EXPLORINGTHE USE OF LIBRARY ASSISTIVE TECHNOLOGY FOR LEARNING BY VISUALLY IMPAIRED STUDENTS OF AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA

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Abstract

The study explored the use of library assistive technologies (LAT) for learning by visually impaired students at Ahmadu Bello University (ABU), Zaria, Nigeria. To achieve this purpose, five objectives were established, amongst which were; to investigate the experiences of visually impaired students of Ahmadu Bello University on the use of Library Assistive Technology and to determine how the Library Assistive Technologies meet the performance expectancy of Visually Impaired Students of Ahmadu Bello University. A qualitative research methodology and a phenomenology research design were used to have a thorough understanding of the subject. The population of the study was 27 visually impaired students and a sample of 9 undergraduate visually impaired students was drawn at the point of saturation. Data was collected using focus group discussions with the help of three research assistants. The rigour of the research process was assessed through credibility, transferability, confirmability and dependability. Data analysis followed a thematic approach to identify recurring themes in student experiences and expectations. From the analysis, it was revealed that most participants were aware of LAT available in KIL, although one participant was unaware of any assistive technologies being available. It was shown that while KIL offers various LAT options, student utilization remains low. The visually impaired students who utilized LAT in the library demonstrated significant academic improvement. While some of the students had positive experiences with some functional equipment, most of them reported negative

experiences due to limited access, malfunctioning technology, and inadequate facilities. Lastly, the finding revealed that the Low LAT use was linked to the student's expectations regarding the technology's performance in meeting their needs. Therefore, the study concluded that the negative experiences of visually impaired students with the LATs coupled with the technologies not meeting their expectations contribute to their low usage. Based on the findings of this study, it is recommended that library management should invest in acquiring sufficient and modern LATs compatible with student needs, to repair malfunctioning LATs and implement a robust maintenance strategy. The management should provide staff training and support by offering workshops and personalized assistance to train staff effectively so they can in turn train and assist students on the use of LATs.

Keywords: Assistive Technologies, Explore, Students, Use, Visually Impaired, University Library

Introduction

Visual impairment (VI) is the loss of vision caused by eye diseases, accidents or eye conditions present from birth. It can be congenital, occurring at or shortly after birth or acquired through other means later in life. It is a condition of reduced visual performance that cannot be remedied by refractive correction (spectacles or contact lenses), surgery, or medical methods which results to functional limitations of the visual system and decreases ability to perform activities of daily living, such as reading or writing (Kapur, 2018; Naipal, 2018). Some of the congenital causes of visual impairments include conditions like retinopathy, glaucoma, cortical visual impairment, optical nerve hypoplasia etc. Visual impairment can also be acquired later in life as a result of cataract, trauma, accidents, inadequate nutrition and so forth (Kapur, 2018).

Visual impairment affects how a student understands and functions in the world. It can affect a student's cognitive, emotional, neurological and physical development by limiting the range of experiences and kinds of information they are exposed to. Educationally defined, visually impaired students are students whose visual loss indicates that they should be educated chiefly through the use of Braille tactile and auditory materials. Education in the present day is the powerful force that brings about development in the society. Similarly the role of education in physical, mental, social and emotional development of an individual with visual impairment is of paramount importance (Pandey, 2018). Education is the key to overcoming the challenges of visual impairment and achieving success. Education helps individuals with visual impairment overcome their visual

disabilities and improve their lives and social status. It is a means of getting empowered, becoming independent and self-reliant. At the same time, it enables them contribute their quota to national development when employed or engaged in productive ventures. Improving the life for visually impaired persons rests in education, as this is a vital gateway to job opportunities, socio-economic integration, and normalization (Aghauche, 2021). From the foregoing, it is obvious that education is the way forward for producing successful contributing members of the society. With the provision of better education opportunities, proper and suitable resources and adequate support, the visually impaired students will fulfill their potential and achieve academic excellence (Aghauche, 2021) with technologies to bridge the gap created through problems associated with vision.

Vision is the primary tool for knowledge acquisition. It is the fundamental brick that helps in observing and interpreting happenings in the environment also an important prerequisite for conceptual development in human learning (Mwakyeja, 2013). Thus, any deformity or destruction of this vital part of the body imposes academic limitations upon students. It interferes with their development of learning, mobility, social growth and adjustment (Mboshi, 2018).

