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PROVISION OF ASSISTIVE TECHNOLOGIES IN ACADEMIC LIBRARIES TO STUDENTS WITH VISUAL IMPAIRMENT IN GHANA: A CASE STUDY OF THE UNIVERSITY OF EDUCATION, WINNEBA, GHANA

Abstract

Assistive technologies are tools used to promote access to information and general education curriculum for students with visual impairment. For students with visual impairment access to a diversity of high and low-tech assistive technologies, including screen readers, magnifiers, electronic brailers, braille n' print, assist students in accessing materials in a standard print format which are not available to them. Provision of assistive technologies is to "level the playing field", in conformity with the social model of disability where emphasizes is placed on physical and social barriers experienced by students with visual impairment and considers the problem as a society rather than persons with disability. This study focused on the provision of assistive technologies in academic libraries to students with visual impairment to ensure prompt access to relevant and timely information for academic work. Access to information has become increasingly important as society has become information - driven. Information can be transmitted electronically or provided in alternative formats for students with visual impairment. Descriptive research design utilizing the case study approach was adopted for the study. Purposive sampling technique was adopted in selecting students with visual impairment from level 100 to 400 offering different programmes. Simple stratified random sampling technique was used in selecting 50 visually impaired students from level 100-400 representing 22 male and 8 female, bringing the total sample size to 30. The outcome of the study revealed that students with visual impairment find it difficult to access relevant information for academic work, due to unavailability of assistive technologies in the library and its attendant professionals, and no alternative service for students with visual impairment. Recommendations were made to promulgate policies, undertake staff training and purchase the various assistive technologies to enable students with visual impairment access relevant information timely for academic work.

Keyword: Assistive Technologies, academic libraries, visual impairment, social model, Disability

Introduction

Academic libraries in Ghana have a responsibility of making libraries collections and services completely accessible to its clientele irrespective of race, color or disability. Academic Libraries adhering to this principle must satisfy Ranganathan's Five Laws of Libraries which states:

- First law- 'Books are for use.' Maximize the use of books.)
- Second law: 'Every reader his book.' (Reader is the prime factor and his/her need must be satisfied.)
- Third law: 'Every book its reader.' (Find a reader for every book.)
- Fourth law: 'Save the time of the reader.' (Organize information in such a way that the reader finds the wanted information promptly.)
- Fifth law: A library is a growing organism.' (Emphasis is on comprehensive and evolutionary growth.)

Access to timely and relevant information has become a prerequisite for survival as information has become a resource for nations, organizations and the individual. Based on the above, Hawthorne, Denge, and Coombs 1997; Calvert and Herson 2006; Jaeger et al. 2011; Mates 2004 predicts that librarians and other stakeholders have become increasingly aware of the importance of providing library access to all users inclusively; this consideration will continue to grow in importance in the future.

The provision of library services inclusively, requires the acquisition of relevant equipment and facilities to facilitate access to information by persons with visual impairment. According to UNESCO, 10% of the world's population is visually impaired. This population may look small and insignificant nationally, there is the urgent need to provide the necessary equipment and facilities to ensure their timely access to information for learning and research. Technology has evolved to make access to information easy and fast, it is this same technology that libraries can rely on to provide the needed assistance to visually impaired students in tertiary institutions.

Assistive Technologies (AT) abound in this technology era, depending the type and degree of visual impairment, the appropriate assistive technologies can be acquired to suit the needs of the students the library is serving.

According to Assistive Technology Industry Association (ATiA) defines Assistive technology (AT) is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities.

Janet Hopkins quoted from the IDEA Act of 2004 to define Assistive Technologies (AT) as “any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a child with a disability” (2006, p.12). Ennis-Cole and Smith (2011) believes “AT can supplement 508 compliance to “level the playing field” and bridge the digital divide for students with disabilities.”

AT is available as hardware, software, and web-based resources like touch-screen technologies, large-screen monitors, optical scanners, light boxes, specialized keyboards, headsets with microphone, screen readers, speech-to-text converters, and browser add-ons with easy access to magnification or talking dictionaries (Burgstahler 2011; Cummings 2011; Ennis-Cole and Smith 2011; Farmer 2009; Hopkins 2006; Krueger and Stefanich 2011; Neal and Ehlert 2006; Socol 2010). AT also takes the form of low-tech tools such as dry-erase boards, laminated photos and albums, three-ring binders, highlighting tape, calculators, and timers to meet the myriad needs of students with disabilities (Ennis-Cole and Smith 2011). The use of virtual worlds, virtual reality, and video-modeling are effective AT for direct instruction (Ennis-Cole and Smith 2011). Hopkins (2006) has maintained that AT is naturally inclusive and provides options for all students, as opposed to simply providing access for students with disabilities. However, the use of any of these assistive technologies depends largely on the two main approaches thus medical and social models.

