PERCEPTION OF TEACHERS ON THE AVAILABILITY AND UTILIZATION OF ASSISTIVE TECHNOLOGY FOR PUPILS WITH LEARNING DISABILITIES IN PRIVATE AND PUBLIC SCHOOLS IN IBADAN, OYO STATE

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Abstract
The use of assistive technologies is expected to provide relief, making learning easier, ensuring equal participation and reducing the level of frustration experienced by children with learning disabilities. However, in Nigeria, not all schools have adequate access to these tools which may be due to insufficient financing training or other associated reasons. This study assessed the perceived availability and utilization of assistive technology for pupils with learning disabilities in private and public schools in Ibadan, Oyo State. Two research questions were raised and answered descriptively. The study adopted descriptive research design of the ex post facto. Purposive sampling technique was used to sample 191 respondents comprising of teachers in public and private primary schools. Inventory of Assistive Technology in the Classroom (IATC) was administered to seven schools and responses were retrieved. This checklist consisted of 12 self-developed items validated with average reliability coefficients ranging from 0.87 to 0.89. The data collected were analysed using descriptive statistics of percentages. The result showed that for the different types of assistive technologies understudied, 54% of the teachers agreed that they had computers in their schools, 27% agreed for ipads while for Mathematics, 19 % of the teachers agreed that they had talking calculators. However, no single teacher in both private and public schools agreed that they had speech synthesizers, abbreviation expanders, inspiration software, Kurzwell 3000, graphic organizers, optical character recognition and Speech-to-text devices. The analysis also revealed that assistive technologies were least utilised for reading and mathematics. Based on the findings, it was recommended that education stakeholders should commit more resources to providing assistive technologies for children with learning disabilities.

Keyword: Assistive technology, Learning Disabilities, Utilization& Availability

Introduction

Every Nigerian classroom environment today is packed with a heterogeneous group of learners with varying abilities and disabilities. With the global adoption of inclusive education practice, the heterogeneity of the classrooms has become more and more diverse hence teachers find classrooms instructional delivery highly challenging. The major and perhaps most critical is the inability of children with learning disabilities to cope with classroom instructions, when there may be no signs of physical or sensory disabilities. Thus, while most children find school and

learning very exciting and interesting; children with learning disabilities develop fear, anxiety and may not cope adequately. They have difficulties with learning, carrying out simple math operations, read a paragraph or partake in social and motor activities as little as picking up crayon to trace letters of the alphabet. These categories of children are of major concerns to teachers in the classroom as the teachers seek ways to make them learn better.

A child with learning disabilities is one having learning problems characterized by difficulties with certain skills such as reading, writing, mathematics or listening not found in individuals with normal intelligence. Learning disabilities affect the ability to process and interpret what the child sees and hears or the ability to link information from different parts of the brain. These limitations can show up in many ways such as specific difficulties with spoken and written language, coordination, self-regulation, or attention. Such difficulties extend to schoolwork and impede learning to read, or write, listen or solve mathematics problems (Lazarus, 2018). Children with learning disabilities face enormous problems trying to learn, some of them never acquire the level of proficiency that will equip them for a successful life (Edyburn, 2019). A child who is constantly working and achieving below peers, leaves a puzzling effect in the minds of teachers, parents, peers and even on his/her own mind. What is more disturbing is the trauma the child goes through thinking about school, trying to unravel why the constant failure in specific academic areas, this must be very frustrating for the child. It is therefore obvious that learning disability is not an issue of intelligence or motivation but rather input and output processes. Thus, it has become intriguing and a sigh of relieve to these children, their parents and teachers that 21st century educational thinkers and inventors have now worked a way around the input and output deficits that plague the learning processes of children with learning disabilities by inventing and integrating various assistive technological devices into the classroom not only to improve performance but also to weaken the psychology of learned helplessness typical of these children and strengthen enthusiasm of learning. The major issue of concern is the availability and accessibility of the assistive technology (AT) resources at the right time, right quantity and its acceptance in our primary schools.

