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AVAILABILITY AND DEPLOYMENT OF ASSISTIVE TECHNOLOGIES (ATS) FOR VISUALLY IMPAIRED STUDENTS: FOCUS ON UNIVERSITY LIBRARIES IN NIGERIA

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Abstract
The study investigated the availability and deployment of assistive technologies (ATs) at university library in Nigeria. Technology is a driving force in every sector of the economy and deployment of ATS for students with visual impairment at the university library is extremely important. The study adopted a descriptive survey design. The study took place during the 10th Conference and 14th induction ceremony of LRCN in 2023. Using a consensus sample method, all the 468 librarians drawn from various universities across Nigeria who enlisted for the ceremony participated in the study. The instrument for data collection was a structured questionnaire that was administered on the respondents. A sample of 384 who responded appropriately to the instrument was taken. The findings indicated that there was availability of ATs at the university library but at lower rate. Majority of the respondents reported unavailability and non-deployment of ATs at their library. Evidence from the findings showed that only two ATs (Braille and Laptop) were fully deployed at the library out of thirty-four that were listed in the study. The study revealed that the deployment of ATs at the university library would create an inclusive learning environment as well increase the capacity of students with visual impairment in learning and research. Some of the major barriers militating against the availability and deployment of ATs at the university library in Nigeria were identified and recommendations were offered in order to mitigate and improve the learning and research experience of students with visual impairment.

Keywords: Assistive Technology, Visually Impaired, Impairment, Students, university library, Nigeria

Introduction

The growing need to revolutionize learning and research with the use of technology for all persons with impairment in the university is increasing the need to deploy assistive technologies (ATs) at the university library for visually impaired students. The eye is a critical organ of the body that helps one to see, providing visual and aesthetic appearance of objects that enhance learning and research. University students with visual impairment are facing a lot of challenges in learning, studying and research without ATs (Chukwujekwu, 2023). Students with visual impairment would need human

assistance or ATs to be able to cope with their learning at the university. The Centers for Disease Control and Prevention (2021) defined impairment as any condition of the body or mind that makes it more difficult for the person to perform certain activities and actively interact with the world around them independently without human or technological support. ATs is defined as tools that helps to maintain or improve an individual's functioning related to cognition, communication, hearing, mobility, self-care and vision, thus enabling their health, well-being, inclusion and participation (World Health Organization, 2024). The World Health Organization (WHO) in 2023 estimated that there are at least a total of 2.2 billion people who have a near or distance vision impairment globally (WHO, 2023). Equally, the Nigeria National Blindness and Visual Impairment Survey (NNBVIS) reported that approximately 4.25 million adult Nigerians were visually impaired (Blaise-Okezie, Ihem-Chijioke, & Ewunonu, 2015). Majority of the people in the WHO 2023 estimate and NNBVIS survey were within adolescents who should be studying in the university. With such prevailing circumstance, it is important to deploy ATs at the university library for students with visual impairment to enhance their learning and research.

The university library was established to provide an equitable access to information materials and technologies to support the teaching, learning and research activities of its users irrespective of age, gender, health condition and race (Nyakweba, et. al., 2020; Omeluzor, et. al., 2017). The role of the library spans beyond acquisition and safeguarding of information resources in its collection, but to ensure that every user, including the visually impaired persons have equal access to information. This study therefore investigates the availability and deployment of ATs for visually impaired students in the university libraries in Nigeria. The study is guided by the following four research questions:

1. What are the available assistive technologies at the university library in Nigeria?
2. What is the extent of deployment of assistive technologies by librarians for students with visual impairment in Nigeria?
3. To what extent can the deployment of assistive technologies by librarians' support learning and research of students with visual impairment?
4. What are the barriers hindering the deployment and use of assistive technologies in the university library in Nigeria?