In recent years, Assistive Technologies are playing efficient and effectively significant role in engaging students with visual impairment in inclusive education. Students with Visual Impairment are now able to have intellectual access and independent learning through the use of Assistive Technologies. Libraries in academic institutions presently provide assistive technologies to enable inclusive learning for visually impaired students. Library Assistive Technology (LAT) as defined by the Individuals with Disabilities Education Act (1997) is any item, piece of equipment, product, or system, whether acquired commercially off the shelf, modified or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. Traditionally, libraries provide conventional alternate format resources to students with visual impairment (Bernardi, 2004). Examples of such are Braille and Large Print. Braille globally was and is still the primary reading method for students with visual impairment to access information and education independently. With Braille, visually impaired students can visualize text by feeling every word of it, and learning how these words are written. Braille gives visually impaired access to material on an equal level to their peers which simultaneously influences their educational achievement and establishes a platform for them to be on a competitive level with others. (Khochen, 2014). Large print is a print format larger than print sizes of 8 to 12 points commonly used by strong-sighted people.

It provides a larger font for making reading accessible to individuals with disabilities or visual impairments (EveryLibrary, 2023)

With the advancement in technology and ICT, more advanced Assistive Technologies are been developed and adopted in the library to give students with visual impairment the same competitive advantage as their sighted counterparts. Library Assistive Technology for VI includes Braille Technologies like an electronic Braille note taker which comes generally in a book size for students to take notes using Braille or standard QWERTY keyboards, Braille printer/embossers which are just like standard printer prints or produce Braille copies of document text, refreshable Braille displays that translates and displaces information appearing on a computer screen into tactile Braille etc. (Martiniello, 2019), Assistive software such as screen reading software which uses text to speech engine to read on-screen information e.g. JAWS, screen magnification software that increases the size of a computer screen from 1.1 to 36 times, making it easier for low vision readers to operate a computer independently e.g. Zoom text and web access software, Braille Translation Software that converts text to Braille e.g. Duxbury (Sutar, 2021). Other assistive technologies include navigation devices that enhance mobility like a walk smart cane (that uses smartphone integration via Bluetooth for obstacle detection, 3D high-tech smart glasses (that use feature recognition to provide audio information), one-on-one aide, highlighted lecture notes, IC recorder, white cane, closed-circuit television, handheld magnifier, video magnifier, abacus, adaptive calculator, adaptive measurement tools, digital voice recorder, magnification software, optical character recognition etc. (Alabi, 2020; Tebo, 2014).

Statement of the Problem

It is the right of every visually impaired person to have access to equal quality education same as that of sighted learners. But all over the world today, educational processes are largely dependent upon printed words and how best one can reconstruct the messages that have been encoded by the writer. According to Kristan (2018), research has shown that 80% of learning is by vision. Perhaps an attempt to educate persons with visual impairment would have been a failure without the development and introduction of Assistive Technologies.

University libraries in Nigeria have invested in assistive technologies so their visually impaired users can have access to the services without restriction to encourage and improve quality learning (Chinwe, 2017). Also, **Ahmadu Bello University just like other universities is trying to achieve the goal of creating an inclusive and accessible learning environment for all students, including**

those with visual impairments. The university has invested heavily in Library Assistive Technology (LAT) and although limited research has been conducted on the use of assistive technologies by the visually impaired, studies have found that there is generally low use of these resources. (Bhardwaj, 2017; Agabirwe, 2020; Mwantimwa, 2021; Obim, 2022).

Therefore, this study focused on finding out the expectations of Visually Impaired Students with regard to the use of LAT in Ahmadu Bello University for learning, using the construct of UTAUT "performance expectancy".

Objectives of the Study

The study achieved the following objectives:

1. To identify the types of Library Assistive Technologies Used by the Visually Impaired Students of Ahmadu Bello University.
2. To determine the effect of the use of Library Assistive Technologies on the learning by Visually Impaired Students.

