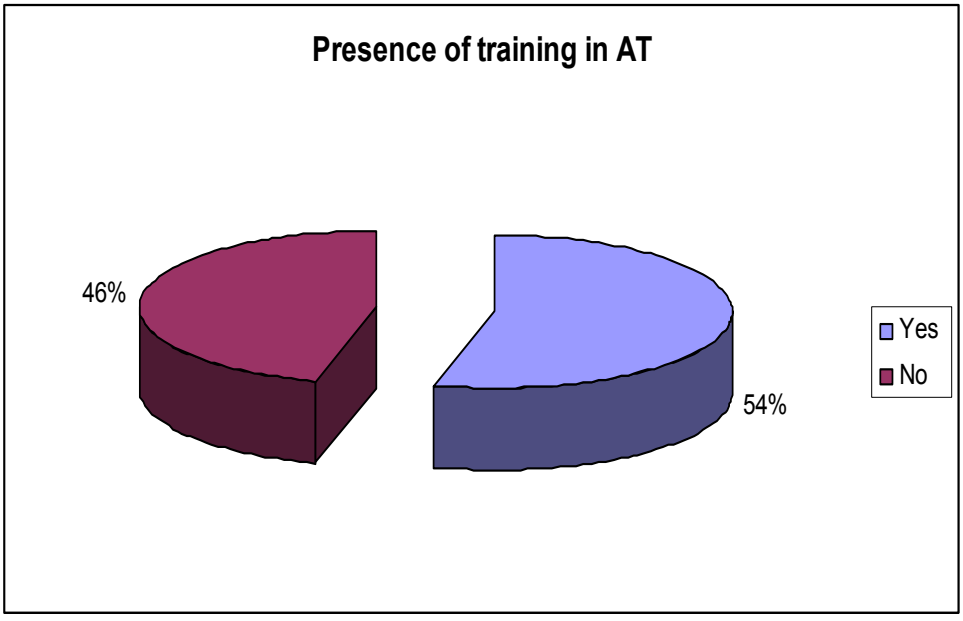

Figure 4. 11: Training in assistive technology

The findings revealed that more than half of the students had received either formal or non formal training on the use of assistive technology. This could be attributed to the students' background from the primary, secondary level or the parents' ability to facilitate the training for the students in assistive technology before joining university. This could also be attributed to peer teaching on assistive technology by those who already have the skills. However a large number of students indicated that they lacked training on assistive technology. This was a significant number, close to half of the students involved in the study. This is an indication that since the library is a key facility in information seeking; the management could consider organizing formal training sessions on assistive technology either at the library or consider recommending such training through a relevant department like that of special education or through the directorate of disability services.

This is in line with findings by (Carney, 2003) that appropriate selection of devices and technology, and subsequent training, is crucial for ensuring proper use of such devices.

4.5.4 Rating of students AT skills

The researcher also found it necessary to find out information concerning the rating of the students' assistive technology skills. The students were asked to rate their abilities on the use of assistive technology and the findings were as presented in figure 4.12:

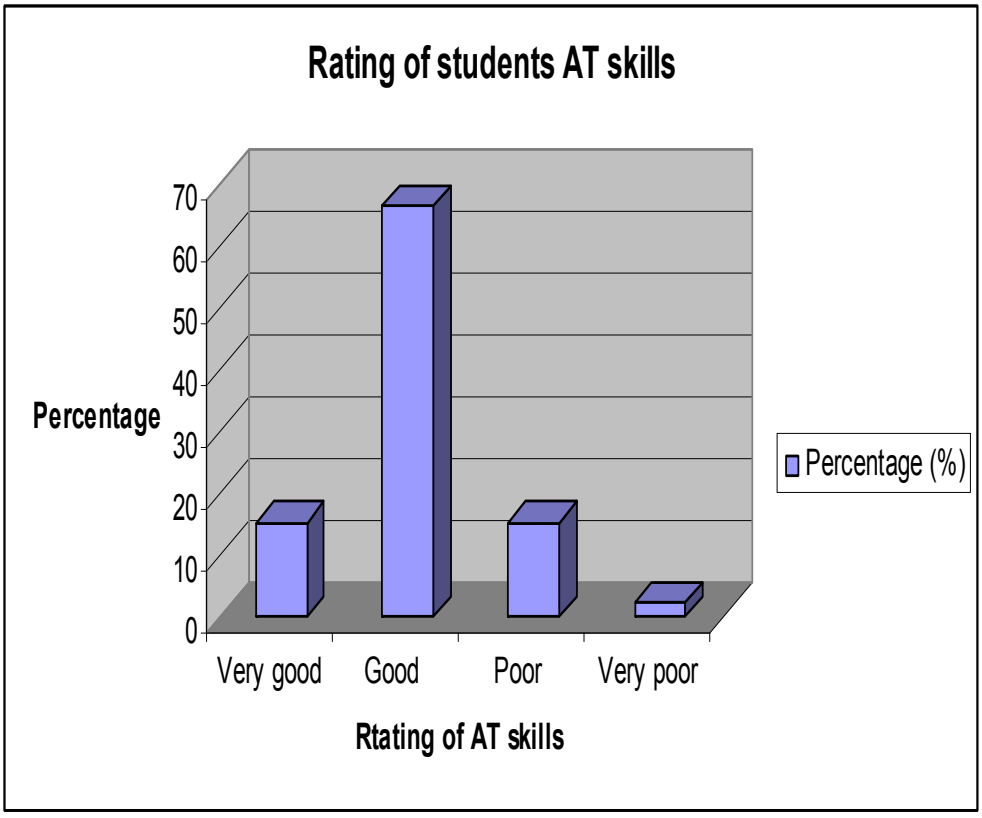

Figure 4. 12: Rating of students AT skills

Out of the total students who had indicated earlier that they had received training on the use of adaptive technology, majority rated themselves as having good assistive technology skills. With assistive technology being a practical skill, the 'good' rating could be attributed to continued usage of these skills through the available avenues like at the library. This is an indication that assistive technology is a useful skill to those that have acquired it and therefore can be specifically very useful in facilitating easy access to electronic information resources. It is therefore important for the university management through the library management to come up with a strategy of ensuring that the students who

join the university without these skills benefit, and with a keen eye on improving access to e-resources.

4.5.5 Usefulness of AT available

The researcher found it necessary to find out whether the available assistive technology at the Post Modern Library was useful to the students with visual impairments. The findings were as presented in figure 4.13:

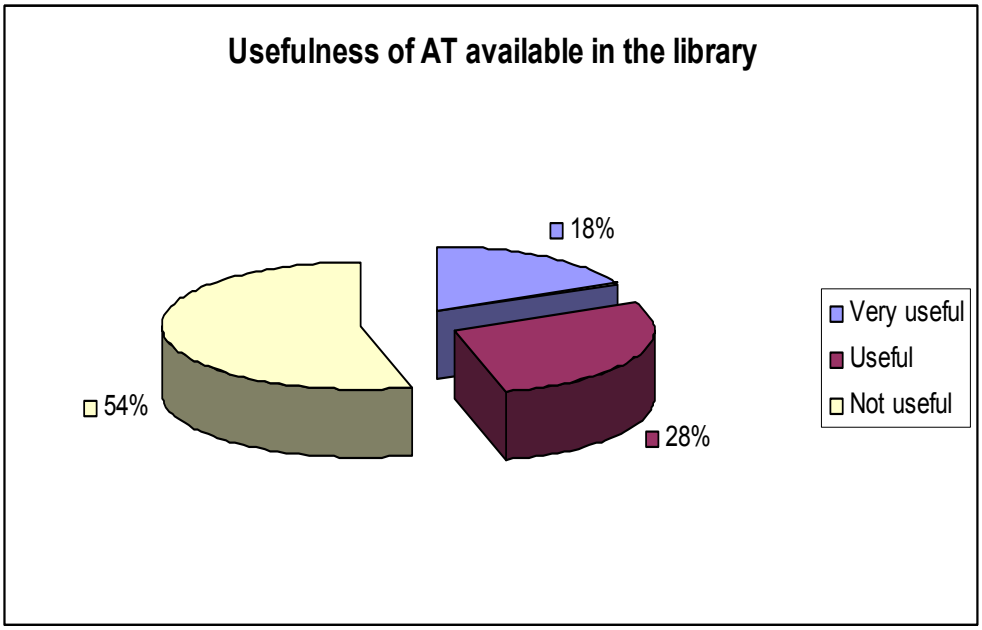

Figure 4. 13: Usefulness of AT available in the library

Majority of the students indicated that the available assistive technology was not useful. This could be due to the fact that many of the students lacked knowledge on how to use assistive technology available in the library like screen readers. A significant number indicated that the available assistive technology was useful. This could be used as a base in the provision of more assistive technology

software and facilities in the library since it proved useful to those who knew how to use.

The findings contradicts earlier findings by (Carney, 2003) which showed that the use of computers is particularly important to students with visual impairments, as their ability to use written communication can be enhanced and access to information improved. This is also supported by a study carried out in Canada by Dermody & Majekodunmi (2011) who established out that there is no doubt that technology has opened the door for students with disabilities. This awareness made the researcher want to find out the reason why the assistive technology could not be useful.