Literature Review

Visually impaired students can experience difficulties in learning the mechanics of writing (Senjam, 2019). The application of technology in the university assist in creating universally designed learning environments for students with visual impairment (Fitzgerald, Koury, & Mitchem, 2008). Technology is bridging the inclusivity gap for visually impaired students to participate in class activities, enabling them to have unique opportunity and a real-time learning experience in classroom and the library (McClain-Nhlapo, Singh & D'Angelo, 2023). *Technology has the potential to bridge disparities for students with visual impairment (*McClain-Nhlapo, Singh & D'Angelo, 2023).

There is an increasing development of ATs for people with one form of impairment or the other. For example: the development of a robot with a gripper that enables children with motor and speech impairments to manipulate educational materials (Encarnação, et al., 2017). In the health sector, study showed a mobile-health based assistive technology for the healthcare of dementia and Alzheimer's disease (Yousaf, et al., 2020). There are a number of technologies including AT devices that could be integrated in the tertiary institution and library for the purpose of solving problems facing humanity (Omeluzor, Okonoko &Anene, 2023).

Students with visual impairment and learning disabilities have improved access to academic, social and extra-curricular activities through the use of ATs (Dyal, Carpenter, & Wright, 2009; Svensson, et. al., 2021). The application of ATs in the university has shown some considerable increase on the independence of students with intellectual and visual impairment (Bouck, Satsangi, & Muhl, 2013). In the United State, the deployment and use of ATs in several schools has increased significantly. A few of such schools include: Okaloosa County School District, North Hills School District, and Newport-Mesa Unified School District. Parents would inform school districts and teachers of students' progress with AT devices outside of the school setting for effective monitoring and support (Etscheidt, 2016).

Both hospital and population-based studies by Nwosu, et al. (2022) cited in Chukwujekwu (2023) on Southeast region of Nigeria showed that visual impairment is common among children and adolescents most of whom were students. This is giving rise to the growing interest and awareness for the support of people with visual impairment (Okonji & Ogwezzy, 2017). Awareness of ATs has ushered a new era to provide assistive devices needed to promote self-care, education, employment, leisure, and recreation for learners with disabilities (Ajuwon & Chitiyo, 2016).

There is a disparity on the availability of ATs at the university libraries in Nigeria. Some university libraries lack assistive technology (AT) resulting to non-access by the visually impaired students (Mishra, 2023). There were 10 out of 21 ATs available at NAL, UNN while 1 out of 21 was available at ESUT Library. It is worrisome that a fewer library that acquired ATs were yet to deploy them for students suffering from visual impairment (Chukwujekwu, 2023). Inaccessibility and non-utilization of ATs by visual impaired students have shown in literature as major challenges that can exacerbate inequalities (McClain-Nhlapo, Singh & D'Angelo, 2023). Similarly, there is evidence of inadequate availability of ATs for effective school library service delivery to students with disabilities in Nigeria (Obim & Akpokurerie, 2022). The same result indicated that the extent of utilization of assistive technologies for effective school library service delivery was very low except for Braille technology and Hearing Aids (Obim & Akpokurerie, 2022).

Etscheidt (2016) and Okonji and Ogwezzy (2017) advocated that for effective deployment and use of ATs in the university, there is need for parents who knows the health condition of their children to request for schools to deploy ATs in support of their children. In India, a study showed that the three most requested physical/sound-based ATs for the 250 students were talking watch, Braille typewriter and audio format. The

study also showed that three most requested vision-based ATs were pinhole visual acuity, optical magnifiers, electronic magnifiers and large keyboard for computer (Senjam, Foster & Bascaran, 2021). The study by Okonji and Ogwezzy (2017) showed that 36% of the participants had good awareness of the existence of ATs while 17.4% of the respondents had good knowledge of usage. Recent study in university libraries in Enugu State, Nigeria showed that only Braille technology was deployed at the Nnamdi Azikiwe Library, University of Nigeria Nsukka and Enugu State. This means that despite the potential impact of ATs, the deployment of the technology at the university library in Nigeria is far below expectation (Chukwujekwu, 2023).