Literature Review

UTAUT has been used by different researchers ((Hoque, 2017, Al-Saedi, 2019; Rabaai, 2017) from a variety of disciplines to investigate why technologies are not adopted. An empirical review of studies that used the theory to explain how potential users deem a technology fit or unfit based on the perceptions of the attributes of the technology were conducted, for instance, Ramgir&Patil (2023) in a study on assistive technologies in libraries for visually impaired users observed that in the current digital era, ensuring that everyone has access to information, regardless of their ability or disability, is a key component of library and information science. The authors stated that there has been an upsurge in the number of impaired students enrolling in universities in recent years. Regardless of the capacity to address the issues of inclusion and social justice, libraries are required to offer information to all visitors. Because a sizable segment of our population is attempting to integrate into society, these special users need special care. It identified that academic libraries must be outfitted with various Assistive Technologies (AT) to meet the needs of individuals with disabilities and help this underserved community become self-sufficient. The adoption of assistive technologies by individuals with disabilities encourages more equity in the social, academic, and economic public spheres.

a study by Williams (2021) on Students' Perceptions of the Adoption and Use of social media in Academic Libraries In which the Unified Theory of Acceptance and Use of Technology (UTAUT) served as a theoretical framework. The study is

qualitative and the purpose is to gain an understanding of students' perceptions of the adoption of social media, namely Facebook and Twitter, in an academic library setting. The study applied the constructs as described by the UTAUT, namely, performance expectancy, effort expectancy, social influence and facilitating conditions, to explore students' perceived behavioural intentions to use social media. A sample of 30 students was selected from two universities, one in Belgium (University of Antwerp) and one in South Africa (University of Limpopo), to gain a better insight into the students' perceptions regarding the adoption and use of social media, in particular Face book and Twitter, by the academic libraries at these two universities. The study showed that the adoption of social media is positively influenced by effort expectancy, performance expectancy and social influence.

A study titled "Application of UTAUT (Unified Theory of Acceptance and Use of Technology) to Understand the Acceptance and Use of the E-Learning System" by Rahmaningtyas (2020) analyzes the source of the problems that affected use behaviour, by exploring the factors of performance expectancy, effort expectancy, social influence, and facilitating conditions as well as presenting a mediating variable that was behavioural intentions. Using a quantitative method, a questionnaire was administered to 201 students to represent a population of 29,629 students. The findings of the study showed that performance expectancy, social influence facilitating conditions and behavioural intentions affected use behaviour. The findings also showed that the direct effect test showed that performance expectancy, social influence and facilitating conditions affected use behaviour while effort expectancy did not affect use behaviour. The indirect effect test showed that behavioural intentions successfully mediated performance expectancy and social influence, and did not succeed in moderating effort expectancy towards use behaviour.

Another study by Mizal (2020) aimed to analyze the low level of adoption of E-Commerce by MSMEs in the fashion sector in Bandung using the UTAUT model. The objective of the study is to determine the factors of technology adoption that are obstacles to SMEs in adopting E-commerce. The independent variables in this study were performance expectancy, effort expectancy, social expectancy and facilitating condition. The dependent variable is Use Behavior and the intervening variable is Behavioral Intention. Using the quantitative method, a questionnaire was used to collect data from 200 respondents and descriptive analysis and SEM-PLS path analysis were used to analyze the results. The results revealed that Performance Expectancy, Effort Expectancy, and Social Expectancy variables have a significant positive effect on Behavioral Intention. Meanwhile, Behavioral

Intention and Facilitating Conditions also have a significant positive effect on Use Behavior.

Research carried out by Ayaz (2020) on the adoption and use of an electronic document management system (EDMS) at Bartın University, Turkey aimed at examining the factors affecting the intentions to use EDMS using the unified theory of acceptance and use of technology (UTAUT). The study hypothesized that performance expectancy, social influence and effort expectancy, which are the determining factors of the UTAUT model, have a positive effect on behavioural intention. Using a quantitative research method, the study revealed that the most important determinant of behavioural intention is performance expectancy. The findings also showed that the social influence factor has a significant effect on the intention to use EDMS. The academic and administrative staff's tendency to use EDMS will increase further with the effective use of EDMS by the people in the university's senior management. However, the result of the findings indicated that the effort expectation factor has no significant effect on the intention to use. This result may be due to the specification and terms of use of EDMS. The result showed that the reason behind the reluctance to use EDMS is due to the ease/difficulty of use of EDMS.

