Improving Quality Education for Visually-Impaired Secondary School Students in Osun State with ICT-Based Tools

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Abstract

One of the goals of the SDGs is to ensure inclusive and equitable quality education which necessity equal learning opportunities for all students, regardless of their abilities, ethnic colour, race, sex, religion, language and disability. This study, therefore, investigated the availability and usability of ICT-based tools used in improving the quality of education of students with visual impairment in Osun State secondary schools. A descriptive survey method of research was employed. The sample size of the study was sixty (60) visually impaired students from two special secondary schools in Osun State. An instrument titled ICT-based Tools for Visually-Impaired Students (ICTVIS) was used for data collection. The reliability coefficient of the instrument obtained was 0.87 using the Split-half method. The findings revealed that some ICT-based tools were made available for visually-impaired students to improve the quality of their learning experiences. However, the study also demonstrated that visually-impaired students face some challenges in accessing and utilizing some of these available tools. It also revealed that there was no statistically significant difference in the challenges encountered by visually-impaired students when using ICT based on gender ($t = 0.743$, $df = 58$, $p > 0.05$). It was hereby recommended that the Ministry of Education should arrange various training skills programs, workshops, and conferences, for teachers teaching visually-impaired students how to teach with ICT-based tools and also government should provide more sustainable funding for ICT-based tools to ensure that students

with visual-impairment also benefit the same quality of education as their peers without disabilities.
Keywords: Quality Education, Visually-Impaired students, ICT-Based Tools, SDGs, Inclusive education

Introduction

Technology has become an integral part of human lives. This has made the whole world technologically connected, which is why it is referred to as a global village (Ertürk & Horzum, 2015). This assertion is attributed to the increase in interest in the use of Information, Communication and Technology (ICT) and how modern *technologies are quickly* connecting people worldwide The impact of ICT has been felt in all aspects of lives including education (Jobirovich, 2022). Technology is a transfer highway of knowledge through modern innovations that have changed the way people think, work and live (Ahmadi, 2018; Merillo & Domingo, 2019). To achieve Agenda 2030 also known as the Sustainable Development Goals (SDGs), there is a need to integrate ICT. This is because digital technologies are key drivers to achieving the 17 SDG goals (Mondejar et. al, (2021) and SDG goal 4, is dedicated to ensuring that there is inclusive and equitable quality education and to promoting long life learning opportunities for all (UNESCO, 2016).

According to the World Health Organization (WHO) in 2015, about 253 million people had visual impairment worldwide, 36 million were blind and 217 million moderately had a severe visual impairment (UNESCO, 2015). In 2020, the record showed that the statistics had increased, about 314 million people globally were visually-impaired, an estimated 40 to 45 million people were blind and 235 million had low vision (UNESCO, 2020). Some studies have also confirmed that the number of enrolments among students experiencing impairments has increased in many countries like the United States (Snyder & Dillow, 2010), the United Kingdom (Ebersold, 2008) and New Zealand (Ministry of Education, 2010). The implication of this according to Hewett et al.(2015) is that the number of people with visual impairment using ICT has also increased dramatically and this is while ICT is becoming much more popular as an instructional delivery for teaching-learning of visually-impaired students (Eligi & Mwantimwa 2017).

Also, according to UNESCO (2020), the necessity to provide equal learning opportunities for all students, regardless of their abilities, has been increased and more attention has been given to inclusive education throughout the whole world. To foster inclusivity, using ICT-based tools could be one way to alleviate the educational gaps that visually-impaired students are experiencing

(Montenegro-Rueda et.al 2023). In response to closing this educational access gap for visually-impaired students, ICT-based tools emerged as the potential solution to these challenges (Course, 2006). This is because ICT generally does not only enhance access to information but also serves as a tool that can be used to foster equality in education and lifelong learning among learners (Eligi, 2017).

