Accessibility and Usability of Library Websites to Students with Visual and Physical Disabilities in Public Universities in Kenya

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ARTICLE INFO

Article history:
Received 02 March 2021
Revised 25 April 2021
Accepted 10 May 2021

Keywords:
Websites,
University Libraries,
Students with visual Disabilities,
Students with physical Disabilities,
Website Accessibility,
Kenya

ABSTRACT

This article examines the accessibility and usability of library websites to students with visual and physical disabilities in public universities in Kenya. The study used survey research design and adopted a mixed methods approach. Data were gathered using survey questionnaire, focus group discussions, structured interviews, and observation. The study population consisted of six public universities that had a longstanding tradition of enrolling students with disabilities. Census was used to obtain a study sample comprising of students with visual disabilities (86), students with physical disabilities (91), University Librarians (6), Personnel from Disability Mainstreaming departments (6), Systems Librarians (6) and Library Personnel who provided information services to students with disabilities (133). The Social Model of Disability and IFLA Access to Libraries for Persons with Disabilities checklist were used as conceptual and theoretical framework in the study. Study results revealed that all the libraries had library websites. However, the websites did not have disability services page or information specific to individuals with disabilities. Also a section of students with disabilities lacked awareness of the existence of library websites and e-resources available through them. Additionally, the website design posed various access challenges. The study concluded that people with disabilities were excluded from access and use of library websites in public universities. The authors recommended that library websites must contain disability services page containing information specific to persons with disabilities. Moreover, libraries should evaluate their websites to ensure compliance with W3C requirements for web content accessibility. Additionally, libraries should develop disability policy to provide guidance on provision of information services to persons with disabilities.

1. Introduction

From the earliest days of human history, information has been the foundation of power and efficiency in all sectors. The proliferation of information and the reliance on it in every sphere

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International Journal of Knowledge Content Development & Technology, 11(2): 55-75, 2021.
http://dx.doi.org/10.5865/IJKCT.2021.11.2.055

of life paved way to information and knowledge societies (Ogar & Tangka, 2018). However, in the current information and knowledge societies, there is great value and demand for information as compared to the agricultural and industrial societies. This is due to the rapid change in dynamics of information and knowledge society characterised by explosion of information as well as the instant pace of information flow that has been made possible by information communication technologies (ICTs). The rapid development and widespread adoption of ICT has greatly transformed every aspect of life. Consequently, information and knowledge have become the driving force for development and prosperity of every nation (United Nations Educational Scientific and Cultural Organization, 2006). The development of information and knowledge societies has transformed economic, social, educational and political sectors. This rapid transformation has necessitated many institutions to adapt to this change (Altay, Tekin, Dursun, & Yayla, n.d.)

Universities are not an exemption since as Ogar and Tangka (2018, p. 8) put it "the new and emerging technologies challenge the traditional process of teaching and learning as well as the way education is managed". Moreover, ICTs have created flexible delivery of education thus enabling learners to easily access knowledge from anywhere and at any time, as well as enhancing access to learning resources. In this regard, universities world over strive to be centers for research and development where access to information becomes the major driving force to achieving this goal. However, universities cannot survive without libraries as their success is dependent on the services provided by their libraries (Library & Information Science Network, 2018). University libraries are established for the purpose of supporting the core activities of the universities including learning, research and innovation. They are the learning, research and innovation centers of the universities and therefore regarded as gateways to information (Rasul & Singh, 2010). In this regard, university libraries are purposely designed to provide information services to support the said activities (Abduldayan, Dang, Karemani, & Obadia, 2016). It is worth noting that university libraries serve patrons with different needs and a wide range of abilities and disabilities (Graves & German, 2018) such as visual, speech, hearing, physical, cognitive and more (Intahchomphoo & Jeske, 2016). Consequently, university libraries have a responsibility of ensuring that the information needs of their patrons are adequately catered for without any discrimination so as to enable the patrons to excel in their research and learning (Kaunda & Chizwina, 2019). According to the Library Services for People with Disabilities Policy of 2001 "libraries must not discriminate against individuals with disabilities and shall ensure that individuals with disabilities have equal access to library resources" (American Library Association, 2006, para. 7). For libraries to adequately satisfy the information needs of persons with disabilities, they must provide relevant information in suitable formats, adequately trained personnel, conducive environment for study and appropriate technologies to enable access, retrieval and use of information.