Reasons for AT not being useful

For those who indicated that the available assistive technology was not useful, the researcher further sought to know why they were not useful and yet AT was at least available. She asked the students to state the reasons why they found AT available not useful. The main reasons given were those given below:

- lack of adequate training
- Very few AT resources

The reasons given still revolve around the point of knowledge of using AT and adequacy of the available AT for use by the users with visual impairment. Many students could have the necessary knowledge in using AT and the library could

be having AT present. However if the available AT present does not tally with the number of students who are expected to use, then the available AT could be termed not useful as attributed to the stated speculation. The library management should ensure provision of enough AT for use by library users with visual impairments.

4.5.6 Rating of staff's AT skills

Service provision is a very important aspect in a library setting. Having enough and skilled staff in the necessary areas as per the specific needs of the library users is vital. With this background, the researcher sought to find out the rating of staff skills in AT. The findings were as presented in table 4.8:

Table 4. 8: Rating of staff's AT skills by the students

Rating	**Frequency (F)**	**Percentage (%)**
Very good	4	5.6
Good	15	20.8
Average	43	59.7
Below average	10	13.9
Total	72	100

The findings showed that the staff members serving users with visual impairment were rated 'average' in skills on assistive technology. When the rating is arranged from very good (1) to below average (4), the staff scored 3 out of 4. Considering 'good' as the bench mark, the staff skills in AT was not sufficient as per the findings. This could be attributed to lack of staff support through

seminars and workshops on assistive technology. It could also be due to the consideration of high staff knowledge on other library operations during staff recruitment without keen interest on the staff knowledge on assistive technology for the staff serving at the section of users with special needs. This is a good policy consideration by the library management when recruiting staff to serve at the section for users with special needs in future. Further, the library management should consider taking their staff through support programs on how to serve best, users with special needs with in service trainings being a part.

4.6 Provision of information literacy in accessing e-resources

The fourth task of the study was to describe the user education offered to students with visual impairments on accessing e-resources. In order to achieve this objective the researcher investigated various aspects and the presentation of findings, interpretation and discussion of the findings is as follows:

4.6.1 Presence of training on e-resources to students with VI

In order to achieve the above objective the research sought to find out whether user education specific to accessing electronic resources was given to users with visual impairment. The findings were as presented in figure 4.14:

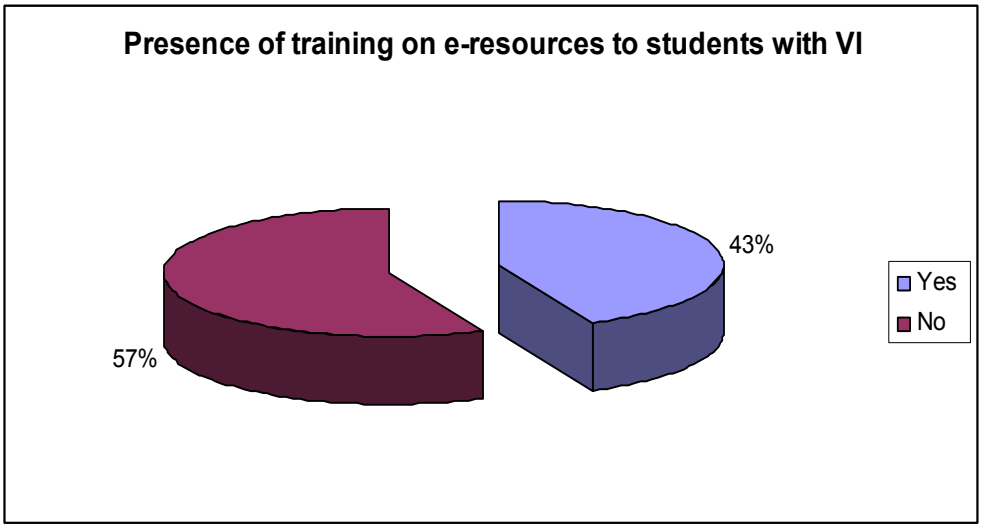

Figure 4. 14: Presence of training on e-resources to students with VI

More than half of the students responded that they had not received any user education on how to access e-resources.

These findings confirm similar findings by Mittermeyer and Quirion (2003) and Nowcki (2003) which demonstrated that students as a general population have significant limited knowledge of the basic elements of research and database searching. However the article by Power and LeBeau (2009) suggests that academic reference librarians can provide students who use screen readers training sessions on how to navigate library databases.

Reasons for not attending the training

For those who had not received training, the researcher further sought to establish the reasons for not attending or having received user education on how to access e-resources. The findings were as described below:

- Majority stated that they lacked awareness on provision of such training at the library.
- Many students stated that there was no such organized training at the section for users with special needs.
- Others stated that the user education was given using a projector and were not able to benefit since they were visually challenged.

In the light of the stated reasons of not receiving user education on accessing e-resources; the low number of e-resource access literacy could be attributed to unavailable logistical provisions in such trainings that could accommodate those library users with visual impairments. Therefore the library management should ensure that training offered to users with visual impairment be provided by a staff with adequate skills in both assistive technology and access to electronic resources.