Another study by Rahi, Abd, Ghani, Alnaser and Ngah, (2018) investigated the role of a unified theory of acceptance and use of technology (UTAUT) in Internet banking adoption in Lahore and Islamabad, Pakistan. The objective of the study was to gain deep insight into customer's unwillingness to adopt Internet banking. Why the majority of banking customers are reluctant to use the innovation irrespective of the benefits? A quantitative approach-based survey was conducted to collect the data. The result of the study indicates that, the UTAUT model provided a good theoretical foundation in technology adoption investigation. Findings confirmed that all four predictors (performance expectancy, effort expectancy, social influence and facilitating condition) were significant and had a significant amount of variance in predicting user's intention to adopt Internet banking. The study showed however that performance expectancy was the most important factor among all other variables to predict user's intention towards adoption of internet banking.

A study by Hoque (2017) aimed to develop a theoretical model based on the Unified Theory of Acceptance and Use of Technology (UTAUT) to determine the key factors influencing elderly users' intention to adopt and use mHealth services in Bangladesh. The most commonly used constructs of UTAUT: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Condition (FC) provided the theoretical framework that guided the study. The

research question was: what are the key factors influencing the elderly's acceptance and adoption of mHealth services in developing countries like Bangladesh? The hypotheses related to the construct are; PE has a positive impact on the elderly's intention to use mHealth, and EE has a positive impact on the elderly's intention to use mHealth. SI has a positive impact on the elderly's intention to use mHealth. FC has a positive impact on the elderly's intention to use mHealth. FC has a positive impact on the elderly's actual use of mHealth. Behavioral Intention has a positive impact on the actual use of mHealth. A face-to-face structured questionnaire survey method was used for data collection. Findings from the study revealed that performance expectancy, effort expectancy and social influence had a significant impact on the user's behavioural intention to adopt mHealth services. The study, however, showed no significant relation between the facilitating condition and the users' behavioural intention to use the mHealth services.

Methodology

The research methodology adopted for the study was qualitative. This conforms to the interpretive research paradigm that guided the study. This paradigm recognizes that reality is subjective and based on individual interpretation and qualitative research methodology is ideally suited for this approach. The study adopted the phenomenology research design. The design was adopted due to the aim of the researchers; to discover the meaning an individual ascribes to a particular issue/problem rather than generalizing results to other groups of people. The population of the study comprised twenty-seven (27) visually impaired students of Ahmadu Bello University, Zaria, Nigeria. This comprised both undergraduate and postgraduate students of the institution. A purposive sampling technique was used for selecting nine (9) participants that served as the sample size for the study. This size was determined at the point of saturation. Data saturation is the most commonly employed concept for estimating sample sizes in qualitative research (Guest, 2020). The research instrument used for the study was a focus group. Qualitative thematic analysis was employed for data analysis. Thematic analysis was adopted by the researchers since the research is a qualitative study that sought to understand and interpret the meaning of visually impaired students ascribed to the problem under study. The method enabled the researchers to construct themes and meaning-based patterns to report the interpretation of the qualitative data set.

Results and Discussion

The data collected from the participants were transcribed verbatim. Responses from the nine visually impaired students who partook in the focus group were read, re-read and examined using an analytical inductive process.

Types of Library Assistive Technologies Visually Impaired Students of Ahmadu Bello University Use for Learning

This research objective sought to identify the types of LAT Visually Impaired Students of ABU Zaria are using for learning, two major themes and six sub-themes. Table 2.

Table 2- Library Assistive Technologies Visually Impaired Students of Ahmadu Bello University are Using for Learning

RQ	Themes	Sub-Themes
What are the types of Libra**ries** Assistive Technologies Visually Impaired Students of ABU are using for Learning?	1. LAT Used for Learning	1.1. Scanning and Reading Machine 1.2. Digital Braille Quran 1.3. Typewriter 1.4. Recorder 1.5. Computer
	2. Non-Use of LAT for Learning	2.1. I have never used any LAT

Source- Interview Analysis, 2024

Theme 1: LAT used for Learning

This theme depicts narratives related to the types of LAT the visually impaired students of Ahmadu Bello University are using for academic activities. It has five sub-themes:

I Use Scanning and Reading Machine: The theme depicts narratives related to the Library Assistive Technologies Visually Impaired Students use for academic activities.