It is widely acknowledged that ICTs can help minimize the obstacles encountered by people with disabilities in all aspects of their lives. According to International Telecommunications Union [ITU] (2013), ICT has the ability to uncover a variety of services, change existing services as well as increase the demand for access to information and knowledge especially among the marginalized and excluded groups particularly people with disabilities. The advancement in ICTs, has made it easier to collect, process, store and disseminate information in variety of formats. The Library and

Information Science Network (2018), opines that libraries have transformed from the traditional close-access libraries to modern hybrid, digital and virtual libraries. University libraries are leveraging the opportunities provided by the new technologies in their operations especially in provision of electronic information. The emerging new technologies have not only transformed the libraries and the library professionals but also they have brought about a new generation of library patrons who are very passionate about technology. Therefore the success of libraries in their role is determined by the level of satisfaction of the patrons which also relies on speed of delivery of information services and the accuracy of information (Bhoi, 2017). In this regard, university libraries use ICT to improve and speed up their operations such as information acquisitions, processing, circulation services, Online Public Access Catalog (OPAC), library databases, websites and more. Moreover, library patrons can now access information at the touch of a button from anywhere at any time thanks to the internet which has connected people with information. To ensure maximum access and utilization of information resources, many university libraries are taking advantage of library websites to provide access to variety of information such as e-resources, e-databases, news, and more. Unfortunately, only persons without disabilities have benefited much while persons with disabilities have continued to suffer (Dodamani & Dodamani, 2019) yet they have the same information needs as those without disabilities. This creates social exclusion of persons with disabilities as they are denied access to information rendering them unable to participate in society as citizens, unable to make informed decisions that affect their lives, and unable to fully take advantage of all that society presents (Moore, 2000). This is despite the fact that computers and assistive technologies such as braille technology, speech synthesizing technology, screen reading technology and more have brought a fundamental change in the lives of persons with visual and physical disabilities. A successful library website is the one that not only provides online information services but also serves as a tool for creating awareness of all available library services, facilities, as well as community resources and programmes for all persons including those with disabilities. With this regard, it is imperative to understand what promotional services/information is provided by libraries on their websites in order to make the libraries inclusive to persons with disabilities. A number of studies conducted in Kenya investigated different aspects of information provision to persons with disabilities in university libraries. Monda (2018) examined the role of librarians in meeting the information needs of students with visual and hearing impairments at the University of Nairobi. Nyaboke (2018) examined the challenges faced by persons with disabilities while accessing information services in university libraries in Meru. Kiambati (2015) examined the challenges experienced in accessing electronic information resources by students with visual impairments at Kenyatta University with particular focus on training, adaptive technology, and factors affecting information behaviour. Njoroge (2013) assessed the status of academic libraries in Kenya with regard to accessibility by persons with disabilities. Kariba (2009) investigated how Kenyatta University Library met the educational and informational needs of students with visual impairments. Anambo (2007) examined the challenges that students with disabilities faced while seeking services at Jomo Kenyatta Memorial Library at the University of Nairobi with particular focus on facilities, policy environment, and staff attitude. However, no previous study has investigated how inclusive the library websites are to persons with disabilities. The purpose of this study is to examine the kind of information provided to persons

with disabilities on the library website and how accessible those websites are.

2. Literature Review

The Social Model of disability theorized by Mike Oliver (1990) and the IFLA Access to Libraries for Persons with Disabilities Checklist are used as theoretical and conceptual frameworks in this study.

