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ACCESSIBILITY AND UTILISATION OF ASSISTIVE TECHNOLOGIES BY STUDENTS WITH VISUAL IMPAIRMENTS IN BAYERO UNIVERSITY KANO LIBRARY

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Abstract

Bayero University Kano has some Assistive Technology tools, but barriers like, malfunctioning or outdated devices are evident, and if these barriers persist, students with visual impairments may remain deprived in their academic work, which undermines the university's commitment to equity and inclusive education for all. This study investigated the accessibility and utilisation of assistive technologies (AT) among students with visual impairments at the Bayero University Kano Library A mixed-method research design was adopted, combining quantitative data from structured questionnaires (10 respondents), and qualitative data from interviews with six (6) respondents and observations. Findings revealed that there are assistive technologies available such as screen readers, braille translators, magnifiers, and Optical Character Recognition (OCR) software, their accessibility and usability remain limited. Students disagreed that the technologies effectively addressed their needs or improved independent access to resources. The results also indicated inadequate awareness and lack of sufficient training. Respondents strongly emphasised the need for training to improve usage of the Assistive technologies. Barriers identified include difficulties in using the Assistive technologies, insufficient facilities, limited staff support, and the distance of the library from lecture venues. The study concludes that availability of assistive technologies is insufficient without training, maintenance, and institutional support. The study recommends that university should ensure training, user involvement in evaluating technologies, and policy interventions to ensure equitable and inclusive access to academic resources for students with visual impairment, relocating AT facilities closer to lecture venues or establishing satellite service points within academic buildings to reduce distance barrier, collaborate with academic departments to integrate the use of AT into teaching, coursework, and assignments

Keywords: Accessibility, Utilisation, Assistive technologies, Students, Visual impairments

Introduction

The World Health Organization (WHO, 2016) reports that over one billion people globally require assistive technology (AT), with the number projected to rise to more than two billion by 2050. Despite this growing need, only about 10% of those who need AT currently have access to it. This limited accessibility stresses the importance of integrating assistive technologies into educational environments to raise inclusivity, independence, and equal learning opportunities.

In the 21st century, the rapid evolution of information and communication technologies has significantly transformed library services. For universities to ensure equitable access to academic resources is critical in promoting inclusive education. Students with visual impairments face unique challenges in

accessing information resources, particularly within library settings. Without adequate technological support, their participation, independence, and academic performance are hindered, (Sutar, 2021).

Mishra, (2023) reported that Assistive technologies, such as screen readers, text-to-speech software, magnifiers, optical character recognition (OCR), and refreshable braille displays, play a pivotal role in addressing these challenges. These tools convert visual information into alternative formats, enabling students with visual impairments to study independently and engage effectively with both printed and electronic resources. In academic libraries, their use enhances accessibility, promotes self-reliance, and contributes to a more inclusive learning environment. Given these realities, it becomes necessary to examine the availability, accessibility, and barriers that affects the utilization of assistive technologies in Bayero University Kano Library.

Statement of research problem

Assistive technologies are necessary for promoting inclusive education by enabling students with visual impairments to independently access, retrieve, and use academic information. Observation confirms that Bayero University Kano Library has assistive technologies, but their availability alone does not ensure that they are accessible and effectively utilised by students with visual impairments. Accessibility may be hindered by barriers like malfunctioning or outdated devices, as highlighted by Selema et al. (2025) and Alabi & Okiki (2023), who both reported shortages of assistive technology tools in academic libraries. Poor internet connectivity, poor power supply, limited staff training as confirmed by (Tuttle & Carter, 2023; Alimović et al., 2024), that inadequate training is a major obstacle in AT adoption. Lack of maintenance, lack of awareness, limited user skills, or anxiety about the use of the technologies.

If these barriers persist, students with visual impairments may remain deprived in their academic work, which undermines the university's commitment to equity and inclusive education for all. Therefore, it becomes necessary to assess the extent of accessibility of assistive technologies and to investigate the barriers that limit the effective use of assistive technologies by students with visual impairments in Bayero University Kano Library.

Research Questions

1. How accessible are assistive technologies to students with visual impairments Bayero University Kano Library?
2. To what extent are students with visual impairment aware and trained in the use of Assistive Technologies?
3. What are the barriers that hinder the use of Assistive Technologies by students with visual impairment?