A growing number of students with disabilities are gaining access to better education and this is a result of the policies and methods implemented to encourage the right to education (Villouta & Villarreal 2022). To ensure inclusive and equitable quality education which is goal 4 of the 17 SDGs goals, all students must have the right to the same standard of education. According to the Charter of Fundamental Rights of the European Union (2000), it is prohibited to discriminate technology against any student based on ethnic or social origin, colour, race, sex, religion or belief, language, membership of a national minority or disability. In this view, all students must have equal education opportunities and must learn with modern educational tools including ICT-based tools.

ICT-based tools in this context are described as assistive tools or pieces of technological equipment which are used to maintain and encourage the functional capabilities of persons with disabilities (Federici, et al. 2017). They are tools that also allow visually-impaired persons to cope with issues related to their environment, to move from one place to another and to read (Bertulfo et al. 2017). ICT-based tools are digital tools designed to assist individuals with speech and braille output, screen amplification systems, speech synthesisers, and, more recently, mobility-aid solutions for mobile phones that support trip planning (Campbell, 2007). Also, Idowu and Abimbola (2023) identified ICT- based tools as braille, screen readers and magnification software.

In recent years, schools have had to confront the difficulty of advancing inclusive education by creating innovative ideas that address the diversity of student profiles and educational environments OECD (2016). For visually-impaired students, ICT-based tools have become important learning tools through which they can access supportive learning materials (Wani, 2021). They are tools that are used to support the limitation of people with disabilities which are referred to as assistive technologies (Emiliani et al., 2011). ICT-based tools are devices developed not only to meet the needs of learners with mild learning disorders but also assistive technology that has made it possible for learners with severe disabilities to participate actively in the classroom alongside their peers without disabilities. However, many special schools still lack the necessary ICT-based tools that can assist learners with disabilities to overcome a wide range of limitations that prevent them from classroom participation- physical disability speech and hearing impairments and visual impairment (Hasselbring et al 2000). Thus many visually-impaired teachers and students are not adequately trained on how to effectively use the available ICT-based tools in the schools (Idowu & Bello, 2023).

In Nigeria, the usage of ICT-based tools in teaching visually-impaired student needs to be emphasized in line with what is obtained in other parts of the world. The effective use of ICT enhances motivation among learners, helps recall previous learning, and provides new instructional stimulus for visually- impaired students. However, despite the numerous benefits that ICT-based tools integration has brought to support and improve the teaching-learning process of visually-impaired students, some factors are still preventing its adoption, availability and usage because some visually-impaired schools still don't have adequate ICT-based tools needed to improve the learners' outcome. A good number of visually-impaired students do not have the required skills and competency in the utilization of ICT for learning while those who have little knowledge encounter one challenge or the other. Based on this, the study investigated the availability and usability of ICT-based tools in improving the quality of education of visual-impaired students in Osun State.

Theoretically, Oliver's social model (2013) was used as the theoretical framework. The concept operates under the premise that the issue about disability exists outside of the person's disability. What affects a person's ability to fully participate equally in society is beyond the impairment. Oliver demonstrates the necessity of addressing disabilities on all fronts and the idea that no one should ever see disability as an obstacle or barrier. He further mentioned that people who are disabled are also entitled to the same childhood experiences as their peers and siblings who are not disabled. This includes attending the same school in their community and using the same public resources. The following features of Oliver's social model are consistent with the challenges faced by students with visual impairments: According to Oliver's social model, some of the challenges faced by students with visual impairments include; attention, attitude, qualified teachers, financial support and availability of learning materials. Learning materials should be made available for those who are visually-impaired, to support their academic learning. Technological learning materials should be made available for them to reduce their academic difficulties (Oliver, 2013).

Research Questions

The following are the research questions raised for the study

i. What types of ICT-based tools are available to improve the quality of education of students with visually-impairment in Osun State secondary schools?

ii. What are the challenges encountered by visually-impaired students when using the available ICT-based tools to improve their quality of education?