4.6.2 Approach used in training

In order for the researcher to fully achieve the fourth objective, she sought to find out information concerning the approach used in giving user education in the area of accessing e-resources. The findings were as presented in figure 4.15:

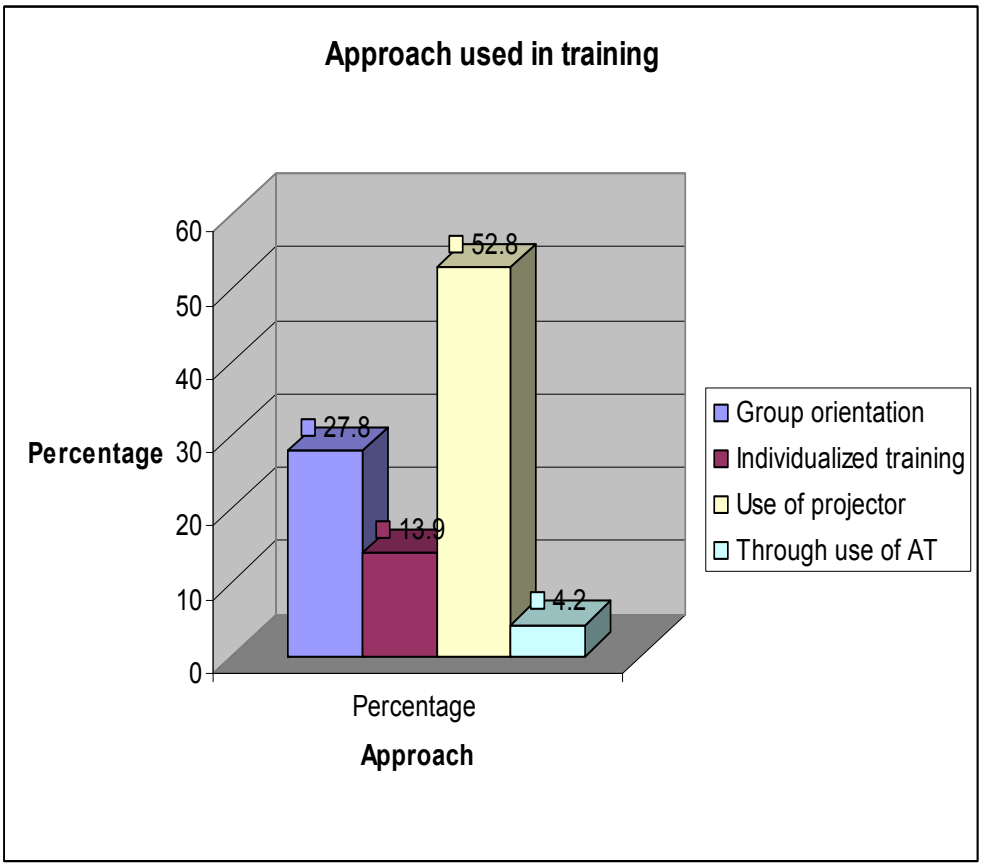

Figure 4. 15: Approach used in training

The findings revealed that the approach that is mainly used in offering user education on access to e-resources was through the use of the projector. The second most used method was through group orientation. The findings also revealed that the least used approach was offering trainings and demonstrations through the use of adaptive technology. From the findings, the methods that were mostly used are those that are not favorable to users with visual impairment while the methods that were least used i.e. Individualized training and training through the use of adaptive technology could be the most favorable given the visual challenge. The low usage of the most favorable approaches in offering user education on access to e-resources could be attributed to the low knowledge

levels of staff offering the training on assistive technology and few staff to manage individualized training.

4.6.3 Frequency of training

With the dynamic nature of the technological world taking into consideration that more and different web sites get created every time and that the appearance of the current websites and search engines keep on changing, there is need to conduct frequent user education forums especially that which concerns the use of e-resources. With this background, the researcher sought to find out how often the trainings were conducted to the users with visual impairments at the Post Modern Library. The findings were as presented in table 4.9:

Table 4. 9: Frequency of training

How often	Frequency (F)	Percentage (%)
Weekly	3	4.2
Monthly	6	8.3
On request	20	27.8
Annually	7	9.7
Only on joining the university	20	27.8
Not aware	16	22.2
Total	72	100

The findings revealed that students with visual impairment mainly receive trainings 'only on joining the University' and 'on request'. The 'on request' frequency means that the users are able to seek information from the staff at any hour of need and as many times as possible. This could be attributed to the welcoming nature of the staff serving the students and their availability at every time of need by the students. The findings of a high frequency of training only when joining the University could be due to lack of awareness of such services which could be attributed to low communication avenues of conveying such information to the users with visual impairments. The findings also showed that a good number are not aware of such trainings in the library. The library management through the staff serving in the section should invent ways of communicating to their clients e.g. through organized meetings at the library section where important information could be communicated to the clients. From the findings, weekly and monthly frequencies were very low. This could

be attributed to lack of organized trainings in the section as stated earlier in the reasons under 4.6.1.