Literature review

Assistive Technology (AT) in special education refers to tools, devices, software, and systems designed to enhance learning, communication, and independence for students with special needs. The concept extends beyond simple devices to include adaptive hardware and software, augmentative and alternative communication (AAC) systems, learning management systems, and emerging tools like artificial intelligence (AI), virtual reality (VR), and augmented reality (AR) and its significance includes promoting inclusion and accessibility, improving learning outcomes of students with special needs (SSN)**,** encourages ad support lifelong skills and well-being, drives educational innovation and addresses equity and ethical issues (Jacob etal 2024). According to Hersh and Johnson (2008), AT encompasses both low-tech and high-tech solutions such as braille, magnifiers, hearing aids, screen readers, captioning, and speech recognition software, which serve to compensate for sensory, cognitive, or physical limitations. In educational contexts, AT functions as a bridge to inclusivity by tailoring learning support to pupils' specific needs (Viner et al., 2020; WHO & UNICEF, 2022). Olumorin etal (2022), reported that AT are relevant in special education as they provide tools that help learners with physical, sensory, cognitive, and communication impairments access educational content. These technologies can range from low-tech devices (e.g., large print books,

reading stands, and crutches) to mid-tech solutions (e.g., electronic worksheets, variable speed recorders) and high-tech systems (e.g., screen reader software, cochlear implants, and speech synthesisers). Various assistive technologies have been developed to enhance accessibility and provide support for individuals with visual impairments. These technologies as highlighted by (Mishra 2023) aim to assist individuals in accessing information, navigating their surroundings, and engaging in various activities. Some examples of assistive technologies for individuals with visual impairments include: Screen Readers, Optical Character Recognition (OCR), Braille Displays, Electronic Magnifiers, Voice Assistance, Mobile Apps, Tactile Graphics and Navigation Systems among others.

These assistive technologies play important role in empowering students with visual impairments by enhancing their access to information, education, employment opportunities, and social interactions. They create greater independence and inclusion for in various aspects of their lives. A study conducted by Eliuteri & Lema (2022) in Tanzania focused on examining the access to assistive devices for special education needs in Morogoro municipal, the study found that although some assistive resources were available for pupils with disabilities, their availability was limited, and users faced difficulties in accessing them. The available assistive devices included writing tools, hearing devices, and mobile devices, optical and non-optical devices, which were accessible to students with disabilities.

Available Assistive Technologies for visual impairments in Bayero university kano, Library.

There are various kinds of assistive technologies available in BUK Library, centre for persons with special needs. These includes the hardware components and the software components. Hardware devices includes, Embosser (visual impairments printer that converts and print word to braille form), Pearl camera which scan document and convert it in braille readable form, Sara Ce which convert document captured using pearl camera, there also Customised Computer and accessories for visual impairments and Topaz Magnifier – a TV like device where colour, size and character can be changed). For the Software; Job Access with Speed (JAWS) is a screen reader for students' visual impairment. It provide braille output which help in navigating internet with a mouse, write a document, read an email and create presentations; Duxbury Technology (DBT) is a braille translator in to many languages of the world, any language of a user choice and None Visual Desktop Access (NVDTA) which allows students visual impairment to access and interact with computer, with window operating system and many third party applications.

Another one is the Optical Character Recognition (OCR) technology which enables the conversion of printed text into digital formats, making it possible for students' visual impairment to access printed materials through electronic devices. The OCR is available for phones and computers. Open book is an example a software designed that convert printed document or graphics-based text to audio for students with visual impairment.

Smith et al. (2019), highlight the positive impact of screen readers in facilitating independent access to digital library resources for persons with visual impairments. Johnson and Davis (2020) highlight the significance of tactile interfaces in creating a more inclusive library environment. He emphasise the relevance of assistive technology in enhancing accessibility and usability in library settings for students with visual impairment.

Students with visual impairment encounter numerous challenges in accessing library resources, including difficulties in navigating physical spaces and accessing printed materials. Smith and Johnson (2018), highlighted the importance of employing assistive technologies to improve accessibility for this user group. Chinasa et al., (2018) study indicated that although there were several assistive technologies available for pupils, they were not fully accessible. This lack of accessibility may be due to physical and environmental barriers that hindered the effective use of these resources by students. The study concluded that the provision of assistive resources for pupils with disabilities was not up to the expected level. The study it was noted that the available resources were not fully utilized by students with disabilities. The study recommended the provision of assistive technologies to meet up with the specific needs of the students with disabilities.

