

Availability of Assistive Technological Tools towards Academic Performance of Students Living with Disability (Visually Impaired) in Ekiti State Nigeria

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Abstract: This study examined the Availability of Assistive Technological Tools for Academic Performance of Students living with Disability (visually impaired) in Oke-Osun, Ikere-Ekiti, Ekiti State. Descriptive case study research design type was employed. The population of the study was 20 students from the senior secondary school using a purposive sampling technique. A self-developed questionnaire was used to elicit information from the respondents. It was divided into two sections. The section A consists of the biometrics of the students while the section B consisted of 20 item questions to know the availability of assistive technological devices among students living with disabilities. Both face and content validity were satisfied by expert after the construction of the instrument. Specifically, this study sought to investigate if there are available assistive technological tools, to investigate the use of these tools and the academic benefits of these tools among students living with disabilities (visually impaired) and determine the level of usage among male and female students living with disabilities. The findings of this study will be of immense benefit to students, teachers, policy makers, society and prospective researchers. The result showed that there is significant difference between the student academic performance and usage of assistive technological tools. It also revealed that there is no significant difference between male and female level of usage of assistive technological tools. It was concluded that the use of the available assistive technological tools among the students living with disabilities improves academic performance. Therefore, it was recommended that assistive technological tools be used continuously in special schools especially among the visually impaired students. Parent and teachers for students with special needs should make frequent use of assistive technological tools for instruction in and outside the classroom not only to enhance academic performance but also to make students living with disabilities participate actively in their communities as responsible active citizens.

Keyword: Assistive technological tools, visually impaired, Student, performance

I. INTRODUCTION

Children with disabilities are among the most stigmatized and excluded groups of children around the world. They are likely to have poorer health, less education, less economic opportunity when they grow up, and are more likely to live in poverty and deal with greater inequalities than their peers without disabilities. The researchers believe that girls with disabilities face more discrimination due to gender, disability

and other compounding factors such as poverty and ethnicity. It is estimated that approximately 1 in every 10 children in the world has a disability and less than 10% of children with disabilities in low-income countries go to school. Besides poverty and prejudice, the lack of access to assistive technology, as well as inaccessible transport and school environments are major barriers, which restrict children with disabilities to access education and to participate in the community (WHO, 2012)

Technology is an unavoidable tool for executing human activities. It is a practical application of knowledge in a systematic way. Technology is a product and a process of solving human problems systematically through scientific and other organized knowledge (Onasanya, 2007). Technology affords entirely new tools and possibilities for advancing and learning practices. Technology promotes literacy by allowing student to present and construct information in a meaningful and productive way. The integration of technology in teaching and learning is a means of attracting and maintaining the attention of students through stimulating materials.

The researchers are of the opinion that assistive technology is one of the key elements to advancing inclusion of people with disabilities together with additional supports such as personal assistance, sign language interpreters and removal of barriers. Access to assistive technology for people with disabilities is critical for many to access and benefit from education. Access to assistive technology is a precondition for achieving equal opportunities, enjoying human rights and living in dignity. Girls and boys with disabilities are entitled to available and affordable assistive technology.

Assistive technology are also be seen as assistive devices, these devices are produced product, or generally available product, that is used by or for persons with disability: for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions. This includes devices, equipment, instruments and software. Assistive technology refers to the devices and services that are used to increase, maintain, or improve the capabilities of a student with a disability (Dell, Newton, & Petroff, 2012). While the phrase assistive technology may make us think of

computers and computerized devices, assistive technology can also be very low-technology. For example, pencil-grips (the molded plastic grips that slip over a pencil) are considered assistive technology. Assistive technology that helps students with learning disabilities includes computer programs and tablet applications that provide text-to-speech, replacing a missing-limbs with constructed wood or metal these are few examples of low-tech that can assist the person living with disability etc. Assistive technology devices can help improve physical and mental functioning, overcome a disorder or impairment and help to improve a person's capacity to learn.