Assistive technology for pupils with learning disabilities include electronic devices that help bypass, work around or compensate for an individual's specific learning deficits to capitalize on their strengths. For example, a pupil who struggles with reading but who has good listening skills might benefit from listening to audio books. Assistive technology for pupils with learning disabilities may include audio books, electronic math worksheets, Freeform database software, graphic organizers and outlining, data managers, optical character recognition, portable word processors, speech synthesizers, speech recognition, talking calculator, spelling/grammar checker, electronic dictionaries, variable-speed tape recorders, word prediction programs amongst others. There are also non-electronic devices that may be equally used to assist children with learning disabilities. Assistive technology can be used in kindling these children's interests, recalling previous learning, providing new stimuli, activating learner's response, and providing systematic and steady feedback, consequently, promoting quality learning in the classroom. It provides opportunities to stimulate learning and increase motivation that enables teachers and these students to interact productively within the classroom. Thus, Roseti (2019) noted that technological devices have become essential tools in today's information age, makes a dramatic impact on the lives of people through education, research and development in the global perspective.

The major learning challenges of individuals with learning disabilities usually relate to cognitive processing, memory and retrieval of taught concepts. Ahmed (2018) buttressed that individuals with learning disabilities may have problems that include attention, memory, and disorders in perception as well as reading, writing and mathematics. In their day-to-day activities, they may also have problems in organization, time management, abstract reasoning,

stepwise and motoric execution of daily tasks. This group of learners may face consistent academic failure and poor learning outcomes in the classroom despite consistent classroom instruction. Ahmed (2018) stated that with the emerging integration of technology into teaching and learning process, the learning success of pupils with cognitive disabilities could be guaranteed because assistive technology could offer them ample opportunity to improve performance of tasks that ordinarily they could not do. It provides opportunities for greater flexibility, interactivity and accessibility for engaging learning at the individual, group, and societal levels (Gbenga, 2019, Orim et al, 2023). Thus, the great chasm between the typically developing learners and those with learning disabilities in terms of educational achievement could be simply bridged with assistive technology.

Dwain and Volk (2018) observed that the education of children with learning disabilities has gone beyond the use of resources such as card board and artwork to adopting available high and medium assistive technological devices into classroom learning to improve mastery and productivity. Thus, assistive technology opens a world of possibilities for children with learning disabilities. By using technology, text that is perhaps poorly understood or not recognized can be read, defined, translated, captured, transformed, or linked to more information. Writing tasks, perhaps once blocked by mobility, cognitive, or expressive limitations, can be accomplished by speaking first, then editing with electronic tools. Attention and organizational skills, often the bane of active and creative minds of learners with learning disabilities, can be aided with organizational software and personal digital assistants. Technology, high, medium and low can provide access, previously unattainable to the content and processes of the general education curriculum for children with learning disabilities (Ansa and Kufre, 2018). Also,Lajira (2018) asserted that assistive technology can support both compensatory and remedial approaches for learners with learning disabilities. A compensatory approach for example, is when a student listens to a digital version of the book for English class to answer questions about it, with the goal of bypassing a reading problem, not of learning how to read. If a child with learning disabilities listens to the book or has a computer reading a scanned or digital version of the book while following along with the text and trying to learn unfamiliar words, this would be a remedial approach, designed to improve areas of deficiency.

For many children with learning disabilities, assistive technology is a necessity for their cognitive, social, and emotional development. However,it might also seem that the perception of teachers of children with learning disabilities in public and private schools may vary in terms of availability of assistive technology as well as its usage in the classroom. These categories of teachers, in addition to their own personal characteristics, are in schools that may have different characteristics in terms of information accessibility, financial capacity as well as learners' socioeconomic and sociocultural backgrounds (Ahmed, 2018). These indices may influence the perception of teachers on the availability, usage and benefits of assistive technology for pupils with learning disabilities. With the critical role of teachers not only to teach but to monitor and assist these children to ensure effective use and operation of these devices, they could be trusted to give valid assessment of assistive technology in terms of its availability, utilisation, benefits, barriers and bridges to it availability and utilisation in Nigerian classrooms.