Barriers Hindering the Deployment and Use of ATs in University Library

Barriers to using ATs among students with visual impairment continue to subsist. Non availability or limited possession of ATs and financial constraints to acquire a device were major barriers (Senjam, Foster & Bascaran, 2021). Inadequate awareness of how ATs can provide an opportunity for independent living among students with visual impairment was another barrier against the deployment of ATs (Martins, Oliveira & Popovič, 2014). Similarly, lack of specialized counseling centers to provide family and friends of disabled students with advice on ATs also deter students from using ATs (Venkatesh& Davis, 1996). Unfortunately, high cost of assistive devices was a major challenge hindering students with visual impairment from using information and services at the library (Kumar, et al., 2022). In addition, some of the barriers hindering people with disability from accessing information at the library were perception of disability in the society, including the federal and state government policy, poverty, corporate policy, cost of mainstream computing products, assistive technologies, real-time online communication, and a lack of educational opportunities (Hollier, 2007).

In Nigeria, the visually impaired adult population reported non-availability of assistive technologies and a lack of awareness as major barriers to access ATs (Okonji & Ogwezzy, 2017). Study has shown that lack of support from the government, inadequate assistive technologies in the university libraries, inadequate funding; and unstable electric power supply were barriers to the deployment and use of ATs at the university library in Nigeria (Obim & Akpokurerie, 2022). Similarly, lack of awareness, inadequate training, unavailability of AT devices and lack of interest to acquire ATs were some of the challenges hindering the acquisition of ATs in Nigeria (Okonji & Ogwezzy, 2017). However, Bamidele, et al (2013) had advocated the need to train and retrain librarians and library staff on the use of technologies for effective delivery of services to library users including people with visual impairment.

Research Methods

Design of the Study. This study adopted a descriptive survey design. A descriptive survey research was suitable for this study because it seeks to collect data, describe, analyze and summarize empirical data on the availability and deployment of assistive technology for students with visual impairment. According to Nworgu (2015) a descriptive survey design collects data on a particular phenomenon and describes it in a systematic manner, facts or features about a given population.

Area of the Study. The study was conducted during the 10th Conference and 14th induction ceremony of Certified Librarians in Nigeria organized by the Librarian Registration Council (LRCN) from 19–24 November, 2023 at Abuja, Nigeria.

Population of the Study/Sample and Sampling Technique. The population of the study comprised a total of 468 librarians. The researchers adopted all the 468 librarians as sample for the study. Using a consensus method, all the librarians who attended the ceremony were used as the sample and included in the study.

Instrument. The instrument that was adopted for data collection for this study was a structured questionnaire. The questionnaire was divided into four sections (A-D) with ninety items. The first section focused on the demographic details of the respondents. Section B tried to find out from the respondents the assistive technologies that were available at the university library. The instrument has two options (available and not available). Section C revealed the extent to which assistive technologies have been deployed by librarians for students with visual impairment. It has a 4-points likert scale with 4 = very high extent, 3 = high extent, 2 = very low extent and 1 = low extent. Section D was to know the extent to which the deployment of assistive technologies has supported learning and research by students with visual impairment. The options have a corresponding 4-point likert scale ranging from 4 = very high extent, 3 = high extent, 2 = very low extent and 1 = low extent. The section E focused on the barriers hindering the deployment and use of assistive technologies by librarians at the university library. The questions have a corresponding likert scale ranging from 4 = strongly agree, 3 = agree, 2 = strongly disagree and 1 = disagree. To determine the validity of the instrument, we did a pre-reliability analysis using contents and construct to verify the instrument. Most of the items and statements in sections B, C and D on the instruments were adopted from Chukwujekwu (2023) and Obim and Akpokurerie (2022).