The social model originated from the political and intellectual arguments of the Union of Physically Impaired Against Segregation (UPIAS) a British activist group responsible for the Fundamental Principles of Disability document published in the 1970s (Oliver, 2013; Shakespeare, 2010). The Social model developed in response to the medical model of disability (also known as personal tragedy model) which perceived a person's disability as individual problem related to disease, accident or any other health related problem that needs to be fixed by treatment or rehabilitation and at times placing the affected individuals in special establishments/ institutions hence segregating them. Consequently, this has led to persons with disabilities being socially perceived and perceiving themselves as damaged, abnormal, patients, and dependent objects for various medical interventions and rehabilitation (Albert, 2004). In contrast, the social model removes disability from the individual and places it on the society or the social structures. The social model believes that individuals are not disabled as a result of their impairments, health condition or other ways that are considered medical problems but rather, it is the physical and attitudinal barriers in society such as prejudices, lack of modifications and systemic segregation and exclusion that disables them (Carson, 2009). Disability is therefore a social construct created by barriers such as attitudinal; structural (such as norms, ideologies and policies of organizations and institutions); and environmental (such as lack of lifts or ramps, unavailability of resources for persons with disabilities for example assistive technology and devices, information in alternative formats and more). These barriers prevent full participation of persons with disabilities in society, accessing employment opportunities and living independently. Shanimon and Rateesh (2014) assert that disability results from the failure of the society to avail suitable services for persons with disabilities and to adequately ensure that their needs are factored in within its social organization. It is against this backdrop that the social model aims at removing these unnecessary barriers (Ghosal & Chandra, 2019) and emphasizes that society should provide accessible buildings, accessible communication, accessible services, accessible information and more (National Commission Persons with Disability, 2007). According to Taylor (2005), the social model has been core in shaping the landscape of disability studies as well as informing collective action within the disability community. Levitt (2017) argues that the social model can be taken as a valuable empirically grounded perspective that has made fundamental contribution in changing society's understanding of disability as well as the way it relates with persons with disabilities. Moreover, the social model has been fundamental in changing the lives of persons with disabilities as organizations have made reasonable adjustments to disability in order to remove many barriers of social inclusion.

The IFLA checklist was prepared by the IFLA Standing Committee of Libraries Serving

Disadvantaged Persons (LSDP) (Irvall & Nielsen, 2005). The checklist was designed as a tool to assess accessibility of services, materials, buildings and programs in all types of libraries as well as to help them improve accessibility where required. The checklist lays down what is required to make the surrounding of the library building, the entrance, stairs, washroom as well as materials and services and more accessible to persons with disabilities. The checklist recommends media formats suitable for persons with different types of disabilities. Further, the checklist prescribes suitable software for computer accessibility. It also covers services and programmes for persons with disabilities as well as communication between library personnel and persons with disabilities. Additionally, the checklist prescribes accessible library websites and catalog (Irvall & Nielsen, 2005) so that persons with disabilities can be able to locate, retrieve and use information. The IFLA checklist has been used successively to audit libraries as well as to help improve accessibility for persons with disabilities. For instance, the checklist was used to audit Fife Campus Library at the University of Dundee in Scotland. The areas that were audited include media formats, physical access, services and communication, and evaluation (Forrest, 2006)

Using both the social model and IFLA checklist can help libraries increase accessibility of ICTs including websites. The social model can be used to identify and eliminate the barriers associated with ICT including lack of assistive technology and devices as well as those caused by poor website design. The social model acknowledges that ICT is liberating for persons with disabilities. The IFLA checklist provides that libraries should have accessible websites and recommends the guidelines provided by W3C on how to make websites accessible (Irvall & Nielsen, 2005).

Websites have become vital tools for enabling organizations world over to achieve their business goals; they are used to provide information, collect data and feedback, provide services and more (Billingham, 2014). Additionally, websites provide information on organizations' culture and values as well as their vision (Mentes & Turan, 2012). Websites are therefore created to enable organizations to improve their service delivery to their clientele as well as their stakeholders. Moreover, websites have become a crucial resource that provides information on every aspect of human life including health, education, employment, and more. Universities all over the world recognize the value of websites in enabling them to achieve their goals of providing quality higher education. According to Keniston (1960, p. 565) the goal of higher education is " the development of an informed, responsible citizenry and the preparation of every boy and girl for personally satisfying and socially useful career". Universities use websites to provide variety of services such as learning resources, information and news, and more (Hassouna, Sahari, & Ismail, 2017) to their audiences comprising of prospective and current students, employees and other stakeholders (Ahmi & Mohamad, 2016). Universities serve people with diverse backgrounds and abilities and in this regard, their websites should be easy to access and use by all their customers regardless of their abilities or disabilities.