Objectives of the study

The general objective of this study is to explore the provision of assistive technologies in UEW Libraries to facilitate learning and research.

The specific objectives are to:

1. Establish the provision of assistive technologies in UEW Libraries
2. Assess the accessibility of these assistive technologies by students within UEW libraries
3. Ascertain the provision and extent of use of these assistive technologies in the library

4. Establish factors challenging effective provision and utilization assistive technologies in the library

Research questions

RQ1. What are the assistive technologies needs of students with visual impairment in UEW?

RQ2. How often do you access to assistive technologies in the library?

RQ3. To what extent do students with visual impairment use these assistive technologies for learning and research?

RQ4. What are the challenges students with visual impairment and staff face in the use of these assistive technologies in the library?

Significance of the study

Undertaking this study will expose challenges students with visual impairment and staff face in using these assistive technologies to access information thereby helping the University librarian, and other stakeholders involved in the provision and use of assistive technologies for students with visual impairment with the requisite tools in addressing the shortfalls in the system.

The overall outcome of the study will enable the achievement of improved provision and use of assistive technologies by students with visual impairment and staff

This work will also be useful to researchers and students who will want to carry out further research in this area of study.

Information needs of students with visual impairment

Hersh, Marion, and Johnson, (2010) stipulate that access to information is becoming increasingly important and the term information society is often used, with a particular stress on electronically transmitted information. Provision and access to relevant and timely information are important to every tertiary institution student, but to the visually impaired student, it is essential and can be compared to the very air that they breathe. This necessity is indispensable because students with visual impaired are required to produce the same depth of knowledge in a particular subject; same as their sighted counterparts who have access to wide range of printed materials/resources to read.

This position has been attested to by Hersh, Marion, and Johnson, (2010) that despite the increasing focus on information and communication technologies, print media continue to be an important and frequently used means of conveying information.

However, the demands of the academic work coupled with the academic environment require access to information for effective and efficient academic work, project work and research, every student's priority on campus.

Access to information can be through cannot materialize if appropriate equipment and facilities provided for use by students with visual impairment in tertiary institutions such as University of Education, Winneba. However, it has been established that most information is in print format which makes it difficult for persons with visual impairment access. This situation denies visually impaired students in tertiary institutions access to gather important information in the print` media. This position has been echoed by the Association of Research Libraries (2012) report on Services to patrons with print disabilities established that "the universe of publishing consisted of printed books, magazines, and journals, and only a small percentage of that annual output was made accessible first in braille and later in "talking books." However, according to ARL research Blind readers, well aware of the inherent limitations of the printed page and the resources required to reformat it into braille or performed audio, refer to the era of print publishing as a "book famine." However, technology has evolved drastically over the last decade and this has affected the operations and service delivery of libraries. Again, the digital revolution in publishing, including electronic texts, has contributed immensely if not eradicated the supposed book famine over the years by students with visual impairment.

Progressively it has become inevitable to use complex media and technology to transmit information and provide services. The use of these requires skills and familiarity with new technological developments to ensure adequate efficient and effective use of these technologies, to adequate use and help visually impaired students in the usage of such. Notwithstanding the usefulness of these technologies in bridging the gap in access to information by visually impaired students, the expensive nature of these technologies makes it impossible to be acquired by individuals to access information. However, it is essential and crucial that students with visual impairment in tertiary institutions have access to these assertive technologies personally to aid in their learning and research. Access and use of assertive technologies by students with visual

impairment have become imperative as they have students with visual impairment benefitted from the traditional library provision and services, normally favors the sighted. It is based on the above limitations faced by students coupled with the enactment of Disability Act 716, 2007, that the University of Education, Winneba must provide such equipment and facilities for students with visual impairment on campus.

The overwhelming interest in the use of assertive technologies stems from the passage of landmark laws such as the Americans with Disabilities Act (ADA) and the Individuals with Disabilities Act (IDEA, 2004), which proposed equal access to technology for all individuals regardless of disabilities.

Machell (1996) reiterated that “the ideal library service is one where each individual, regardless of the degree of visual impairment, have access to materials and information at the time they are required, in a format that can be used, in quantities that are needed, and where the needs of the user are understood by the staff”. Todaro (2005, p.253) also recognized that access to information is one of the most important human rights as it allows the individual to develop himself/herself, and participate actively in a democratic society, fully exercising his/her rights and duties.

To this end, the use of Technology-Related Assistance for Individuals with Disabilities Act (Assistive Technology Act of 1998), and Public Law 105– 17, the IDEA amendments of 1997, define an assistive technology device as “any item, piece of equipment, or product system that is used to increase, maintain, or improve the functional capabilities of a child with a disability” (Section 300.5).

Assertive Technologies mostly is developed to satisfy a disability need. A person with visual impairment do not have the same condition, ranges from low vision to total blindness. Low vision Despite the increasing proliferation of assertive technologies print media continue to dominate as the most appropriate means of conveying information to the detriment of persons with visual impairment.