Validity and Reliability Test. To ascertain the validity of the questionnaire, the researchers conducted a pre-reliability test, such as face, content and construct checks. On the face and contents validity checks, the researchers sought the services of an information management expert, who went through the questionnaire and, after making some minor corrections, certified that it was appropriate for collecting data for the study. To verify the validity of the contents, the researchers sent out 10 copies of the questionnaire to 10 librarians at Delta State University, Abraka who had undergone the induction programme of LRCN. The 10 questionnaires were retrieved and were found usable and were analyzed using Cronbach's alpha correlation coefficient at 0.5 point of acceptance, which gave a result of $r = 0.86$. This result means that the questionnaire was reliable and suitable for data collection for the study since the test result was above the acceptance level of 0.5.

Method of Data Collection/Analysis. The questionnaire was distributed to the respondents face-to-face at the venue of the 2023 LRCN induction. The researchers employed the services of five research assistants who assisted in the administration of the questionnaire on the respondents, collection and collation. Out of the total 468 questionnaire that were administered, 384 were retrieved and found to be usable given a response rate of 82% that were used for the analysis of the study. The collected data were analyzed using SPSS (Statistical Package for the Social Sciences), version 16.0. The results were presented in frequency tables, percentage, means and standard deviation for precision and understanding. The mean scores are rated as follows: 0.1 to 1.9 is very low, 2.0 to 2.4 is low, 2.5 to 2.9 is high, and 3.0 and above is very high.

Results

Research Question 1: What are the available assistive technologies at the university library in Nigeria?

Table 2: showing the available Assistive Technologies at the University Library in Nigeria

Assistive Technologies	Available	Not available
Book on Tape/CD	336 (87.5)	48 (12.5)
Braille Technology	96 (25)	288 (75)
Cane	48 (12.5)	336 (87.5)
Draft Builder	48 (12.5)	336 (87.5)
Electronic Organizers	240 (62.5)	144 (37.5)
eXternal display	144 (37.5)	240 (62.5)
Ginger Ghotit	48 (12.5)	336 (87.5)
Hearing Aids	96 (25)	288 (75)
JAWS Screen Reader	98 (25)	288 (75)
Kurzweil Education	48 (12.5)	336 (87.5)
Magnifying glass	144 (37.5)	240 (62.5)
Math simulation	48 (12.5)	336 (87.5)
Math Talk	48 (12.5)	336 (87.5)
Model and Mock-ups	48 (12.5)	336 (87.5)
Modified Keyboard	96 (25)	288 (75)
Notetaker	48 (12.5)	336 (87.5)
Overhead lighting	192 (50)	192 (50)
Proofreading software	240 (62.5)	144 (37.5)
Raised dots	48 (12.5)	336 (87.5)
Ray electronic mobility aid	48 (12.5)	336 (87.5)
Reading assistance software	144 (37.5)	240 (62.5)
Screen Reader	144 (37.5)	240 (62.5)

Signaling device	96 (25)	288 (75)
Sip-and-puff system	48 (12.5)	336 (87.5)
Smart glasses	96 (25)	288 (75)
Speech-to-text-software	144 (37.5)	240 (62.5)
Stylus	96 (25)	288 (75)
Talking calculator	96 (25)	288 (75)
Talking Dictionary	192 (50)	192 (50)
Underline/line tracker	96 (25)	288 (75)
Video Magnifier	144 (37.5)	240 (62.5)
Virtual assistant (voice assistant)	96 (25)	288 (75)
Visual timer	144 (37.5)	240 (62.5)
Laptops	336 (87.5)	48 (12.5)

The result in Table 2 reveals that book on tape/CD (87.5%), electronic organizers (62.5%), overhead lighting (50%), proof reading software (62.5%), and laptops (87.5%) were available in the library for visually impaired students. The result also shows that 37.5% of the respondents indicates that eXternal display, magnifying glass, reading assistance software, screen reader, speech-to-text-software, video magnifier and visual timer were also available. The result in Table 2 further shows that other ATs were available at different rate, while most of the ATs were not available at the university library in Nigeria.