The International Organization for Standardization (ISO 9241-11:2018) defines usability as "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO, 2018, sec. 3.1). In this context, Web usability means how user-friendly a websites is in terms of design and ease of use to enable the user to interact with it, and access its content efficiently and effectively to satisfy his information need. According to Nielson (2012), usability has five quality components that define it including

learnability (the easiness with which users complete simple tasks when they interact with the website for the first time); efficiency (the speed at which users can perform tasks once they are familiar with the website); memorability (the easiness with which the users can re-establish proficiency once they revisit the website after a duration of non-use); errors (how many errors users make when using the website, how severe the errors are and how effortlessly the users can resolve them); and satisfaction (how enjoyable it is using website design). Nielson (2012) further argues that usability is an indispensable condition for existence of a website because if users find a website difficult to access and use, or the homepage does not indicate what the organization provides and what the users can do, they will leave it for something else. In this scenario, persons with disabilities would not find the website useful at all.

Web accessibility on the other hand is the practice of ensuring that websites are barrier-free and accessible to all especially individuals with disabilities. According to the World Wide Web Consortium (W3C), web accessibility "means that websites, tools, and technologies are designed and developed so that persons with disabilities can use them. More specifically they can perceive, understand, navigate, and interact with the web." (Web Accessibility Initiative, 2020, para. 4). The W3C has laid down a set of guidelines to increase accessibility of web content for persons with various types of disabilities in an effort to ensure they can actively participate in society. Moreover, accessible websites improve their life experience. However, Alahmadi and Drew (2017) point out that even though web developers have tried to ensure accessibility of websites as well as developed advanced tools and features for web applications, websites still pose accessibility restrictions to persons with disabilities particularly when accessing online content and web-based resources. Similarly, Kimura (2018) notes that in theory, web is believed to eliminate barriers of communication and understanding but as a matter of fact many websites and tools present many obstacles that hinder many potential users particularly those with disabilities from accessing web content. This is largely due to the failure of web developers to fully conform to the web standards provided by W3C. Ismail and Kuppusamy (2019) assert that websites are universally accessible only if they adhere to the guidelines laid down by W3C but if they have some aspects that do not conform to the web standards, then barriers that inhibit access to web content will always present. The most common barriers highlighted by Alahmadi and Drew (2017) include empty links; linked images, missing alternative text; unordered links; absence of cues for reading and navigation sequence; inaccessible document files such as PDFs, Word, and Excel files and more.

Persons with disabilities particularly those with visual disabilities use screen readers to access web content. However, research has revealed that they are always restricted by poor web design (Alahmadi & Drew, 2017; Ismail & Kuppusamy, 2019). This is because many university websites do not comply with W3C guidelines (Harper & DeWaters, 2008). A study conducted in US by Byerley and Chambers (2001) tested the website usability by persons with disabilities at the Kraemer Family Library at the University of Colorado Springs. The findings revealed that side bars on each web page were ineffective due to insufficient colour contrast between the text and the background and some links had confusing terminology that required better labelling. Furthermore, the placement of certain links was inadequate rendering it difficult for the respondents to locate some information. The findings also revealed that navigation bars were not noticeable to some respondents hence

they did not use them. It was also revealed that the structure of website had been set on tables which was a big obstacle for the blind respondents as the JAWS screen reader read it in a linear fashion instead of reading it in a vertical fashion thus, rendering the output illogical and difficult to follow. Mulliken (2019) study also conducted in US examined the experience of eighteen blind library users while using library websites and search tools. The study revealed that many users took long to navigate the library webpage while using the screen reader due to the design of the web page. A study by Tomlinson (2016) also in US revealed that websites had inaccessible features. Some of the issues that were highlighted include images that had no alternative text, inaccessible PDFs, CAPTCHA without audio alternative, text embedded on images, text in tables and more. These inaccessible web features rendered the website unusable by people with visual disabilities. Similarly, a study conducted by Venter and Lotriet (2005) in South Africa which assessed the accessibility of South African websites to users with visual disabilities revealed that all the websites were of poor quality hence inaccessible. In particular, the web design made excessive use of graphics, animations as well as use of other multimedia without accessible alternatives rendering them unreadable to the screen readers.