Assistive Technology for Visually Impaired People

A number of structures and educational facilities are in place to cater for the interests and welfare of people with disability. The Nigerians with Disability Decree of 1993 noted in Section 2 (c) that "Disabled persons are provided equal and adequate education". Therefore, cooperation and collaboration among relevant authorities, organs, institutions and trained personnel should ensure early and coordinated education of the disabled; and interaction and exchange between disabled children in special schools and children in normal ordinary schools. National Policy on Education (NPE) (2004).

In the case of students with disabilities in the classroom, assistive technology has the potential to enhance and increase their learning and academic performance (Edyburn, 2006). Currently, many students with disabilities are included in the classroom. Students may have difficulties in different areas like reading, listening, organizing information, or writing. Therefore, identifying and providing the right assistive devices to enhance performance will enable those with disabilities access great possibilities of living beyond their challenges.

There are varieties of technological devices that can be used by the visually impaired persons to further promote academic performance ranging from screen reader, Audible and tactile signs and warning surfaces, Braille translator and digital talking books, CD audio players and lots more. Whichever device that is used to enhance performance, clinical expertise may also be required to diagnose and monitor underlying conditions that impair functioning (Lindström, 2008). Studies have shown that when student with disabilities are trained with an assistive device it boosts their self-esteem and make them function positively in the society. Yusuf, Fakomogbon and Issa (2012). stated that student living with disabilities are able to compete with outside world when they are instructed with low to high assistive technological tools.

Adoption and Acceptance of Assistive Technology

According to Renaud and Van Biljon (2008) make the distinction between adoption and acceptance of technology. While technology adoption implies a process (from becoming aware of the technology to using the technology as a way of life), acceptance is defined as an attitude towards technology. The example given by the two authors refers to a user that

purchases a device but who needs time until adoption per se. Full adoption happens only after full acceptance (Renaud and Van Biljon, 2008)

Interestingly, while the information system domain talks, at the micro-level, about technology acceptance models without considering the process of full adoption, sociologists underline a macro-level approach by considering a purchasing decision (acceptance or rejection) as part of the

adoption process (Renaud and Van Biljon, 2008). The technology adoption process is described by Renaud and Van Biljon, (2008) as a set of five stages: the knowledge stage (the individual gets to know about the product), the persuasion phase (the individual becomes persuaded of a need for the product), the decision stage (that leads to purchase), the implementation stage (the product is being used), and the confirmation stage (the need to confirm the decision taken to buy the product). In the same respect, Renaud and Van Biljon, (2008) talk about the Technologies domestication of technology, in which users are considered social actors and in which the main focus is on the way technological innovations change and are changed by the social context. The most important model related to technology acceptance is the Technology Acceptance Model (TAM). This model was introduced by Fred Davis in 1986 and it helps explain and predict user behaviour for information technology (Park, 2009). In other words, TAM can explain why a user accepts or rejects information technology and it is based on two cognitive beliefs: perceived usefulness and perceived ease of use (Park,2009). The technology acceptance process is translated into TAM by relying on six variables: external variables (demographic variables, perceived usefulness, perceived ease of use), perceived usefulness(the degree to which the technology is enhancing performance), perceived ease of use (the degree to which an individual considers the technology as being free of effort to use), attitude towards use (the desirability of using the system), behavioural intention (predicted by attitude towards use and perceived usefulness), and actual use (predicted by behavioural intention). However, this model does not take into account the social influence (Renaud van Biljon,2008)

The main description of TAM refers to the fact that the use of technology is influenced, directly or indirectly, by the user's behavioural intention, attitude, the perceived usefulness of the system, and the perceived ease of using it. At the same time, external factors can affect intention and use through the perceived usefulness and ease of use (Park,2009). Figure 1 represents an adaptation of the original TAM model.