Research question 2: What is the extent of deployment of assistive technologies by librarians for students with visual impairment in Nigeria?

Table 3: Showing the extent of deployment of Assistive Technologies by Librarians for Students with Visual Impairment in Nigeria

Assistive Technology	N	Min	Max	Mean	Std. Dev.	Decision
Book on Tape/CD	384	1.00	3.00	1.87	.78164	Very low
Braille Technology	384	1.00	2.00	3.12	.95218	Very high
Cane	384	1.00	2.00	1.43	.49673	Very low
Draft Builder	384	1.00	2.00	1.43	.49673	Very low
Electronic Organizers	384	1.00	2.00	1.43	.49673	Very low
eXternal display	384	1.00	3.00	1.76	.71337	Very low
Ginger Ghotit	384	1.00	2.00	1.43	.49673	Very low
Hearing Aids	384	1.00	2.00	1.43	.49673	Very low
JAWS Screen Reader	384	1.00	2.00	1.43	.49673	Very low
Kurzweil Education	384	1.00	2.00	1.43	.49673	Very low
Magnifying glass	384	1.00	3.00	1.63	.65335	Very low
Math simulation	384	1.00	2.00	1.43	.49673	Very low
Math Talk	384	1.00	2.00	1.43	.49673	Very low
Model and Mock-ups	384	1.00	2.00	1.27	.44630	Very low
Modified Keyboard	384	1.00	3.00	1.60	.75451	Very low
Notetaker	384	1.00	3.00	1.76	.71337	Very low
Overhead lighting	384	1.00	3.00	1.79	.82827	Very low
Proofreading software	384	1.00	3.00	1.76	.71337	Very low
Raised dots	384	1.00	2.00	1.43	.49673	Very low
Ray electronic mobility aid	384	1.00	2.00	1.43	.49673	Very low
Reading assistance software	384	1.00	3.00	1.79	.82827	Very low
Screen Reader	384	1.00	3.00	1.95	.74982	Very low
Signaling device	384	1.00	2.00	1.43	.49673	Very low
Sip-and-puff system	384	1.00	2.00	1.43	.49673	Very low
Smart glasses	384	1.00	2.00	1.43	.49673	Very low
Speech-to-text-software	384	1.00	3.00	1.76	.71337	Very low
Stylus	384	1.00	2.00	1.43	.49673	Very low
Talking calculator	384	1.00	3.00	1.43	.75876	Very low
Talking Dictionary	384	1.00	3.00	1.60	.75451	Very low
Underline/line tracker	384	1.00	2.00	1.43	.49673	Very low
Video Magnifier	384	1.00	2.00	1.43	.49673	Very low
Virtual assistant (voice assistant)	384	1.00	3.00	1.60	.75451	Very low
Visual timer	384	1.00	2.00	1.43	.49673	Very low
Laptops	384	1.00	4.00	3.12	.95218	Very high

The result in Table 3 shows that to a very high extent, ATs has not been fully deployed in most university libraries across Nigeria. The result reveals that within an acceptable mean score of 2.5, majority of the items in Table 3 indicates that the deployment

of ATs at the university library fall below expectation, but it is taking off at a slower pace. With the highest mean score of 1.95 for Screen reader and the least at 1.27 for Model and Mock-ups, the result shows that, the deployment of ATs is at a low extent at the university libraries. The result also reveals that to a very high extent, Braille technology and laptop with a mean score of 3.12 were the only ATs tools that have been deployed at the university library. The implication of the result in Table 3 is that students with visual impairment may find it difficult to access information within the university library that have not deployed ATs for students with disability.

Research question 3: To what extent can the deployment of assistive technologies by librarians support learning and research of students with visual impairment?