With recent developments in technology, libraries have witnessed new types of information and information sources as well as innovative techniques of providing information. This has necessitated libraries to consider marketing as a tool to improve customers' satisfaction Gupta (2003). The IFLA Checklist, asserts that libraries should provide information about access, services, materials and programs for people with disabilities in alternative formats such as audio tapes and websites among others. Furthermore, Green and Blair (2011) note that the library web page should include information on facilities, services, and access as well as emergency plans for persons with disabilities. Power and LeBeau (2009) in a study conducted in the US revealed that only five out of the 33 libraries examined mentioned database availability on the website. They also provided inadequate information that was not supportive to persons with disabilities. Omekwu and Nwafor (2014) in a study conducted in Nigeria found that majority of libraries websites did not have a webpage on disability services though a number of them provided access to databases, Wi-Fi, Online Public Access Catalog (OPAC), online reference service as well as online selective dissemination of information (SDI). However, the study found that the libraries did not have most of the essential assistive technology and devices required to access these resources by persons with disabilities. A study conducted in Ghana by Ayoung, Baada, and Baayel (2020) found that academic libraries did not have assistive technologies. Similarly, Bashir, Fatima, and Malik (2017) in their study conducted in India revealed that the libraries did not provide assistive and adaptive technology such as JAWS software, Braille conversion software, Braille printers, and large monitors for people with low vision. Rugara, Ndinde, and Kadodo (2016) in a study carried out in Zimbabwe revealed that most libraries had no assistive technology to facilitate access of information by persons with visual disabilities. In the context of Kenya, Githinji (2013) and Njoroge (2013) in their studies found that the libraries the did not have assistive technology and devices.

3. Objectives of the Study

The following objectives are addressed in this article:

(a) To examine the kind of information provided on the library website for students with disabilities
(b) To assess the usability of library websites to students with disabilities
(c) To identify the challenges faced by students with disabilities while accessing the websites
(d) To propose solutions to the identified challenges

4. Methodology

This study adopted survey research design. The study population comprised of six public universities purposively selected on the account of their longstanding tradition of enrolling students with disabilities into their programmes. The universities were Kenyatta University, Jomo Kenyatta University of Science and Technology, Egerton University, the University of Nairobi and Moi University. Census was used to select the study sample where all students with visual and physical disabilities and library staff who served persons with disabilities were included in the study. The study sample comprised of 91 students with physical disabilities, 86 students with visual disabilities, 133 library personnel, six University Librarians, six Systems Librarians, and six staff from Disability Mainstreaming departments. A mixed methods approach was employed in which survey questionnaire was used to collect data from students with physical disabilities and library personnel who provided services to persons with disabilities. The study used structured interview schedule to collect data from University Librarians, Systems Librarians, and personnel from the Disability Mainstreaming department. The focus group discussion schedule collect data from students with visual disabilities. The observation checklist collected data on design and layout of the library, and facilities. Whereas quantitative data were analysed using Statistical Package for Social Sciences (SPSS), qualitative data were analysed thematically.

Before the commencement of the main study, a pilot study was conducted in a public university that was not part of the main study population. The sample size for the pilot study was equivalent to 10 percent of the main study sample. Quantitative data obtained from the pilot study were analysed and Cronbach values of 0.74 and 0.78 were generated for library personnel questionnaire and questionnaire for persons with physical disabilities respectively. These values were satisfactory and revealed reliability of the survey questionnaires that were used. Methodological triangulation used in the study increased the validity of the study results (Johnson, 2017).

5. Results and Discussions

This section presents the description and interpretation of the main study findings. The section is organized around the research objectives.

5.1 Information provided on the Library Website for persons with Disabilities

The study sought to know from the students with disabilities and the library personnel the kind of information that was provided on the website for persons with visual and physical disabilities. The students with physical disabilities indicated that the library website contained information on library personnel serving the people with disabilities (50, 54.95%), specialized library materials (48, 52.75%), online instructions for assistive technology (47, 51.65%), links to outside resources (45, 49.45%), and disability services page (43, 47.25%) as presented in **Table 1**.

Table 1 Availability of specialised information on library website – students with physical disabilities (n=91)

Information	Available	Not Available	Not sure
Disability services page	43	25	23
	(47.25)	(27.47)	(25.27)
Online instructions for assistive technology software	47	21	23
	(51.65)	(23.08)	(25.27)
List of specialized library materials	48	15	28
	(52.75)	(16.48)	(30.77)
Links to outside resources	45	16	30
	(49.45)	(17.58)	(32.97)
List of library personnel serving the people with disabilities	50	16	25
	(54.95)	(17.58)	(27.47)

The library personnel on the other hand indicated that the library website contained bibliography of library materials of interest to persons with visual disabilities (95, 71.65%), service instructions for the employees and the policy related to service provision for the people with disabilities (96, 72.18%) each as presented in **Table 2**.