Notably, despite the ability and significance of the AT devices in supporting the development of children with LD, teachers of children with LD still hold individual opinions based on certain indices that the availability and utilisation of assistive technology have remained a consistent struggle across schools (Anderson, 2017, Amodu, et al 2022). One would expect that schools should have well -equipped computer room with a knowledgeable resource teacher where children with learning disabilities can study or at least complete their home works under the supervision of a knowledgeable resource person. Also, teachers both in public and private school should have a personal computer and that reasonable access to assistive technology is given to the pupils during classroom instructions. This was not the case in most

schools. Today, with the advancement of technology, expansion of knowledge, as well as globalization issues, technology-enhanced learning becomes a central figure and most challenging, because it requires new planning and technological adaptation to cope with cultural dynamism. If pupils with learning disabilities are not familiar with the available help assistive technology offers, learning will continue to be unbearable and integration into the society very difficult. More also, the teachers' perceptions and readiness for the use of assistive technology in classroom instructions will determine to what extent pupils with learning disabilities can embrace the new dispensation. Thus, integration and application of assistive technology in classroom for pupils with learning disabilities has become a major concern in the school system (Gbenga, 2019).

Nevertheless, through concerted and committed efforts, barriers to effective utilization of assistive technology could be bridged. It may require planned efforts from all concerned stakeholders including the primary beneficiaries which are children with learning disabilities. Such efforts are a click that will upturn the digital divide that tends to slow down assistive technology utilisation and access to expanded core curriculum. It is against this background that this study is keen on investigating the availability, utilisation, benefits, barriers and bridges of assistive technology for pupils with learning disabilities.

Statement of the Problem

The availability and utilization of assistive technology for children with learning disabilities represent critical factors in enhancing their educational experiences and outcomes. However, there is a pressing need to investigate the extent of this availability and its effective utilization in educational settings. However, many children with learning disabilities may lack access to appropriate assistive technology tools, hindering their ability to engage effectively in the learning process and achieve their full potential. Also, disparities may exist in the distribution of assistive technology resources among different educational settings, resulting in unequal opportunities for children with learning disabilities. Equally, even when assistive technology is available, its underutilization due to factors like lack of awareness, training, or resources may persist, preventing children from reaping the full benefits. This study sought to address these issues by conducting a comprehensive assessment of the availability and utilization of assistive technology for children with learning disabilities. Through data collection and analysis, it aimed to provide valuable insights to guide educators, policymakers, and stakeholders in fostering an inclusive educational environment that maximizes the potential of these students.

Purpose of study

The purpose of this study was to assess the perception of teachers on the availability and utilization of assistive technology for children with learning disabilities Ibadan, Oyo State. Specifically, to ascertain the:

1. Availability of assistive technology for pupils with learning disabilities in selected schools in Ibadan, Oyo State.
2. Utilization of assistive technology among pupils with learning disabilities in Ibadan, Oyo State

Research questions

The following research questions were answered in the study:

1. What are the available assistive technologies for pupils with learning disabilities?
2. What are the perceptions of teachers on assistive technology utilization for pupils with learning disabilities?

Methodology

This study adopted ex post facto research design. The population of this study comprised all primary school teachers in private and public schools in the study area. The sample of this study consisted of one hundred and ninety-one (191) teachers in public and private primary schools. The participants were sampled from seven schools of which 4 were public schools and 3 were private schools. At least 25 teachers were selected from each school. The schools were selected purposively based on the evidence of inclusive education practices of accommodating children who are psychologically identified as having learning disabilities.

A checklist of 12 item titled Inventory Assistive technology in the classroom (IATC). The data collected were analysed statistically using descriptive statistics of percentage count.

Results

Research question one: What are the available assistive technologies for pupils with learning disabilities?