A student from the Department of English, Faculty of Art said: *"I use scanning and reading machines to read my course materials. I also use it to read books and novels that I borrow from the Library"*

Similarly, a student from the Department of Sociology said: *"I use scanning and reading Machine to read handouts lecturers give us, I use it to read my assignments and I use it to read books I get from the library shelves"*

I Use Digital Braille Quran: this theme depicts narratives related to the Library Assistive Technologies Visually Impaired Students use for learning.

A student from the Department of Guidance and Counseling, Faculty of Education said: *"I use Digital Braille Quran. I pick electives from Islamic Studies so I use the Digital Braille Quran for their assignments and to prepare for their tests and exams"*

***I Use Typewriter*:** this category depicts narratives related to the Library Assistive Technologies Visually Impaired Students use for academic activities.

A student from the Department of Mass Communication, Faculty of Social Science said: *"Okay, I use a typewriter and I use, okay seriously typewriter is the only Assistive Technology I use in the Library. I don't have a personal computer so a typewriter is what I use for my tests and exams"*

Similarly, another student from the Department of Political Science Faculty of Social Science said: *"I use a typewriter for exams. In our department, some lecturers don't allow laptops during the exam so I settle completely for Library typewriters"*

Also, another student from the Department of Guidance and Counseling, Faculty of Education said: *"I use a typewriter. I use it to write during exams"*

***I Use IC Recorder*:** this theme depicts narratives related to the Library Assistive Technologies that Visually Impaired Students use for academic activities. Some of the participants make use of IC Recorder.

A student from the Faculty of Education said: *"I use an IC recorder to record lecture's voice during lectures"*

One other student from the Faculty of Education said: *"I use the recorder to record when Librarians or my coursemates are reading for me"*

Another student from the Faculty of Social Science said: "*I use an IC recorder to record or copy the written to an audio converted file of my course material on scanning and reading machine"*

I Use Computer: this category depicts narratives related to the Library Assistive Technologies Visually Impaired Students use for academic activities.

A 100 student from the Department of Sociology, Faculty of Education said: "*I use a computer but to be specific, the staff computer to do my assignment"*

Similarly, another Student from the Department of Sociology, Faculty of Social Science said: *"I use the computer to do my assignment. I also use it to form my note"*

Theme 2: Non-Use of LAT for Learning

This theme includes narratives related to Non-use of Library Assistive Technologies for Learning by Visually Impaired Students. This theme has only one sub-theme; I have never used any LAT. The sub-theme is explained below.

I have never used any LAT: this theme depicts narratives related to the Library Assistive Technologies Visually Impaired Students use for academic activities.

A 300-level student of the Department of Political Science, Faculty of Social Science said: *"I have most of the Library Assistive Technologies available in the unit. I have a recorder, I have a typewriter, I have my phone and computer. What I need is the Braille printing Machine and I heard it is not working well. I also need the scanning and reading machine but it's even hard to get someone who will bring me to the Library so I beg my friends to read for me"*

Effect of the Use of Library Assistive Technologies on the Learning of Visually Impaired Students of Ahmadu Bello University.

This objective sought to find out the effect of the use of Library Assistive Technologies on the learning of Visually Impaired Students of Ahmadu Bello University. Two major themes and six sub-themes emerged. These themes are presented in Table 3.

Table 3- Effect of Library Assistive Technologies on the Learning of Visually Impaired Students

RQs	Themes	Sub-Themes

What is the Effect of the use of Library Assistive Technologies on the Learning of Visually Impaired Students of ABU?	1. Improve Academic Performance	1. The computer helps me with assignments and Information Access. 2. IC Recorder helps me in recording my lectures 3. The scanning and reading machine help me in reading my books 4. A typewriter enables me to write my tests and exams
	2. Lower Academic Performance	5. Digital Braille Quran helps me do assignments and prepare for tests 6. Depending on the Typewriter affected my examination performance

Source- Interview Analysis, 2024

Theme 1: Improve Academic Performance

The theme reveals narratives that explain the effect of the use of Library Assistive Technologies on the Learning of Visually Impaired Students. This theme has five sub-themes. They are explained as follows.