Table 2 Availability of specialised information on library website – Library Personnel (n=133)

Information	Available	Not Available	Not sure	Total
Disability services page	47	81	5	133
	(35.34)	(60.90)	(3.76)	(100)
Online instructions for assistive technology software	46	82	5	133
	(34.59)	(61.65)	(3.76)	(100)
List of specialized library materials	46	82	5	133
	(34.59)	(61.65)	(3.76)	(100)
Links to outside resources	46	82	5	133

	(34.59)	(61.65)	(3.76)	(100)
Bibliographies of library materials of interest to the people with visual disabilities	95 (71.43)	33 (24.81)	5 (3.76)	133 (100)
Service instructions for employees serving the people with disabilities	96 (71.43)	31 (23.31)	5 (3.76)	133 (100)
Policy related to service provision for the people with disabilities	96 (72.18)	31 (23.31)	6 (4.51)	133 (100)

The interview with University Librarians and the Systems Librarians and the focus ground discussion indicated that the library websites did not have a disability services page. Moreover, the websites did not provide any information designed for persons with disabilities as claimed by the students with physical disabilities and the library personnel. Instead, they pointed out that the websites provided information meant for the general user including mission statement and objectives of the library, electronic resources, institutional repository, news, library rules and regulations, OPAC and more. A scrutiny of the library websites by the researcher confirmed that all the libraries had library websites but the websites did not have disability services page or any information meant for persons with disabilities. A possible explanation of these conflicting findings could be that the library personnel and the students with physical disabilities had no awareness of the exact contents of the library websites. Green and Blair (2011) emphasize the need for libraries to ensure the disability services page provides information on facilities, services, campus accessibility maps as well as emergency exit plans for persons with disabilities. If the libraries are committed to supporting the universities in achieving their goal of providing quality education to students in order to prepare them to be informed and responsible citizens who can participate and make valuable contribution to the society, then the libraries need to ensure that they have the capacity to serve all their patrons irrespective of their abilities and disabilities. Creating a disability services page within their websites and providing information regarding their disability policy, services, facilities, resources available for people with various types of disabilities and more would go a long way in improving the experience of the people with disabilities using the libraries.

The results from the focus groups discussions also revealed that respondents in two of the libraries in the study were not aware of the existence of the library websites. This can be attributed to poor marketing strategies by the libraries and failure to educate persons with disabilities on the existence of websites as well as the information available on the websites. The implication of this is that some respondents were not able to access and use valuable e-resources and other services that were available through the websites. This also means that the websites were of no use to them. Burrington (2007) cited by Noh, Ahn, and Park (2011) stresses that failure by the libraries to inform individuals with disabilities about the services available to them renders those services meaningless. Moreover, their academic performance would be negatively impacted by lack of access to the services. The IFLA checklist recommends that libraries consult the W3C guidelines on how to make library websites accessible to persons with disabilities (Irvall & Nielsen, 2005) Elaydi and Shehada (2013) point out that persons with visual disabilities in universities could experience

difficulties in their academic endeavour if they were not enabled to access information resources.

A third of respondents with visual disabilities who were aware of the websites found them inaccessible and unusable because they were not designed with the interests of persons with disabilities in mind as one of the focus group remarked"

" uum..the website is not accessible to us people who cannot see or who have problem with sight. So we don't use it because the website is not yet modified for persons with visual disabilities".

Moreover, the websites were considered inadequate because they could only be accessed with assistance from friends who were sometimes not available because they were busy studying and doing assignments as one focus group noted:

"….I can call it substandard. It can only be accessed when being assisted by friends…You see you cannot get information when you are alone. You are supposed to have someone having sight and you know the greatest motive of having sight is that somebody can to a greater extent be independent. So there should be a way such that when you access it, at least you can manage it alone without any assistance. Most of the times you approach someone to help they are busy with their work and we understand".

Seyama, Morris, and Stilwell (2014) in a study at the University of KwaZulu-Natal South Africa found that students with visual disabilities sought help from their friends or classmates to access the OPAC. Such dependence on others to access information could cause people with visual disabilities to lack self-confidence and suffer low academic achievement.