Based on the above discrepancies in accessing information by visually impaired students as against their sighted counterparts; technology seems to bridge the gap. Technology has over the years evolved to affect the operations and services of libraries all over the world. The University of

Education, Library is no exception to this development, in the use of technology in providing the needed equipment and facilities for students with visual impairment on campus.

According to Subramaniam, Oxley and Kodama (2013), asserts that the basic technology resources & assistive technologies for any research library for students with visually must include the following:

- Computers Laptops iPods/iTouch/MP3 players iPads/tablets
- Kindles/Nooks/E-readers
- Large-screen monitors
- Braille keyboard
- Scanners
- LCD projector
- JAWS software
- Text-to-speech software TTY/TTD (communications for hearing impaired)
- Dictation software
- Talking browser
- Optical scanners
- Interactive whiteboard

Other assistive technologies can be acquired depending on the needs and degree of disability. For many years persons with visual impairment have not benefitted fully library services, but technology has provided various equipment that would help persons with visual impairment access information and library services through assertive technologies. The situation is aggravated by the fact that they are often supplied without considering the need for associated services (Oderud 2000). It is, therefore, promising that assistive technology measures are required to comply with the Convention on the Rights of Persons with Disabilities (CRPD) (United Nations 2007a). However, the definition of any assertive technology is dependent on the model of disability. There medical and social models.

According to Borg, Larsson, and Östergren, P. (2011), identify five (5) points assistive technologies can do for students with visual impairment:

- The use of assistive technology can increase participation, but in many countries such technology is not available.
- The United Nation's Convention on the Rights of Persons with Disabilities (CRPD) requires States to take measures related to the provision and use of assistive technology.
- The explicit assistive technology measures in the CRPD are scattered and do not cover all human rights or all people with disabilities. This makes it difficult to use the measures for advocacy and policy straightaway.
- Based on the principle of non-discrimination it is concluded that all people with disabilities have a right to demand available and affordable assistive technology to ensure their enjoyment of all human rights. Provision of assistive technology is a national as well as an international responsibility.

Methodology

The descriptive research design was adopted for the study. Multi-stage sampling technique was also espoused in selecting the sample size. First, the purposive sampling technique was adopted in selecting visually impaired students from level 100 to 400 offering different courses. Students with low vision and can read modified printed were not selected as the study did not cover that area.

Second, the simple stratified random sampling technique was employed in selecting five (5) level 100 visually impaired students, fifteen (15) level 200 students, seven (7) level 300 students and three (3) level 400 students. The sample size for the study, therefore, is 30. The instruments for data collection were structured questionnaire and oral interview. The researcher employed research assistants in the administration of the structured questionnaire and oral interview. The oral interview was used to complement the questionnaire as the researcher observed that the students do not have the means and time to answer the questionnaire. The researcher and the research assistants personally administered the instruments on campus at different times. The oral interview was guided by the interview schedule constructed by the researcher based on the research questions. The interview outcome was recorded by noting the respondent's responses on a paper. Prior to the interview, the respondents were told the purpose of the study and made to understand that the outcome will create room for providing the necessary assistive technologies that will facilitate access to information and other resources for effective and efficient academic work.

Respondents were equally made to realize the need for them to be sincere in their responses. The administration of the structured questionnaire and interview lasted two weeks. Data collected were analyzed using simple percentages and frequency count and presented in tables and figures.

Result and discussion of findings

Table 1. Demographic characteristics of respondents

Characteristics	Frequency (%)
Sex	
Male	22 (73.3)
Female	8 (26.7)
Age	
0-20yrs	2 (6.7)
21-30yrs	16 (53.3)
31-40yrs	9(30)
Above 40yrs	3(10)
Type of Degree	
Diploma	0(0)
Degree	30(100)

Data from Table 1 above revealed that 73% of the respondents were males while the remaining 27% were females. The males domination found out in this study could be as a result of the fact that visually impaired students do not get the requisite encouragement from society coupled with lack of facilities and equipment. Most of the female visually impaired tend to do other things rather than pursuing the education.

The result also indicated that majority of the farmers fall within the age bracket of 20-30 years (53.3%), followed by those within the age bracket of 31-40 years old (30%) while those above 40 years old (10%) came third and those between the ages of 0-20years old constituted (6.7%) of the total population.

This finding corresponds with the result of the study carried out by World Declaration on Higher Education (UNESCO, 1998) elaborates on the alarmingly low percentage of students with disabilities in universities, independent of the country's level of development (Gabel & Danforth, 2008).

Assistive Technologies

To establish the provision and access to assistive technologies, respondents were provided with a list of the basic assistive technologies for visually impaired students in tertiary institutions. Their responses are tabulated below.