***Computer helps me with Assignment and Information Access*:** This sub-theme depicts the effect of computers on the learning of Visually Impaired Students of ABU. The participants explained that using the computer had assisted in the completion of assignments and improved access to information. Narratives about this sub-theme are captured in the following sentence;

A participant from the Faculty of Social Science said: *"The Library computer helps me with note forming. Some of our lecturers only give course outlines. I browse and form my notes myself and okay not myself completely, with the help of a librarian. I use the Library Computer for my assignments. Currently, my CGPA is 4.62 and this wouldn't have been possible ever without the help of the*

computer. I also use it to search for national or international grants available to People with Special Needs. For example, I recently applied for the MTN grant for Visually Impaired Students. It's one of the opportunities that enable me to purchase Braille papers and other expensive resources that aid my learning"

Another participant in this study setting from the Faculty of Social Science said: *"The computer in the library helps me apply for different scholarships. I am studying Sociology but my greatest interest is in Programming. I use the staff computer to search and apply for international scholarships for Special students who want to pursue a career in Software Engineering. I use it too for my assignments*"

IC Recorder helps me in recording my lectures: This sub-theme presents narratives of the participants on the effect of IC Recorder on the learning of Visually Impaired Students of ABU.

One of the participants from the Faculty of Education said: *"The IC recorder enables me to listen to the Lecturer's explanation after class. It's hard to catch up when using Braille to jot down explanations so IC Recorder works excellently in its stead"*

Another participant in this study setting from the Faculty of Education also said: *"I use the recorder to record when people are helping me read my handout. Me, I don't usually understand that automated voice of the Scanning and Reading Machine so I use the IC Recorder to record when maybe a Librarian or my coursemate is reading for me"*

Another student from the Faculty of Social Science said: *"I use an IC recorder to record during Lectures and I also use it as a flash drive to copy the converted file from scanning and reading machine because I prefer all my reading materials in one source"*

The scanning and reading machine helps me in reading my books: This sub-theme explains the effect of Library Assistive Technologies on the learning of Visually Impaired Students of ABU. *One* of the respondents, a student from the Department of English, Faculty of Art said: *"The Scanning and Reading Machine allows me to read my books and documents It also enables me to read books I am given in class and the recommended ones I find on Library Shelves" "Similarly, another student from Department of Sociology, Faculty of Social Science said: scanning and Reading Machine help me read my notes and documents independently. It also has this function that allows me to copy read files on my recorder for later use anywhere"*

Typewriter enables me to write my tests and exams: This sub-theme explains the effect of typewriters on the learning of Visually Impaired Students of ABU. The participants said typewriter helps them write their tests and exams.

One of the participants, a student from Mass Communication, Faculty of Social Science said: *"The typewriter helps me write during tests and exams"*

Similarly, a student from the Department of Guidance and Counseling, Faculty of Education said: "typewriter allows me to write tests and exams"

Another student from political science said: "*The typewriter helps me confidently write exams. It prevents suspicions of malpractice that come with using laptops"*

Digital Braille Quran helps me do assignments and prepare for tests: This sub-theme explains the effect of Digital Braille Quran on the learning of Visually Impaired Students of ABU.

A respondent, a student from the Department of Guidance and Counseling said: *"Digital Braille Quran enables me to do my Islamic Studies assignments. Though I have the Braille Quran I read with hand but that is not as easy to use as the Digital Braille Quran. It takes time to locate a particular surah I am looking for but this one is so easy. Apart from assignments, it helps me memorize for tests and exams too"*

Theme 2: Lower Academic Performance

This theme includes narratives related to the objective of the effect of the use of Library Assistive Technologies on the Learning of Visually Impaired Students. It has only one sub-theme. Depending on Typewriter affected my examination performance. The sub-theme is explained as follows;