4.6.4 Staff knowledge in e-resources

With e-resources being the most possibly used resources by the virtue of their ability to be accessed both in the library and remotely, it is important that the users, especially those with visual impairment receive detailed training on how to access them. In order to achieve this, it is important for the staff offering such trainings be well informed and knowledgeable in the area of e-resources. The researcher therefore sought to find out the staff knowledge in accessing e-resources. To achieve this, the students were asked to indicate their opinions for the statement that 'staffs are knowledgeable in accessing e-resources'. The findings were as presented in figure 4.16:

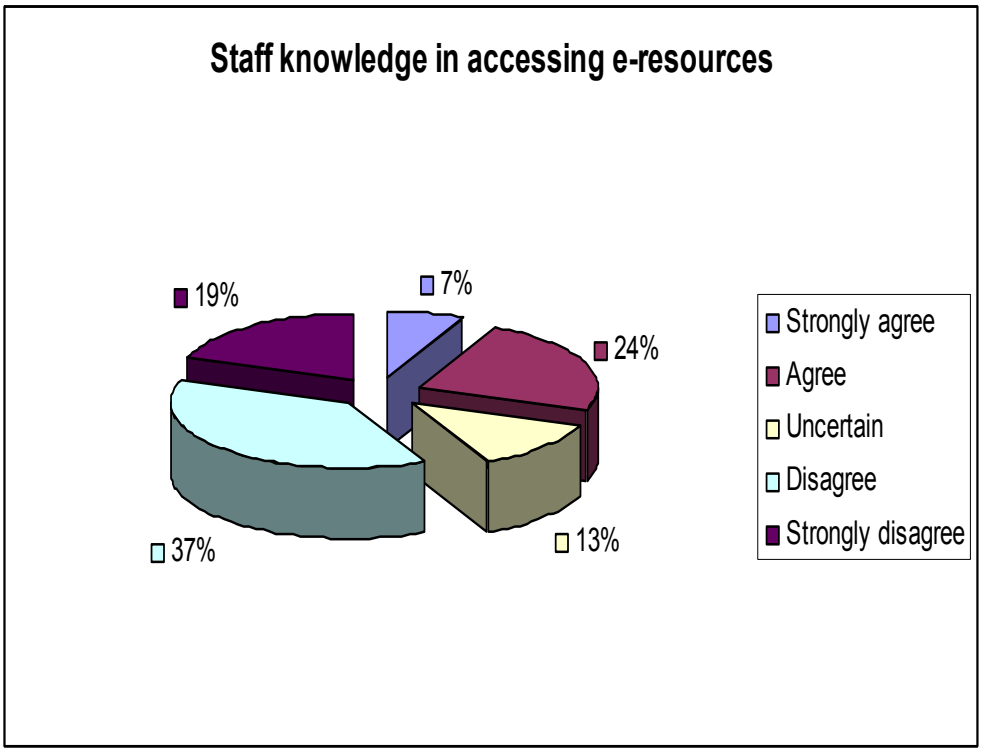

Figure 4. 16: Staff knowledge in accessing e-resources

The findings showed that out of the five options, majority of the students were of the opinion that staffs are not knowledgeable in e-resources. This could be attributed to low skills in the use of AT which could limit them in guiding the users to access e-resources purely through the use of assistive technology. However, the same staff could be very knowledgeable in the opinion of the sighted students in a case where guidance on the use of e-resources does not involve the use of assistive technology. In order to serve students with visual impairment better especially in the area of offering user education on the use of e-resources, library management could consider enhancing assistive technology skills for the staff especially through practical experiences with the electronic informational plat forms.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the major findings recorded and discussed in chapter four; it shows the conclusions made from the findings and presents the recommendations suggested. It also includes suggestions for further study.

The purpose of this study was to establish the challenges of accessing electronic information resources by students with visual impairments, with a view of enabling the library management to make informed decisions in the build-up and organization of electronic information resources and improving accessibility to these resources by users with visual impairment.

The study was guided by the following specific objectives: To establish the factors that affect e-information seeking behavior by students with visual impairment, to identify the challenges that students with visual impairment face in accessing e-resources, to find out whether adaptive technology affect students with visual impairment in accessing e-resources and to describe the training offered to students with visual impairments on accessing e-resources.