Hypothesis

This hypothesis was generated in line with the purpose of this study

H_o: There is no significant difference in the challenges encountered by visually-impaired male and female students when using the available ICT-based tools to improve their quality of education.

Methodology

The study employed a descriptive survey method of research. The study population comprised visually-impaired secondary school students studying in the special schools in Osun State. The only two secondary schools for visually-impaired students in Osun State were purposively selected for the sample. Thirty (30) students were selected randomly from each of the schools making a total of sixty respondents. 61.7% of the respondents were male while 38.3% of the respondents were female.

An instrument titled ICT-based tools for Visually-Impaired Students (ICTVIS) was developed and used for the data collection. The questionnaires consisted of two sections (A&B). Section "A" elicit the respondent's demographic information with attention to the name of the school, gender, class and whether the respondent has visual impairment. Section "B" consisted of relevant items that were used to elicit responses from the respondents in line with the research questions. The items were measured on a 4-point Likert-like scale ranging from "Strongly Disagree" scored (1) to "Strongly Agree" scored (4) for positively scored items; while a reverse in the scoring was done for the negatively scored items. (ICTVIS) was subjected to face and content validity by experts in the test measurement field. To determine the reliability of the instrument, ten students were selected from another special school in Oyo State which was not part of the secondary school used in the study. The reliability coefficient obtained from Cronbach Alpha with Split-half was 0.87. The questionnaires were distributed to the respondents by the researchers with the assistance of their teachers and were retrieved immediately. The collected data were subjected to analysis using descriptive and inferential statistics.

Results

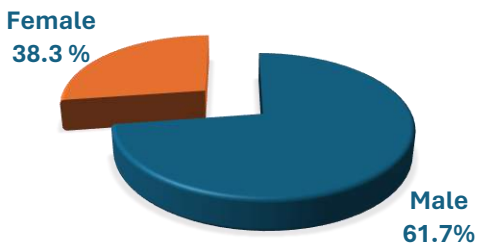
Respondents Demographic

Table I: shows that the total number of visually-impared students that particiapated in this study was 60. Out of these, 37 (61.7%) were male and 23(38.3) were female . The result from this table shows that male students participated more than the female students .

Table I: Distribution of the Paticipants Based on Gender

Gender	Frequency	Percentage	Cumulative
Male	37	61.7	61.7
Female	23	38.3	100.0
Total	**60**	**100.0**	

Figure 1: Distribution of the paticipants based on gender



Research Question 1: What types of ICT-based tools are available to improve the quality of education of students with visually-impairment in Osun State secondary schools?

Table II: Analysis showing the types of ICT-based tools available for students with visual impairment in Osun State (N = 60)

S/N	Types of ICT-based tools	RESPONSE								Remarks
		Strongly Agree		Agree		Disagree		Strongly Disagree		
		F	%	f	%	F	%	F	%	
	Media players are adequately provided	32	53.3%	24	40.0%	Nil		4	6.7%	Agreed
	Talking Dictionary are adequately provided	52	86.7%	6	10.0%	Nil		2	3.3%	Agreed
	Closed Circuit TV are adequately provided	17	28.3%	39	65.1%	2	3.3%	2	3.3%	Agreed

S/N	Types of ICT-based tools	RESPONSE								Remarks
		Strongly Agree		Agree		Disagree		Strongly Disagree		
		F	%	f	%	F	%	F	%	
	Typewriters are adequately provided	13	21.7%	44	73.3%	1	1.7%	2	3.3%	Agreed
	Computers are adequately provided	45	75.0%	12	20.0%	1	1.7%	2	3.3%	Agreed
	Perkins Braille are adequately provided	32	53.3%	25	41.7%	1	1.7%	2	3.3%	Agreed
	Braille Embosser are adequately provided	19	31.6%	10	16.7%	22	36.7%	9	15%	Agreed
	Internet facilities adequately provided	50	83.3%	7	11.7%	2	3.3%	1	1.7%	Agreed
	Digital Video Disk players are adequately provided	46	76.7%	12	20.0%	1	1.7%	1	1.7%	Agreed
	Speech Synthesis are adequately provided	2	3.3%	1	1.7%	40	66.7%	17	28.3%	Disagreed
	E-books are sufficiently provided	1	1.7%	Nil		4	6.7%	55	91.7%	Disagreed
	Note Taker are adequately provided	1	1.7%	2	3.3%	11	18.3%	46	76.7%	Disagreed