Challenges faced by students with visual impairments in the use of Assistive Technologies

Students with disabilities may face challenges in "accessing and in using" electronic learning tools and depending on the type of impairment, the challenges may vary significantly. Wyclife and Nyambura (n.d) list down limitations such as lack of specialized disabled friendly teacher training, limited flexibility in training options for students with disabilities, limited availability of specialized hardware and software resources due to financial business, lack of support of government organisations and ICT support for the disabled, attitude towards people with disability, lack of appropriate disabled friendly policies and their implementation, among others.

Kisanga and Kisanga, (2020) study on the access to Assistive Technology among students with visual impairment in a higher education institution in Tanzania. The challenges identified were; students with visual impairments encounter problems when accessing information with the Assistive Technology. These challenges included: a lack of knowledge on how to use assistive technologies, limited availability of assistive tools, devices that were not customised to suit the environment and lack of maintenance the study recommended that need for regular training on accessing and using assistive devices to enhance the abilities of students with visual impairments.

Research methodology

This study adopted mixed research design as the method for collecting, processing and analysing data. The quantitative data was collected using structured questionnaire, and qualitative data collected through interviews. Both methods were applied not only because of the nature of users under study and the study area, but also because the findings will give more insights about the study population than when only a single instrument is used. The use of a mixed methods increases the credibility and reliability of the data collected from research area.

Study area and population

The study was conducted at the Bayero University kano library. It provides assistive technologies as part of institutional efforts to support learning for the visual impaired students. The population in this study was total of 37 visual impaired students admitted with visual problems at the Bayero University Kano, who are the focus of this study.

Sample size and sampling procedures

Purposive sampling was used to select a sample among the students on the basis of their knowledge on using assistive technologies (AT). The respondents are students with visual impairment.

Data collection methods and instruments

Data were collected through the use of questionnaire, interviews and participant observations. The instruments used was designed by the researchers. Twentyfive (25) closed ended questionnaires were administered to the respondent, only ten (10) questionnaires were returned and found valid. Interview was conducted to six (6) visual impaired student. Through observation method and information gathered from the staff in charge of the section, the researcher was able to see the available assistive technology facilities for the visual impaired students in the library.

Data analysis

Data were collected, organised, coded and analysed using both qualitative and quantitative methods. Statistical Package for Social Sciences (SPSS version 23) was used to analyse quantitative data to generate mean and standard deviation for the data collected. Content analysis was used to analyse qualitative data to provide classifications, descriptions and narrations.

Quantitative data was gotten from descriptive survey research from ten (10) respondents that involves using questionnaires to gather information from the respondents. Qualitative data on the other hand was obtained from interviews conducted on six (6) of the respondents.

The result collected on the respondents' Accessibility of the available Assistive Technologies in libraries and barriers for effective utilisation among students with visual impairments in Bayero University Kano are in the table below:

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Q1 **Q**1: The assistive technologies available in the university library effectively address my specific needs as a visually impaired student	10	1	3	1.90	.738
Q2: Assistive technologies significantly improve my ability to independently access information resources in the library	10	1	3	1.90	.738
Q3: I encounter challenges in using assistive technologies for information access within the university library	10	3	4	3.30	.483
Q4: The library's assistive technologies contribute to a more accessible and inclusive learning environment	10	2	4	2.90	.568
Q5: I face barriers that hinder my effective use of assistive technologies in the library	10	3	5	3.90	.568
Q6: There is a need for additional training or resources to overcome challenges in using assistive technologies in the library	10	4	5	4.50	.527
Q7: Overall, I am satisfied with the usability of assistive technologies in the university library	10	2	4	2.60	.699
Q8: The use of assistive technologies has positively impacted my participation, inclusion and academic experience in the university library	10	2	4	3.10	.738
Q9: I would recommend improvements in the current use of assistive technologies in the library	10	4	5	4.60	.516
Q9: Valid N (listwise)	10				

Key: 1 - 1.8, Strongly Disagree; 1.8 - 2.60, Disagree; 2.61 - 3.40, Neutral; 3.41 - 4.20, Agree; 4.21 - 5 Strongly Agree.

Presentation of quantitative data from questionnaire.