In order to achieve these objectives, data was collected from 72 students and 5 staff members. The obtained data was then analyzed using descriptive statistics. The following is the summary of findings as per each of the specific objectives:

5.2 Summary of the findings

5.2.1 Information seeking behavior of students with visual impairments

The study sought to establish the factors that affect information seeking behavior of students with visual impairment. The study revealed the following:

i. Most of the students were not able to retrieve and use e-resources though their own efforts.
ii. More than half of the student with visual impairment used long time to retrieve a single e-resource.
iii. More than half of the students used e-resources often. However a good number of students also indicated that they rarely used e-resources.
iv. After retrieving, most students with visual impairment used other students to read for them. A significant number used screen readers while only a very small number used staff to read for them

5.2.2 Challenges facing students with VI in accessing e-resources

The study also sought to find out the challenges that students with visual impairment face while accessing electronic resources. The study established the following:

i. Majority of the students stated that he library website was not very accessible to users with visual impairment
ii. More than half of the students indicated that it is not easy to use e-resources.

iii. Majority of the students indicated that there are not enough computers in the section for users with special needs.

iv. Majority of the students indicated that the staff serving in the section for users with special needs were not enough to assist them.

5.2.3 Use of adaptive technology in accessing e-resources

Further, the study sought to find out how use of assistive technology affects students in accessing e-resources. Several findings were made:

i. Assistive technology was not adequate to cater for the students needs in accessing e-resources.

ii. The awareness level of students on assistive technology was sufficiently high.

iii. More than half of the students had received either formal or non formal training on the use of assistive technology. However a large number of students indicated that they lacked training on assistive technology

iv. Out of the total students who had indicated earlier that they had received training on the use of adaptive technology, majority rated themselves as having good assistive technology skills.

v. Majority of the students indicated that the available assistive technology was not useful due to lack of adequate training and very few AT resources.

vi. The staff serving users with visual impairment were rated ‘average’ in skills on assistive technology.

5.2.4 The provision of training on the use of e-resources for students with VI

Finally, the study investigated the training/user education offered to students with visual impairments, the approaches used and its effect in accessing e-resources. The findings were:

i. More than half of the students responded that they had not received any user education on how to access e-resources. Reasons for not attending the training were:

   - They lacked awareness on provision of such training at the library.
   - There was no such organized training at the section for users with special needs.
   - A projector was used limiting the benefit to those with visual impairment

ii. The approach that is mainly used in offering user education on access to e-resources was through the use of the projector and group orientation while the least used method was individualized training and use of AT.

iii. Students with visual impairment mainly receive trainings 'only on joining the University' and 'on request'. A good number are not aware of such trainings in the library. Weekly and monthly frequencies were very low.

iv. Majority of the students indicated that staff are not able to assist access e-resources through AT.

5.3 Conclusions

The purpose of this study was to identify the challenges that face students with visual impairment in accessing electronic information resources. The study resulted in four main conclusions based on the findings of the study as follows:

Firstly, on the information seeking behavior, the study concluded that students with visual impairments lacked independence in using e-resources because they were not able to retrieve and use e-resources through their own efforts. This conclusion was reached with the realization that the efforts of the students with visual impairment to retrieve a single resource resulted in spending a lot of time and that even after retrieval they had to rely on other sighted students to read for them.

Secondly, on the challenges of access, the study concluded that the information seeking behavior described above was a product of the various challenges that students with visual impairments faced when accessing e-resources. The main challenges were low skill levels in AT for both staff and students, low literacy levels in accessing e-resources and inaccessible websites.

Thirdly, regarding assistive technology, the study findings indicated that the literacy levels of both staff and students in assistive technology was low thus limiting access to e-resources. However, the study concluded that assistive technology is a key aspect in the access of e-resources by users with visual challenges and thus much emphasis should be put.

Finally, pertaining (e-resource) user education, the study concluded that there were very low literacy levels to students with visual impairments owing to mainly lack of awareness and the low skill levels in using assistive technology for both the training staff and the students being trained.

In order to address the challenges as per the conclusions above, recommendations were put forward as indicated in the recommendations section below.

5.4 Recommendations

In the light of the study findings and the conclusions made of this study, the following recommendations were made:

5.4.1 Policy recommendations

1. **Recommendations based on the information seeking behavior**

The study established that most of the students were not able to retrieve and use e-resources though their own efforts. The study also established that more than half of the student with visual impairment used long time to retrieve a single e-resource. Further, it was established that a good number of students rarely used e-resources and that even after retrieval; most students with visual impairment used other students to read for them.

The study therefore recommends that the library management needs to encourage independence of learners through equipping them with self reliant skills like

information literacy and AT skills. This way they will be able to achieve retrieval of a resource within the shortest time possible.

2. **Recommendations based on the challenges of access**

The study established that the library website was not very accessible to users with visual impairment, as per the statements by the majority. It also established that more than half of the students found it difficult to use e-resources. further the study established that computers in the section for users with special needs were not enough as per the statement made by majority and that staff serving in the section for users with special needs were not enough to satisfactorily attend to the needs of students with visual impairments.