The result obtained from Table 2 shows the analysis of the types of ICT-based tools available for supporting learning among visually-impaired students in Osun State. The findings show that (53.3%) of the respondents strongly agreed that media players are adequately provided, (40.0%) agreed while only (6.7%) strongly disagreed that media players are adequately provided. Also. (96.7%) of the respondents both strongly agreed and agreed that talking dictionaries are adequately provided,(93.4%) indicated Closed Circuit TV system, (95%) mentioned typewriters, (95%) indicated that computers are adequately available, (57%) said Perkins brailles are available and can be accessed, (95%) agreed that internet services are always made available and (96.7%) also agreed that Digital Video Disk (DVD) players are adequately available. However, the respondents also mentioned that some ICT-based tools are not adequately available, (95%) disagreed that Speech Synthesis is made adequately available for them to access, (98.4%) mentioned that E-books were not sufficiently provided and (95%) also did not agree that note taker are adequately provided.

Research Question 2: What are the challenges encountered by visually-impaired students when using the available ICT-based tools to improve their quality of education?

Table III: Analysis of the challenges encountered by partially visually impaired when using the available ICT-based tools (N = 60)

S/N	Challenges encountered in when using of the ICT-based tools	RESPONSE								Remark
		Strongly Agree		Agree		Disagree		Strongly Disagree		
		F	%	f	%	F	%	F	%	
1	Learning schedule do not allow for the use of ICT-based tools individually	12	20.0%	21	35.0%	18	30.0%	9	15.0%	Agreed
2	ICT software are not readily available	16	26.7%	22	36.7%	20	33.3%	2	3.3%	Agreed
3	Poor working conditions of the available ICT-based tools	30	50.0%	12	20.0%	15	25.0%	3	5.0%	Agreed
4	Lack of assistance from the teachers on how to use some of the ICT-based tools	19	31.7%	24	40.0%	12	20.0%	5	8.3%	Agreed
5	Lack of time	14	23.3%	22	36.7%	19	31.7%	5	8.3%	Agreed
6	Lack of awareness of the importance of those ICT-based tools	12	20.0%	24	40.0%	22	36.7%	2	3.3%	Agreed
7	Lack of teachers competency	9	15.0%	18	30.0%	23	38.3%	10	16.7%	Disagreed
8	Limited accessibility and poor internet connectivity	12	20.0%	6	10.0%	28	46.7%	14	23.3%	Disagreed
9	Maintenance and technical problem	17	28.3%	1	1.7%	13	21.7%	29	48.3%	Disagreed
10	Poor power supply	14	23.3%	11	18.3%	31	51.7%	4	6.7%	Disagreed

The result obtained from Table 3 shows the challenges encountered by visually-impaired students when using the available ICT-based tools. The findings revealed that (55%) of the respondents agreed that learning schedules do not allow for them to use ICT-based tool individually, (63.4%) ICT softwares are not readily available, (70%) agreed that poor working conditions of the available ICT-based tools are also a challenge. (71.7%) of the respondents indicated a lack of assistance from the teachers on how to use some of the ICT-based tools, (60%) lack of time, (60%) lack of awareness of the importance of those ICT-based tools. Only (45%) of the respondents agreed that

lack of teacher competency is one of the challenges they encountered when using the available ICT-based tools, (30%) agreed that limited accessibility and poor internet connectivity is a challenges, (30%) indicated maintenance and technical problems as a challenge they faced and (41.6%) of the respondents agreed that power supply is also one of the challenges they encountered when using the ICT-based tools.