Table 2. Availability and Usage of Assistive Technologies by V.I students in the Library

Information needs	Frequency	Availability (%)	Usage (%)
Computers/Laptops	30	--	--
Large-screen monitors	30	--	--
Scanners	30	--	--
Perkins Braille	30	--	--
LCD Projector	30	--	--
JAWS software	30	--	--
Dictation Software	30	--	--
Interactive Whiteboard	30	--	--

The overall outcome as shown in Table 2 above indicates the non-existent of any of the assistive technologies in University of Education, Winneba to be used by visually impaired students. The

researcher could not present all the assistive technologies mentioned in the structured questionnaire and the interview as the respondents indicated the non-existent of the aforementioned assistive technologies in the University of Education, Winneba library. The researcher was overwhelmed with responses given by students with visual impairment as the University has a department of special Education, educating students on issues with disability coupled with the enactment of the Disability Act 716, 2007.

The findings in this study correspond with the findings of the study carried out by Lee and Templeton (2008) which indicated that considering the continuum of assistive technology items and services for individuals with disabilities is a mandated practice in the field of education. However, due to the vagueness of the current laws and lack of clear, consistent guidelines on how the services should be provided, service providers are faced with challenges of developing effective AT service delivery systems on their own. According to McGorry, (2002) states the use of ICT in an educational setting by itself is a major catalyst to promote the necessary changes and to equip students with the skills they are expected to have upon graduation.

Usage of assistive technologies in the library

To ascertain the provision and usage of assistive technologies in the library by students with visual impairment, the respondents were provided with a table containing varying assistive technologies available and requested to indicate the extent to which they utilize them. Their responses were analyzed and presented below.

Table 3. Usage of assistive technologies in the Library

Usage of assistive technologies	Freq	Percentage (%)
Computers/Laptops	30	--
Large-screen monitors	30	--
Scanners	30	--
Perkins Braille	30	--

LCD Projector	30	--
JAWS software	30	--
Dictation Software	30	--
Interactive Whiteboard	30	--

According to table 3, the unavailability of these assistive technologies makes it difficult for students to access and use such. This goes to buttress the World Health Organization (WHO) estimates that in low- and middle-income countries only 5–15% of people requiring assistive technologies have access to them (WHO 2010). The researcher inquired from students how they were able to cope with their academic without the use of assistive technologies. Interesting responses were adduced as respondents cite friends and voluntary service by concern students. Access to information for classwork, project or research work was mainly done through personal friends

Factors militating against the provision and usage of assistive technologies

The responses on the Factors militating against the provision and usage of assistive technologies for students with visual impairment in the University of Education, Winneba is tabulated in Table 4 below.

Table 4: Factors militating against the provision and usage of assistive technologies

Factors	SA (%)	A (%)	D (%)	SD (%)
Policy	11 (36.7)	4 (13.3)	7 (23.3)	8(26.)
Budget	23 (76.7)	7 (23.3)	-	-
Unavailability of information materials in Braille audio-visual format	23 (76.7)	5 (16.6)	2 (6.7)	-

High cost of Assistive Technologies	-	4 (13.4)	5(16.6)	21 (70)
Lack of Professional/Technical Personnel	24 (80)	6 (20)	-	-

Where SA= Strongly Agree, A= Agree, D=Disagree, and SD=Strongly Disagree

The highest factors identified as militating against effective utilization of assistive technologies in the library identified by students are: lack of Professional/Technical personnel accounted for 80% of the problem, budget 77% as well as Unavailability of information materials in Braille audio-visual format 77%.

Conclusion and Recommendations

Provision and use of assistive technologies can be used to support access to information and library services to improve learning and research opportunities for students with visual impairment on campus. Provision and access to assistive technologies in tertiary institutions is to increase accessibility and meaningful participation in education. This participation and access should have the ultimate goal of increasing life chances and educational opportunities for student with visual impairment.

Information undoubtedly is relevant in the achievement goals. This is because it does not only help in reducing the level of risk and uncertainty but empowers one to take the right decisions; it is crucial to the attainment of success. As a result Libraries and librarians do not need to become experts in every disability to meet the goals.

In an open letter to all librarians, written in 2011, by the President of the National Federation of the Blind, Marc Mauer, wrote: “Libraries can meet their obligations by adopting and publicizing accessibility policies; incorporating accessibility into their technology procurement, development, and testing processes; holding vendors accountable for accessibility; training staff; seeking input directly from patrons with disabilities, and conducting regular audits of accessibility.”

Based on the findings of the study, the following recommendations were made.

- Policymakers should provide the appropriate assistive technologies to promote equity in educational opportunities for all students.
- Librarians should ensure the use of assistive technologies by students to improve on their academic work

- Librarians must ensure provision of different support services such as digitalizing & recording teaching material, creating training courses, improving learning environments (assessing physical)

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