This study recommends advocacy for and facilitation of learners for learners' initiative where learners who are knowledgeable in AT can assist the others during their free time. The study further recommends that the library management Organizes training and induction forums for staff on AT and e-resources. This is because both areas are dynamic.

3. **Recommendations based on the use of assistive technology**

The study established that assistive technology was not adequate to cater for the students needs in accessing e-resources. It was also established that the awareness level of students on assistive technology was high and that a large number of students lacked training on assistive technology. Further the study established that out of the total students who had indicated that they had received training on the use of adaptive technology, majority rated themselves as having

good assistive technology skills. The study also established that the available assistive technology was not useful due to lack of adequate training and very few AT resources. Further it was established that the staff serving users with visual impairment had average skills in assistive technology.

Based on these findings, the study recommends that the library management should provide adequate assistive devices as well as ensure regular maintenance of such facilities and software for example by ensuring they are up to date and relevant to the users.

4. Recommendations based on user education

The study established that more than half of the students had not received any user education on how to access e-resources with reasons being lack of awareness on provision of such training in the library, absence of such trainings organized at the section, and usage of a projector during training. The study also established that: the approach that is mainly used in offering user education on access to e-resources was through the use of the projector and group orientation while the least used method was individualized training and use of AT; that students with visual impairment mainly receive trainings 'only on joining the University' and 'on request'; that a good number are not aware of such trainings in the library and that the staff are not able to guide students with visual impairment access e-resources through AT.

The study recommends that the library should design a training program for users with visual impairments like, conducting regular and one on one training

sessions for users with visual impairments. Further the study recommends that the library users who are visually impairment should be provided with awareness about the availability of on request trainings.

5.4.2 Recommendations for further research

This study looked at the access of electronic information resources by students with visual impairment. Taking up research in the following areas of study will be very useful in the area of information provision:

1. Considering the current digital era with digitization and e-publishing, it is important to conduct a study on the Effects of e-publishing on the use of the physical library.
2. In the light of the high rate of advocacy for the support of persons with disabilities, it is important to carry out a study in the area of hearing impairment and access of electronic information resources.
3. Effectiveness of the approaches used in offering user education on the use of e-platform to learners with visual impairment. This was informed by the low information literacy rate of students with visual impairment in accessing e-resources.
4. A comparative study between a developed and a developing country needs to be carried out on the access of electronic resources. This is because of the digital divide factor.
5. This study explored the challenges that students with visual impairment faced in accessing electronic resources. However, a more expansive study is required to establish the challenges as per the nature of visual

impairment and specifically how the challenges faced by the low vision students are different from those faced by the totally blind.

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APPENDICES

APPENDIX I: QUESTIONNAIRE FOR STUDENTS

Introduction letter

Dear Student,

Re: Request to Participate in Questionnaire for Master's Research Project

I am a master's student at Kenyatta University conducting a study on challenges of accessing electronic resources by learners with visual impairment. I have selected you as one of my respondents in data gathering because you are the best suited candidate. I will appreciate if you assist me to achieve the intended goal by filling the attached questionnaire. The questionnaire will take you very limited time to complete. The information provided will only be used for the purpose of this study and will be treated with utmost confidentiality.

Thank you for your time and cooperation.

Fridah Gatwiri Kiambati

email address: fridah.gatwiri@gmail.com

Section A: General Information

Please tick appropriately.

1. Age: Below 20 yrs ☐

   21yrs- 25 yrs ☐

   26 yrs- 30yrs ☐

   31yrs- 35yrs ☐

   Above 35yrs ☐

2. Sex: male ☐

   Female ☐

3. Year of study: year 1 ☐

   Year 2 ☐

   Year 3 ☐

   Year 4 ☐

   Year 5 ☐

   Masters ☐

   PHD ☐

4. Area of study/course being undertaken: please indicate below…….

5. Nature of Visual impairment: Blind ☐

   Low vision ☐

Section B: E-resources, adaptive technology and information literacy

Please tick or fill appropriately

6. Are you able to access, retrieve and use e-resources without any assistance?

   Yes ☐ No ☐

7. How long do you take to retrieve a single e-resource?

   ☐ Very long time

   ☐ Long time

   ☐ Short time

   ☐ Very short time

8. How do you read the resource retrieved?

   ☐ I use student readers

   ☐ I use the staff in the section

   ☐ I use screen readers

☐ I use screen magnification

9. In a scale of 1-5 ,where 1 is ' strongly agree' 2 is 'agree', 3 is 'uncertain' 4 is 'disagree' and 5 is' strongly disagree', please indicate by a tick the extent to which you agree to the following statements.