***Depending on how the Typewriter affected my examination performance*:** This sub-theme explains the effect of the use of Library Assistive Technologies on the learning of Visually Impaired Students of ABU. A participant from the Department of Political Science, Faculty of Social Science said: *"There was a time I requested for the typewriter. I made my request a week before our exam began and I was assured I would get it, just for me to be told that day that the storekeeper refused to give out a typewriter and the one in the unit couldn't be borrowed. I had to borrow from another student and his own was a model I didn't know how to use well. It affected my exam performance that semester"*

Discussion of Findings

Types of Library Assistive Technologies the Visually Impaired Students of Ahmadu Bello University are Using for Learning

Kashim Ibrahim Library has several LATs to support the learning of Visually Impaired students. The LAT available are Computer systems, Scanning and

reading machines, Manual Braille machines, Braille Embossing machines, Adaptive wristwatches, and Talking dictionaries. Digital Braille Quran, Typewriter and IC Recorder. There is also wireless and LAN connection to enable internet connectivity. The findings showed that the Library Assistive Technologies the participants use for learning are the Scanning and Reading Machine, Digital Braille Quran, typewriter, IC Recorder and Computer. To complement the effort of the Library Management, some Visually Impaired students purchased personal MODEMS, wireless, laptops, and flash drives to gain uninterrupted access to the internet and make optimal use of the Library Assistive Technologies. This shows that the students are making an effort to manage the inadequacy of the Technologies available.

The findings indicate that three of the participants use typewriters and IC recorders, two use computers and scanning and reading machines while only one uses the Digital Braille Quran. The number of participants that use the LAT is relatively low and this corresponds with the submissions of other scholars who noted there is low use of LAT. The number of students with Visual Impairment registered in the university does not match the number of students with Visual Impairment who frequently use the AT resources available in the Library. It has been disclosed that respondents minimally use Library Assistive Technology (Kiambati, 2018; Osman, 2020; Mwantimwa, 2021; Obim, 2022; Amurani, 2019). Also, not all the available assistive technologies are effectively and frequently accessed and used. The LAT used on average are computers, scanning and reading machines and typewriters. The reason for this is attributed to the level of importance of the LAT in supporting the learning process. For example: literature associates the frequency of use of a computer with multiple applications such as word processing, communication, research and access to library materials. The computer appears to enhance the utilization of other accessories, devices and software (Perfect *et al*., 2019).

Some of the participants only use the LAT they don't have personally. Some of them have personal computers, and phones with software that can substitute for a typewriter, computer or scanning and reading machine. **S**tudents' ownership of smartphones and laptops is also associated with low usage of assistive technology resources available in the library. It is an undeniable fact that smartphone and computer technologies are integrated with diverse assistive tools and accessories. Multi-functions of smartphone and computer technologies are one pulling factor for the Low use of Assistive Technologies in the Library by students with visual impairments (Mwantimwa, 2021).

Effect of the Use of Library Assistive Technologies on the Learning of Visually Impaired Students of Ahmadu Bello University

Library Assistive Technologies have a significant impact on the learning of visually impaired students. They are tools that serve as instructional strategies through which academic performance is enhanced among students living with disabilities. They foster an inclusive learning environment Library and help students with special needs break barriers and achieve better educational outcomes (Okoh, 2022).

Generally, Library Assistive Technologies allow visually impaired students to have improved access to information. It allows them access to information in a variety of formats, including text-to-speech, Braille, and large print. This means that visually impaired students can access the same information as their sighted peers, regardless of the format in which it is presented. Library Assistive Technologies increase independence. It allows visually impaired students to navigate libraries and access information independently. This can help in boosting their self-confidence and self-esteem. It improves academic achievement. Studies have shown that visually impaired students who use assistive technologies in libraries tend to have higher academic achievement than those who do not. This is likely because assistive technologies give visually impaired students the same access to information and resources as their sighted peers.