Table 4: showing the extent to which the deployment of assistive technology can support learning and research of students with visual impairments

Statement	N	Min	Max	Mean	Std. Dev.	Decision
Assistive technology will facilitate reading among students with visual Impairment	384	3.00	4.00	3.50	.50059	Very high
Assistive technology will increase and improve their independence in academic activities	384	3.00	4.00	3.67	.47014	Very high
Assistive technology will encourage and allow students to execute activities that they were previously unable to handle	384	1.00	4.00	3.05	.98002	Very high
Without assistive technology, students with visual impairment may be unable to go from home to School	384	3.00	4.00	3.41	.49274	Very high
Assistive technology will enable students with partial visual impairment to see what is written on the whiteboard	384	3.00	4.00	3.50	.50059	Very high
Assistive technology will improve the utilization of information resources for their academic Activities	384	3.00	4.00	3.508	.50059	Very high
Assistive technology will improve the academic self concept of students with visual impairment	384	3.00	4.00	3.69	.47014	Very high
Assistive technology will boost the moral and self-esteem of students with visual impairment	384	3.00	4.00	3.67	.47014	Very high
Assistive technology will increase their learning capabilities and Understanding	384	2.00	4.00	3.52	.68523	Very high

The result in Table 4 reveals that the deployment of ATs at the university library will facilitate and enhance the reading and learning of students with visual impairment (3.50), increase and improve independence of students with visual impairment (3.67) and encourage and allow students to execute activities that they were previously unable to handle (3.05). The result also shows that without ATs, students with visual impairment would not be able to go from home to school (3.41). Furthermore, the result in Table 4 also reveal that ATS will enable students with partial visual impairment to see what is written on the whiteboard (3.50), improve the utilization of information resources for academic activities (3.50) and improve the academic self-concept of students with visual impairment (3.69). The result in Table 4 also shows that the deployment of ATs will boost the moral and self-esteem of students with visual impairment (3.67) and will increase their learning capabilities and understanding (3.52). Since the result in Table 4 shows higher mean score above 3.00 on a scale of 2.50 for each of the items, it means that the deployment of ATs at the library would make positive impact that will result to improving the learning and research experience of students with visual impairment.

Research question 4: What are the barriers hindering the deployment and use of assistive technologies in the university library in Nigeria?

Table 5: showing the barriers hindering the deployment and use of assistive technologies in the university library in Nigeria

Barriers	N	Min	Max	Mean	Std. Dev.	Ranking
Lack of awareness of assistive technologies for visually impaired Persons	384	1.00	4.00	3.89	0.33	1st
Inadequate power supply to use assistive technologies in the library	384	2.00	4.00	3.78	0.62	2nd
Lack of training to support students with assistive technologies	384	3.00	4.00	3.64	0.47	3rd
Non availability of assistive Technologies	384	2.00	4.00	3.61	0.67	4th
Lack of interest by librarians in using assistive technologies in the library	384	2.00	4.00	3.58	0.67	5th
High cost of assistive technology Devices	384	1.00	4.00	3.49	1.02	6th

The result in Table 5 reveals that all the items were barriers to the successful deployment and use of ATs in university libraries in Nigeria. From the ranking, the result shows that lack of awareness (3.89), inadequate power supply (3.78), lack of training (3.64), non availability of ATs (3.61), lack of interest among librarians (3.58) and high cost of AT devices (3.49) were major barriers against the deployment and use of ATs in

university libraries in Nigeria. This result indicates that since the mean scores of the items in Table 5 are higher than the acceptable mean score of 2.50, it imply that the barriers have a high negative effect on the deployment and use of ATs in the university library in Nigeria.

Summary of Findings

The findings show that ATs are available in some libraries in Nigeria.

i. The findings reveal that the extent of deployment of ATs is still very low in university libraries in Nigeria.
ii. There is evidence that to a very high extent, the deployment of ATs would support learning and research of students with visual impairment.
iii. The findings show that there are barriers that are impeding the deployment and use of ATs in the university libraries in Nigeria.