The respondents who could access the library websites observed that they faced challenges while navigating around many web pages and some features of the websites were inaccessible using the screen readers. Sanaman and Kumar (2015) study in India revealed that users with visual disabilities faced challenges related to incompatibility of the web and the screen readers as the latter could not read some information. This was attributed to poor quality of web site design where designers elaborately use graphics, animation and other multimedia without providing accessible alternatives. Venter and Lotriet (2005) note that most screen readers do not indicate efficiently when new content appears on the website thus hindering people with visual disabilities from fully experiencing the benefits of the dynamic websites. In this regard, (Ferati, Vogel, Kurti, Rau, and Astals (2016) recommends a change in the overview and web design so that the websites can be fully accessible by use of assistive technology.

5.2 Usability of Library Websites

With regard to the level of use and usability of the library websites, respondents with visual disabilities in three libraries said that the use of the library websites was moderate while in two libraries the websites were heavily used. However, respondents in one of the universities when asked if they used the library website claimed that there was no library website apart from the general university website

"..no we don't. The school has no website (laugh)…the library itself within the university has no Website. The only Website is the university Website"

Moreover, most respondents with visual disabilities felt that the library websites were somehow

not usable to them because they did not provide information designed purposely for them but instead, they were designed to provide information to the general reader without disabilities. This coupled with lack of assistive technology and devices to access the available information made them feel excluded from the rest of the student community and as a result, some students opted not to visit the library. The findings of this study suggest that the university libraries had not done well enough to eliminate barriers that hinder persons with disabilities from accessing information services. This also implies that persons with disabilities are excluded from accessing the most pertinent information that would help them overcome their disabilities. The Social Model of disability requires institutions to remove all disabling barriers that hinder persons with disabilities from accessing services for it is these barriers that cause marginalization, discrimination and disadvantage for persons with disabilities (Inclusion London, 2015). What would make the library websites usable for persons with disabilities, is to provide the necessary information tailored to the specific information needs. The IFLA checklist provides that information about access, services, materials including information resources, assistive technology and devices, and programs should be made available through the library's accessible website (Irvall & Nielsen, 2005).

5.3 Challenges Encountered while Accessing Library Websites

One of the challenges encountered by students with disabilities especially those with visual disabilities was lack of awareness. Whereas most of the respondents knew that the library websites existed, a few of them were not aware. Almost half of those who were aware of the existence of the websites did not know that the information resources they required for their academic survival were available through the websites. Confirming this, one of the Systems Librarians notes:

"...one of the challenges they might have is that they are not aware that the information they need exists in the library information portal and I have this fear of calling it library website. So it is possible that a student looking for information and he doesn't know that it is available in the library until he gets into contact with the librarian who actually can request on behalf of the student or if the student has enough motivation to ask the member of staff …that do you have the information?...but usually they ask and sometimes the Library staff search for information and they email to them (students) and they down load the email. But basically, you see most of the information that is posted is supposed to be seen or explored and if somebody is not able to explore then of course you know there is a problem there"

Lack of awareness of what the libraries could offer through the websites affected the level of use of information services by students with visual and physical disabilities as they felt the library could not cater for their information needs and therefore some of them kept off the library. The respondents suggested that the libraries ensure that every student with disabilities is facilitated to attend library orientation immediately they are registered in the university. Many respondents said they missed library orientation because they did not have anyone to take them to the orientation venue. The respondents also recommended thorough marketing of information services as one of the systems librarians suggests:

"..there is need to market the library services so that people with disabilities can gain confidence

to visit and use the library because most of them believe the library has nothing to offer"

Overall, these results indicate that there may be inadequate marketing of information services by the library to persons with disabilities Marketing of information services helps in promoting the use of available resources as well as improving the image of the library (Patil & Pradhan, 2014).