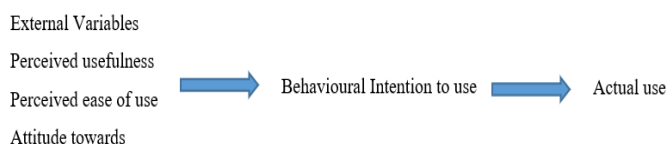


Figure 1. The main variables of the Technology acceptance model (TAM), Source: (Park, 2009).

Benefits of Assistive Technological Tools

When appropriate to the user and the user's environment, assistive technology is a powerful tool to increase independence and improve participation (WHO 2011). It helps individual children become mobile, communicate more effectively, see and hear better, and participate more fully in learning activities (Netherton DL, Deal WF. 2006). Moreover, assistive technology supports children to access and enjoy their rights; do things they value; and bridges disparities between children with and without disabilities (WHO 2008) Bouck EC, Flanagan S, Miller B, Bassette L (2012) Ground A, Lim N, Larsson (2010) opined that it provides the means of access to and participation in educational, social and recreational opportunities; empowers greater physical and mental function and improved self-esteem; and reduces costs for educational services and individual supports. (Alquraini T, Gut D. 2012). Benefits in areas such as health, mobility and education have been linked to the use of assistive technology. By improving access to education and increasing achievement in school, assistive technology can have a positive socioeconomic effect on the lives of people with impaired vision (Omede 2016). By facilitating the participation and inclusion of student disabilities in all aspects of life, assistive technology can impact on self-image, self-esteem and sense of self-worth. In a study, in Jos plateau state it was observed that assistive technological devices support the teachers' instructions and reduces frustrations. Adebisi (2015) opined that Assistive technology can act as a support to the teaching of instruction to the learner with special needs, thereby reducing the workload and stress of teachers. According to WHO 2011, it gives children with disabilities opportunity to flourish as others might, with the potential to live fulfilling lives and to contribute to the social, cultural and economic vitality of their communities.

According to Illinois University Library, the following are some assistive technologies software/devices that can help those who are blind or visually impaired read printed materials.

- **JAWS Screen Reader**
JAWS stands for Job Access with Speech and is a popular screen reader. JAWS works with Windows operating system and provides text-to-speech and Braille output.
- **Kurzweil Education**
This text-to-speech software can help those who are blind or visually impaired use computers and also can read scanned printed material. Kurzweil offers various versions for individuals.
- **Refreshable Braille Displays**
These devices processes information on computer displays and electronically raises and lowers different combinations of pins in Braille cells. It changes continuously as the user moves the cursor around on the screen. Common Assistive tools for the blind within our environment are: Eyeglasses, White cane,

balls that emit sounds. Audio materials like talking books and audio cassettes of recorded lessons Sophisticated audio devices, CD players and recording machines can be used to record lectures.

Other assistive tools for persons with disabilities according to Illinois University Library are as follow:

1. Mobility

Walking stick, crutch, walking frame, manual and powered Wheel chair, People living with paralysis can join colleagues at class with an automated wheel chair instead of waiting for someone to wheel them to the class. Artificial leg or hand, leg or hand splint, clubfoot brace Corner chair, supportive seat, standing frame Adapted cutlery and cooking utensils, dressing stick, shower seat, toilet seat, toilet frame, feeding robot

2. Hearing

Headphone, hearing aid Amplified telephone, hearing loop Communication cards with texts, communication board with letters, symbols or pictures Electronic communication device with recorded or synthetic speech

3. Cognition

Task lists, picture schedule and calendar, picture based instructions Timer, manual or automatic reminder, smart phone with adapted task lists, schedules, calendars and audio recorder, Adapted toys and games

Factors affecting the use of assistive technology:

Some assistive technology services and devices may require a great deal of effort in order

for students to access and properly use them. The barriers of accessing assistive technology may

include but are not limited to funding, training, and insufficient assessment. Lack of planning. Sophistication of the device and adaptation by the user.