Kashim Ibrahim Library Management has put spirited effort into making available the most basic and important Assistive Technologies to support the learning of Visually Impaired Students and the findings of this study reveal some substantial impact. The participants interviewed stated that the use of the Library Assistive Technologies significantly assists them in learning. They indicated that the IC recorder assists greatly in recording lectures in class. They can record explanations in class for later use. This gives Visually Impaired students who are not fast enough with Braille writing the opportunity to record the lecturer's voice in class. It also prevents diversion of attention by enabling the students to focus completely on the lecturer's explanation while recording rather than struggling to catch up when jotting with Braille. The participants reveal that the computers help with note forming and assignments. Students with the help of a Librarian can use the computer to form lecture notes and do their assignments. They also use it to access the internet for academic-related activities. The typewriter also enables them to write tests and exams conveniently. Some of the students do not have personal laptops and some do not have complete knowledge of its usage. They use typewriters as a substitute. In addition, some of the departments do not allow

personal devices during exams so the typewriter gives the student freedom to conveniently write their exams without fear of being framed for examination malpractice. Other LATs like the IC recorder, digital Quran and scanning and reading machines also have positive effects on the student's ability to learn independently. They allow them to compete with sighted students. This finding is consistent with the work of other scholars that reveals that Library Assistive technology has been used by blind and partially-sighted people to help increase their independence and boost their social inclusion when it comes to education access (Eligi, 2017; Rabonye, 2020; Siddiqua, 2022).

There is a notable difference in the academic performance of students who use the LAT and the students who do not. A student in the Department of sociology, faculty of Education who frequently uses the library has a CGPA of 4.62. This is because LAT allows Visually Impaired Students access to information, they would otherwise not have access to without the use of LAT. This has been confirmed by other scholars. A study by Siddiqua (2022) reveals that there is a remarkable difference in the academic performance of students when they study with Library Assistive Technologies compared to when they do not. Another study by Amurani (2019) noted that students with Visual Impairment often experience greater success when they use their abilities (strengths) to work around their disabilities (challenges). Assistive Technologies combine the best of both practices as students agreed that AT use leads to a positive increase in their skills and academic performance. Also, the findings of the study (Okoh, 2022) showed that there is a significant difference between student academic performance and the usage of assistive technological tools. Meaning there is an improved performance with the use of assistive technological tools for learning among students with impaired vision.

Conclusion and Recommendations

Based on the findings from this study, it is concluded that although visually impaired students utilize available Library Assistive Technologies (LATs) for their learning, the use is significantly low. This finding goes beyond mere user adoption and delves into the mismatch between student expectations and LAT capabilities. The main issue lies in the relevance and age of the LATs. Some LATs fail to fully address the specific learning needs of visually impaired students; thus, their effectiveness suffers. Outdated tools lack compatibility with students' needs and additionally, some features crucial for specific learning styles or disabilities are absent, forcing students to adapt their methodologies to fit technology limitations, rather than the other way around. As a consequence,

student engagement with LATs becomes partial and potentially less impactful. They resort to using only specific technologies that align with their needs, leaving the rest underutilized. This low use underscores the disassociation between the envisioned potential of LATs and the reality experienced by students. Library Assistive Technologies must be helpful if they are to be used. They should be usable to increase the chances of use. The more usable they are, the easier they will be to persuade and encourage Visually Impaired Students to use them. However, neither usability nor usefulness guarantees use.

Based on the findings, the following recommendations were made:

1. The library management should collaborate with other library units, all academic departments and faculties to ensure that every new visually impaired intake is aware of existing assistive technologies in the library and be encouraged to adopt the technologies to aid his/her learning process.
2. University management should formulate a policy that will ensure that departments demand complete independent activities from Visually Impaired Students. CBT examinations that are being read and filled for students should be discouraged. When the students realize there is a need to write exams and carry out every academic activity independently, they will be compelled to seek out the use of LAT. Equipping Libraries with Assistive Technologies is not enough, policy should be made to guarantee their use.
3. The library management should purchase modern LATs that are compatible with users' needs, fix malfunctioning LATs and develop a maintenance strategy. Lack of good maintenance is greatly affecting the efficiency of the technologies and the impact they are supposed to be having on the student's learning. The Braille Embosser Machine (Braille Printing Machine) is a very important Assistive Technology for visually impaired students. It is the machine that prints Braille output. Without the Braille materials, students have to depend completely on voice reading which is not as compelling as reading on Braille. Comprehension is easier and faster with Braille so effort should be made to ensure that the machine is functioning unceasingly. A maintenance culture should also be developed to ensure little problems are tackled before they aggravate into irredeemable challenges.

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