Statement	**1**	**2**	**3**	**4**	**5**
All computers in the resource room are equipped with internet connectivity					
The internet connectivity is always good in the resource room					
All computers in the section have assistive software to assist me					
There are enough computers and other assistive technologies for VI students in the library					
I get all materials I need on library website					
Staff members in resource room are enough to assist all students with disability					

The staff members in the section are knowledgeable enough to assist me to access e-resources					
It is very difficult for me to use e-resources					

10. How often do you use the e-resources available in the library?

☐ Very often

☐ Often

☐ Rarely

☐ Not at all

11. Have you ever attended any training on the awareness and use of e-resources in the library?

☐ Yes ☐ No

12. If not to (11) above, what was the reason?

……

……

13. If yes, which among the following methods were used:

☐ Group orientation

☐ One on one /individualized training

☐ Use of projector

☐ Through the use of adaptive technology

14. How often do you receive training on the use of e-resources in the library?

☐ Weekly

☐ Monthly

☐ On request

☐ Annually

☐ Only when joining the university

15. Have you any knowledge on adaptive technology?

☐ Yes ☐ no

16. Have you received any formal or informal training on the use adaptive technology?

☐ Yes ☐ no

17. If yes to (10) above, how can you rate your skills on adaptive technology?

☐ Very good

☐ Good

☐ Poor

☐ Very poor

18. Which type of adaptive technology is available in the library?

(Please list any that you know)

……

……

19. Is there any other adaptive technology for the visually impaired that you think can be useful in the library?

Please list if any:

……

……

……

20. How useful are the available adaptive technology when accessing electronic resources.

☐ Very useful

☐ Useful

☐ Not useful

21. If the answer to (14) is ‘not useful’, what do you think would have contributed to this?

……

……

……

22. In your opinion how knowledgeable are the staffs currently serving the visually impaired in assistive technology?

☐ Very high knowledge on assistive technology

☐ High knowledge on assistive technology

☐ Average knowledge

☐ Little knowledge

☐ Very little knowledge

23. What challenges do you experience in accessing electronic information resources in the library?

……

……

……

24. What do you think can be done or improved to facilitate easy access to e-resources by the learners with visual impairments in the post modern library?

……

……

……

THANK YOU

APPENDIX II: INTERVIEW GUIDE FOR STAFF

1. How long have you served in the section for users with special needs?
2. Do you have any formal training in computer applications with internet being a part?
3. Have you attended any formal training on the use of adaptive technology?
4. Have you ever attended a user education seminar on the retrieval of e-resources?
5. Which services do you offer to students with visual impairment that are related to the access of e-resources?
6. Do you provide training on how to access e-resources to the visually impaired? If yes, How often and how?
7. How do you assist students who do not know how to use adaptive technology in accessing e-resources?
8. Which challenges, if any do you encounter when offering user education on accessing e-resources to the students with visual impairment?
9. What challenges do you encounter in serving students with visual impairment especially in the retrieval and use of e-resources through the use of adaptive technology?
10. What steps do you take as staff serving students with visual impairment in ensuring improved access to e-resources and ensuring a greater frequency in using e-resources?
11. What suggestions would you give to facilitate easy access of e-resources under the following areas: Adaptive technology, User education, Formats of Available e-resources and Web format?

APPENDIX III: TIME SCHEDULE

Activity	**Time duration in months**
Proposal writing	May to August, 2014
Proposal defense	September, 2014
Pilot Study	October to November, 2014
Data collection	December to January, 2015
Data analysis	February to March, 2015
Project report writing	April to May, 2015
Submission of final copies	May, 2015
Graduation	July, 2015

APPENDIX IV: BUDGET

Item/activity	**Cost/Unit**	**Units**	**Cost in Ksh.**
Printer	20,000	1	20,000
Printing papers	400	5	2,000
Laptop	45, 000	1	45, 000
Bus Fare (pilot study)	200	4	1,000
Bus fare (data collection)	200	10	2000
Total			70, 000

APPENDIX V: STUDY LOCATION APPRECIATION PHOTOGRAPHS AND RESEARCHER INTRODUCTION LETTER

Post Modern Library, front view

Post Modern Library, side view

Section for users with special needs in Post Modern Library

Source: Kenyatta University Website.

KENYATTA UNIVERSTIY
DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
P.O. Box 43844, 00100
NAIROBI, Kenya
Tel: 8711622, Ext. 3525
E-Mail: chairman-infoscience@ku.ac.ke

11th December 2014

The Chief University Librarian,
Kenyatta University,
P. O. Box 43844 – 00100,
NAIROBI.

RE: FRIDAH GATWIRI KIAMBATI – E65/24523/2013

This is to introduce the above named student who is a Postgraduate student in our department. She is carrying out her research on a topic entitled **"Challenges of Accessing electronic Resources by Learners with Visual Impairment: A Case Study of KU Post Modern Library".**

Any assistance given to her will be highly appreciated.

Thank you.

DR. CHARLES K. MAINA
AG. CHAIRMAN
DEPARTMENT OF LIBRARY & INFORMATION SCIENCE

Approved
11/12/14.