Funding: The high costs of Assistive technological devices and the lack of funds available to meet these costs were the most frequently mentioned barriers to Assistive technological use reported by coordinators of government special school in Ido Osi Ekiti state. Schools typically report access to fewer financial resources than they require to meet the technology needs of their students Governments and private companies vary considerably in terms of the type of equipment they will fund because the high cost of devices. This means that the students will have less than ideal exposure to different devices also the availability of these devices for student use depends on the funds given for the purchase of these device.

Environmental: The environment of the disable student is also a factor. Most of the student who reside in rural areas may not have the electricity to power most of their devices even to charge batteries for their usage. The environment may

not accommodate features for disabled learners like ramp for wheel chair by the side of a stair case for easy mobility.

Planning: Lack of planning for successful implementation is one of the mistakes most government disability centers experience in Ekiti state. Often, specific realistic outcomes for the student' technology use are not determined. Frequently, no structured program is put in place to allow the student regular, systematic use of technology in the classroom.

Adaptation: it was observed by a group of medical researchers from Enugu which focused on Factors affecting the use of mobility aids devices among young adults with mobility disability in a selected Nigerian population that some learners find it difficult to adapt to the use of technological devices due to the previous experiences and psychological trauma and it sometimes take series of rehabilitations to put them back on track psychologically. Antoninus O E, Chigozie I U, Stephen S.E, Obinna C O, Adaora J O, Chukwudi M O, Ekezie M U, Benedict C.O & Emmanuel C. A (2019)

Sophistication: it seems that some of these devices are so complicated to use by the teacher and the student sometime this situation frustrates both the teacher and the learner. In many schools, it is common practice for equipment to be shared between classrooms, which reduces its availability to individual children. The way in which individual schools store and manage equipment further determines accessibility of devices for spontaneous and functional use. Difficulties with repair and maintenance of equipment are a constant source of frustration to users and service providers alike. When equipment breaks down, teachers report that students may be without their assistive device for months while it is returned for repairs. Even day-to-day maintenance of devices which require a constant power source can be disruptive and time-consuming for teaching staff.

Trained or qualified teachers: It is vital that teachers are exposed to and have knowledge of the available technologies that could support students in their academic tasks (Ghaleb A.2014). The researchers observe that teachers who do not realize and have not been exposed to the usefulness and applications of technology in education in general, and special education specifically, will be more reluctant to use them. It is therefore important that technology is included in preparation programs for special education teachers; in these programs, technology should be used as part of the preparatory program for teachers and cover technical applications at the classroom level. In this way, special education teachers will have the knowledge and experience in using technology that will contribute to the wide spread of the use of technology in special education.

The Statement of Problem:

Disability especially blindness is not what any individual desires to be born with. Therefore, when a person has such challenge, facilities could be available to help the person actualize his or her dreams. Students living with disabilities

are often treated as second class citizens and adequate facilities are not put in place for them during the teaching and learning process. When they find themselves in special schools, there are still not enough assistive devices that can cater for the special individual needs. The aim of this study is therefore to Ascertain the availability and usage of assistive technology in teaching and learning among the visually impaired students in special school (Oke –Osun Ikere-Ekiti) in Ekiti State

Purpose of the study

The purpose of this study is to investigate the usage and available assistive technology for teaching and learning among students living with disabilities (the Blind and visually impaired) in special schools in Ekiti state. It intends to determine the extent of adoption of the assistive technology by the visually impaired students. Cook & Hussey (2013) introduced a model HAAT (human, the activity, the assistive technology) for persons with disabilities as the model was designed to guide assessment and prescription, as well as evaluate the result. The functional outcome of an assistive technology system is defined as “someone (person with a disability) doing something (an activity) somewhere (within a context). This model was found to be successful in the clinical practices.

Research Hypothesis

1. There will be no significant difference in performance the usage of assistive technological tools among the visually impaired person
2. There would be no difference in the level of usage of assistive technology among male and female students with disabilities.