***Research Question 1*:** How accessible are the available Assistive Technologies to students with visual impairment?

Descriptive statistics indicated generally low mean scores for accessibility to assistive technologies. (Q1, Q2, Q4, Q7, and Q8). Specifically, Q1 (mean = 1.90) and Q2 (mean = 1.90) suggest that students disagreed that assistive technologies effectively address their needs or significantly improve independent access to resources.

Q7 (mean = 2.60) showed dissatisfaction with usability, while Q8 (mean = 3.10) reflected neutrality regarding the impact of assistive technologies on participation and inclusion. Similarly, Q4 (mean = 2.90) suggested neutrality about whether the assistive technologies contribute to an inclusive learning environment.

***Research Question* 2:** To what extent are students with visual impairment aware and trained in the use of Assistive Technologies?

Responses to Q6 showed a high mean score of 4.50, reflecting strong agreement that there is need for additional training to overcome challenges in using assistive technologies.

Research Question 3: What are the barriers that hinder the use of Assistive Technologies by students with visual impairment?

Survey responses revealed that students face multiple barriers. Q3 (mean = 3.30) and Q5 (mean = 3.90) indicated that there are challenges in using assistive technologies in the library. Additionally, Q9 (mean = 4.60) revealed strong agreement that significant improvements are needed to enhance usability

Qualitative Data from Interview.

This report presents the findings from interviews conducted with students with visual impairments regarding their access to, and utilization of, Assistive Technologies (AT) in the university library. The purpose of the interviews was to explore students' awareness, challenges, and experiences in using AT, as well as to identify barriers hindering effective use. This study, therefore, examines the perspectives of visually impaired students on AT utilization within the university library setting.

Findings

The interviews revealed several issues affecting the effective utilisation of Assistive Technologies:

1. **Distance from lecture Area:** Many students indicated that the library is located far from their lecture area. This discourages regular visits and reduces the likelihood of frequent use of the assistive technologies. Similar findings have been reported by Mutsvanga & Sithole (2020), who observed that physical distance can serve as a barrier to AT utilisation.
2. **Lack of Training:** Students are aware of the existence of Assistive Technologies but lack adequate training on how to operate them. Most of the respondents said that they need training to improve their ability to use the assistive technologies effectively
3. **Inadequate Facilities:** The available Assistive Technologies are insufficient to cater to the number of students who require them. This creates accessibility challenges, because some students are unable to use the facilities when needed
4. **Limited Staff Support:** Respondents highlighted the lack of enough trained staff who can provide continuous support and guidance. Without technical assistance, some students are unable to maximize the use of available AT. Similar challenges were observed in Tanzania, where library staff lacked adequate competencies to support visually impaired students (Selema et al., 2025).
5. **Lack of Interest in Library Use:** some students show little or no interest in using the library. The absence of motivation and awareness campaigns has further contributed to this lack of engagement, consistent with Mutanga (2018).

Discussion

The findings indicate that while the provision of Assistive Technologies is a positive step toward promoting inclusive education, several barriers prevent students with visual impairments from benefiting fully. The issues of distance, inadequate training, insufficient facilities, and limited staff support significantly affect the usability of AT. Furthermore, the lack of consistent sensitisation and awareness has led to reduced interest in library use.

Conclusion

The level of awareness and effective use of Assistive Technologies among students with visual impairments remains low. The facilities are underutilised due to inadequate training, insufficient resources, shortage of trained staff, and the distance of the library from class areas. These barriers not only limit access but also contribute to declining interest in the use of the library. Therefore, while the presence of Assistive Technologies is commendable, need for more inclusive measures are required to maximize their benefits (Kisanga, 2025).

Recommendations

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

1. Employ additional staff and provide them with specialised training in Assistive Technologies to ensure adequate support for students.
2. Acquire more Assistive Technologies to meet the demand of students, ensuring equitable access at all times.
3. Timely upgrades and maintenance should be carried out to improve usability and ensure inclusiveness in the learning environment.
4. Students should be actively involved in evaluating the accessibility of existing technologies to provide their view for improvement.
5. Regular training and workshops should be organised to build students' skills and confidence in using assistive technologies.
6. Consider relocating AT facilities closer to classrooms or establishing satellite service points within academic buildings to reduce distance barrier.
7. Collaborate with academic departments to integrate the use of AT into teaching, coursework, and assignments, thereby motivating students to engage with the library.

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