Hypothesis 1: There is no significant difference in the challenges encountered by visually-impaired male and female students when using the available ICT-based tools to improve their quality of education.

Table IV: Summary of t-test Analysis of Difference between Male and Female visually-impaired Students on challenges encountered by when using the available ICT-based tools

	N	Mean	S.D	T	Df	Sig.(2-tailed)	Remark
Male	37	11.45	2.58	0.743	58	0.460	Not Significant
Female	23	12.00	2.96				

The result obtained from Table 4 shows the analysis of the difference in challenges encountered by visually-impaired students when using the available ICT-based tools based on gender. The finding reveals that there is no statistically significant difference in the challenges encountered by visually-impaired students when using available ICT-based tools based on gender ($t = 0.743$, $df = 58$, $p > 0.05$). This implies that the challenges encountered by partially visually-impaired male students are the same as those of female students when using the available ICT-based tools.

Discussion of findings

The first research question for this study finds out the type of ICT-based tools that are available for students with visual-impairment in Osun State secondary schools. The results show that ICT-based tools such as media players, talking dictionaries, Close Circuit TV, typewriters, computers, Perkins braille, Braille embosser, internet facilities and Digital Video Disk players are adequately provided and were available for usage while speech synthesis, E-books and Notetaker were not provided. The findings from this study agree with the results of Eligi & Mwantimwa (2017) who listed some similar ICT facilities relevant for supporting visually-impaired learners at the University of Dares Salaam (UDSM) as tape-recorders computers, the Perkins Braille and scanners among others. This finding also concurred with the other studies by Idowu & Abimbola

(2023); Bertulfo et al. (2017) and Eskay & Chima (2013), who listed some of the assistive technology that are beneficial in learning for the visual-impaired speech and braille output, screen amplification systems, reading machine, computer, the internet, World Wide Web (WWW), screen magnifier, screen reader and Voice recognition software.

The second research question is on the challenges encountered by visual-impaired students while using the available ICT-based tools. The result revealed that some of the challenges encountered by the visual-impaired students are learning schedules which does not allow the use of ICT-based tools individually, ICT software which is not also available, poor working conditions of computers, ICT-based tools which are too expensive for use, lack of sufficient time, limited technical support, limited accessibility of the network connection, maintenance and technical problem and poor power supply This does not agree with the findings of Borg (2011) , who attributed the challenges facing the availabilities and usability of ICT required by the visual-impaired to heavy import duties and taxes paid to purchase them.

The result further revealed that there was no significant difference in the challenges encountered visual-impaired male and female students when using ICT-based tools. This result aligns with the finding of found no gender differences in occupational aspiration but contradicts the study conducted by Arap-Maritim (1984) and Kamau, (2011) as cited by Were et al. (2010) that boys have higher aspirations than girls.

Conclusion

Based on these findings, the study revealed that ICT-based tools are made available for visual-impaired students to improve the quality of their education. However, there are a few challenges in accessing and utilizing some of the available ICT-based tools to enhance their learning experience. The study findings also demonstrated there is a need to continually provide learning opportunities through ICT-based tools for the visual-impaired students and not just to provide but to make it possible for them to actively participate in the classroom.

Recommendations

On this basis, the following recommendations were made;

1. Visually-impaired students should be encouraged to use ICT-based tools to promote quality education

2. The Ministry of Education should arrange various training skills programs, workshops, and conferences, especially for teachers on how to use ICT-based tools for their students
3. Appropriate and effective training skills should also be provided to improve the visual-impaired students' confidence and skills so that they can participate effectively in their academics.
4. The government should provide more sustainable funding for ICT-based tools to ensure that students with visual-impairment also benefit from the same quality of education as their peers without disabilities.
5. Further studies should be done at the local and international levels to establish these findings.

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