II. METHODOLOGY

The population consisted of 20 students from Oke-Osun special school for the visually impaired Ikere-Ekiti state. The ethical approval to conduct the study was obtained from the school coordinator. Also, the consent of the students with visual impaired the content was read to them and their consent was gotten. Instrument used for this study was questionnaires with five open-ended questions for each item making a total of 20 questions in all that were required to be answered. The questionnaire was designed to investigate available assistive technological tools for students with disabilities. It is structured in two Sections. Section A contains the biometrics of the students while Section B contained the questionnaire which is in four sections with five questions each addressing the availability of assistive technology, the usage of assistive technology, adopting assistive technology and the academic benefit of assistive technology

Data Analysis

The data obtained through the research instruments were analysed and all hypotheses were tested at the alpha of 0.05 level of significance using t-test.

III. RESULTS:

The results are presented as follows

Research Question 1

There will be no significant difference in performance the usage of assistive technological tools among the visually impaired person

Table 1: t-test showing difference in performance and the usage of assistive technological tools among the visually impaired student

Variable	N	Mean	SD	df	t-cal	Sig. Val
Students' academic performance	20	29.7000	2.45164	38	41.29	0.003
Usage of assistive technological tools	20	6.4000	0.59824			

$P > 0.05$

The significant value of 0.003 is less than the alpha level of 0.05, the null hypothesis is therefore not rejected. Hence, there is significant difference between the student academic performance and usage of assistive technological tools

Research Question 2

There would be no difference in the level of usage of assistive technology among male and female students with disabilities.

Table 2: t-test showing no difference in the level of usage of assistive technology among male and female students with disabilities

Variable	N	mean	SD	df	t-cal	Sig. Val
Male	12	6.2500	0.62158	18	1.408	0.807
Female	8	6.6250	0.51755			

$P > 0.05$

The significant value of 0.807 is greater than the alpha level of 0.05, therefore the null hypothesis is accepted. Hence there is no significant difference in the level of usage of assistive technological tools between male and female.

III. IMPLICATION OF THE FINDINGS

Assistive technological tools serve as instructional strategies through which academic performance is enhanced among students living with disabilities. The result showed that there is significant difference between the student academic performance and the usage of assistive technological tools. This means that there is an improved performance with the use of assistive technological tools for teaching and learning among students with impaired vision. The findings revealed that the students are acquainted with the available assistive technological tools and are enthusiastic to learn and be relevant in their society. It was also observed that these assistive tools reduce frustrations on the part of the teachers during instructional delivery. The findings of this study agrees with (Watson, Ito, Smith, & Andersen, 2010) who opined that

in comparison to other interventions, assistive technology may have a significant effect in helping students with disabilities progress towards the goals outlined on their Individual Education Plans.

The findings of this study further showed that there is no difference on gender basis on the usage of assistive technological tools. It shows that both male and female students are able to use Assistive technological tools effectively for learning. In our world today, education is currently going through a massive technological transformation and it is imperative that every child is in touch with the digital world not excluding those living with disabilities.

IV. CONCLUSION

Based on the findings the following conclusions were drawn.

1. Teachers of special schools adopts the available assistive technological tools for instruction
2. The use of the available assistive technological tools among the students living with disabilities improves academic performance.
3. Both male and female visually impaired student have equal access to assistive technological tools.

V. RECOMMENDATION

Based on the findings of this study, it was recommended that:

1. Assistive technological tools are used continuously in special schools especially among the visually impaired students.
2. Parents, teachers and caregiver for students with special needs should make frequent use of varieties of assistive technological tools for instruction in and outside the classroom not only to enhance academic performance but also to make students living with disabilities participate actively in their communities as responsible active citizens. Ignoring the existence of devices and tools that can help students with disabilities facilitate and maximize their educational and academic gains can also prevent students from having opportunities to reach their maximum performance.
3. Male and female students should be given equal opportunity during instruction. Low to high technological devices can be gradually introduced to high flyer students.

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