Discussion of Findings

The findings in Table 2 clearly indicate that ATs were available but inadequate across the university libraries in Nigeria. The finding shows that 50% and above of the respondents attest that some of the ATs including Book on Tape/CD, Electronic Organizer, overhead lighting among others were available. Similarly, there is also availability of external display, magnifying glass, reading assistance software, among others as testified by 37.5% of the respondents. This finding agrees with Boza-Chua (2021) and Yousaf, *et al.* (2020) which showed that ATs were available to assist blind students and for healthcare of dementia and Alzheimer's diseases.

The finding in Table 3 reveals that the extent at which ATs is deployed at the university libraries across Nigeria is very low. The finding shows that only two devices, such as: Braille Technology and laptop were deployed at the library. This finding concurs with the finding of Chukwujekwu (2023) which showed that only Braille technology was deployed at the Nnamdi Azikiwe Library, University of Nigeria Nsukka and Enugu State University of Technology. However, the finding in Table 3 also shows that there was a gradual take off of the deployment of ATs but at a lower level. The lower extent of deployment of ATs may affect the learning and research activities of students with visual impairment. This finding substantiates the findings of Obim and Akpokurerie (2022) who confirmed in their study that the extent of deployment of assistive technologies for library service delivery was very low.

The finding in Table 4 shows the extent to which the deployment of ATs could support inclusion, learning and research of students with visual impairments. The study reveals that the deployment of ATs at the library would facilitate reading, increase and improve independence of students with visual impairment; encourage and allow students to participate in activities that they were not previously able to partake. The findings in Table 4 further shows that the deployment of ATs would boost the moral and self esteem of students with visual impairment and increase their learning capabilities and understanding. There is evidence that application of technology in the library is

increasing access and use of information by people with varied circumstances; creating unique opportunities for everyone to participate in learning and research (Mhlongo, et al, 2023; McClain-Nhlapo, Singh & D'Angelo, 2023).

The findings in Table 5 reveal that there are several barriers that are hindering the deployment and use of ATs at the university library in Nigeria. Among these barriers, a lack of awareness ranked as the highest. Lack of awareness can affect the deployment and use of ATs in the university library. The finding agrees with the findings of Martins, Oliveira and Popovič (2014) who claimed that lack of awareness of ATs among students with visual impairment was a barrier for its use. The finding also indicates that inadequate power supply was a barrier. Power supply is critical for the deployment and use of ATs and IT tools in the library. Unstable electric power supply or lack of power supply remains a major barrier for the deployment and use of ATS in the library (Obim & Akpokurerie, 2022). Findings in Table 5 further reveals that lack of training on the use of ATS also contributes to setback in deploying and using ATs in the university library. Training on the use of ATs and other devices may reduce the barriers hindering students from using ATs in the library. A lack of training was attributed as a major challenge affecting the acquisition, deployment and use of ATs and other technologies in the library (Okonji & Ogwezzy, 2017, Bamidele, et al., 2013). Other barriers include: lack of interest among librarians and high cost of AT devices. These barriers are impediments to the acquisition and deployment of ATs in the library. These barriers have shown in literature as major factors that hinders the visually impaired students from accessing ATs in the library (Senjam, Foster & Bascaran, 2021, Okonji & Ogwezzy, 2017).

Recommendations

In view of the findings in the study the researchers recommends as follows:

1. The university and Library management should consistently make available ATs at the university library for students with visual impairment to enable them engage effectively in learning and research.
2. Library management should improve in deployment of ATs in university libraries for students with visual impairment as to enhance the study, learning and research of students with visual impairment.
3. The library management should pursue for the deployment of ATs in university library, highlighting the positive impact of ATs usage on students with visual impairment.
4. The university and library management should ensure to mitigate the barriers that are hindering the availability and deployment of ATS in the university library in order to support students with visual impairment.

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