Another challenge was to do with website design. The respondents stated that some information on the websites could not be accessed due to the design of the websites. Student with visual disabilities found it very difficult navigating around many pages on the library website. Additionally, information in some formats such as PDFs could not be read using the screen reading technology. Tomlinson (2016) stresses that a website is considered unusable if it has inaccessible element and therefore websites should be designed in manner that they can be interpreted by the screen reader. The Web Content Accessibility Guidelines 2.1 (WCAG 2.1) provides guidelines to make web content perceivable, operable, and understandable such as providing text alternative where content is of non-text in nature such as images, graphics, objects etcetera; creating content that can be presented in various methods such as providing captions and alternatives for non-text content; providing simple layouts without losing information; using appropriate contrast to enable persons with disabilities to see and hear content and more (Hwang & Song, 2019). University libraries should ensure that their websites are usable to persons with disabilities. Usability has become fundamental factor as far as satisfaction of website users' needs and expectations are concerned (Mentes & Turan, 2012).

Other challenges included total lack or inadequacy of assistive technology to access the library websites in most of the libraries; internet downtimes; power cuts; and inadequacy of library computers and lack of laptops by many students with disabilities hindered access to the library websites. Moreover, access to e-resources while off campus was impossible to some students with visual and physical disabilities due to credentials and configuration issues as expressed by one of the systems librarians.

"One of them (challenges) is to log in especially if one is not within the campus, you need log in credentials which we provide. In the event that one does not have, ..uum..of course they will not be able to access. The reason being almost all the publishers want to be accessed within the institutions which have subscribed the resources. So we have provided uum…. a software to help students to log in the main campus... the EZ-proxy to help them to access...but again most of them might not know that the facility is there and especially if they don't attend the orientation programmes if there nobody to bring them to the library. Well, of course the user has a challenge in the hardware I have just remembered. Uum.. most of the students have laptops which are not customized and they make use of the Library staff in the ICT to customize the laptops for them or to even trouble shoot when they are not working. That also includes the smart phones. In the event that they are malfunctioning they are not able to access the information, and so they will require intervention of someone from the library that includes network configuration"

The respondents suggested that the libraries should increase internet bandwidth for stable internet connectivity, increase the number of computers designated for persons with disabilities in the library, install power backup, and acquire the needed assistive technology as well assistive devices. The libraries should also ensure that orientation programmes are done in a manner that allows all persons with disabilities to attend. Special orientation sessions for all persons with disabilities was suggested

as a way of ensuring that their needs are catered for. According to (Kumar & Sanaman, 2013), library orientation improves the efficiency and skills of library patrons with disabilities in locating, accessing and using resources as well as other services in the library.

6. Conclusion and Recommendations

The authors of this article aimed at examining the accessibility and usability of library websites by students with visual and physical disabilities in universities in Kenya. The study sought to find out the kind of information that was provided on the library website for students with disabilities, how useful library websites were for students with disabilities, and the obstacles encountered by students with disabilities while accessing the websites. The study also aimed to proffer solutions to improve accessibility and usability of library websites for students with visual and physical disabilities.

The results revealed that all the libraries that were studied had library websites. However, the websites did not have disability services page and neither did they have information designed for persons with disabilities as provided by the IFLA checklist. Findings also revealed a lack of awareness of existence of library websites among students with visual and physical disabilities. Others were not aware that most of the information resources especially e-resources and e-databases that were fundamental in their academic achievement were available through the library websites. This was as a result of poor marketing strategies of information services and failure by the libraries to educate their patrons with disabilities on the availability of library websites. Furthermore, many patrons with disabilities did not attend library orientation because they did not have someone to take them to the venue where orientation was conducted. Findings also revealed that the websites design hindered access to some web content. This coupled with lack of assistive technology made websites inaccessible and unusable to some respondents.

These results indicate that persons with physical and visual disabilities in public university libraries are excluded from accessing and using websites- the vital tools that carry very valuable educational information that is critical for academic achievement of persons with disabilities. Access to information is a fundamental right for all persons including those with disabilities. Libraries should make sure that their information services are inclusive. The Social Model of disability requires institutions to eliminate all barriers of inclusion in their services, education, transport and more.

The authors recommend that:

- The library websites must necessarily contain disability services page to provide the necessary information required by persons with disabilities in their educational life.
- Libraries should create awareness of availability of library websites as well as the information contained in those websites. Marketing of information services for persons with disabilities will help change their perception about the library.
- Libraries should evaluate the accessibility of their websites to see how well they comply with the W3C guidelines so that they can improve accessibility for persons with disabilities.

- Libraries need to develop library disability policy to address issues of digital accessibility as well as other information services for persons with disabilities.

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