Table 1: Inventory of Assistive Technologies available for written language disabilities

Written Language Technologies:	NO. of schools	School type: Private	School type: Public	Frequency	Percentage
Speech synthesizers	0	0	0	0	0.00
Talking spell checks	3	2	1	7	3.67
Word prediction program	1	1	0	2	1.04
Abbreviation expanders	0	0	0	0	0.00
Proof reading programs	1	1	0	4	2.09
IPAD	7	3	4	61	31.94
Computers	7	3	4	117	61.27
Total				191	100

Table1 shows descriptive analysis of different assistive technologies for written language difficulties. The results reveal that 117 (61.27%) of the selected teachers of pupils with learning disabilities in reported the availability of computers for teaching and improving written language of pupils with learning disabilities, 61(31.94%) reported same for iPADs, 7(3.67%) for Talking Spell checks, 4(2.09%) for proof reading programs and 2 (1.04%) for Word prediction program but 0 (0%) for speech synthesizers and abbreviation expanders.Hence, the results revealed that the teachers of pupils with learning disabilities in area of written language perceived the availability of the following assistive technologies; Talking spell checks, Word prediction program, Proof reading programs, IPAD and Computers.

Table 2: Inventory of Assistive Technology tools available for Reading disabilities

Reading technologies:	No. of schools	School type: Private	School type: Public	Frequency	Percentage
Tape recorder	7	3	4	18	9.42
Variable speed recorders	1	1	0	2	1.05
Inspiration software	0	0	0	0	0.00
Kurzwell 3000	0	0	0	0	0.00
Audacity software	2	2	0	4	2.09
IPAD	7	3	4	62	32.46
Computers	7	3	4	105	54.97
Total				191	100.0

Table 2 reveals descriptive analysis of different assistive technologies for reading disabilities. The results reveal that majority 105(54.97%) of the selected teachers of pupils with learning disabilities reported the availability of Computers for teaching and improving reading fluency of pupils with learning disabilities, 62 (32.5%) for IPAD, 18 (9.42%) for Tape recorder, 4 (2.09%) for Audacity software and 0(0%) for Kurzwell 3000 and inspiration software.

In essence, the following assistive technologies were available for teachers, Tape recorder, Variable speed recorders, Audacity software, IPAD and Computers while inspiration software and Kurzwell 3000 were not available for improving reading abilities.

Table 3: Inventory of Assistive Technology tools available for Memory deficit and Executive Functioning disabilities

Memory/Executive functioning technology	No. of schools	School Type: Private	School Type: Public	Frequency	Percentage
Freedom database software	3	2	1	11	5.76
Information and data managers	2	2	0	4	2.09
Prezi	1	1	0	2	1.05
graphic organizers	0	0	0	0	0.00
Outlining programs	1	1	0	2	1.05
IPAD	7	3	4	61	31.94
Computers	7	3	4	111	58.11
Total				191	100.0

Table 3 reveals descriptive analysis of the perception of the teachers on the availability of different assistive technologies for memory deficit and executive functioning. Results reveal that more than half 111 (58.11%) of the selected teachers of pupils with learning disabilities reported that Computers are available in their schools for improving memory and executive functioning abilities, 61(31.94%) for IPAD, 11(5.76%) for freedom database software, 4(2.09%) for Information and data managers 2(1.0%) for Prezi outlining programs and 0(0%) for graphic organizers .This is not surprising as some of the software /programmes(e.g. graphic organizers) are in-built in the computer.

The teachers reported the availability of Freedom database software, Information and data managers, Prezi, Outlining programs, IPAD and Computers for pupils with memory and executive functioning disabilities. None of the teachers reported the availability of Graphic Organizers to assist their students with memory deficit and executive functioning disabilities.

Table 4: Inventory of Assistive Technologies available for Listening and Attention deficit

Listening /Attention deficit technology	No. of schools	School type Private	School type Public	Frequency	Percentage
Optical character recognition	0	0	0	0	0.00
Personal FM device systems	2	2	0	6	3.14
Tape recorders	4	2	2	4	2.09
Screen readers	1	0	1	2	1.05
Audio books	2	2	0	3	1.57
IPAD	7	3	4	60	31.41
Computers	7	3	4	116	60.73

Total	191	100.0

Table 4 reveals descriptive analysis of different assistive technologies available for listening and attention deficit. The results reveal that more than half 116 (60.73%) of the selected teachers of pupils with learning disabilities reported the availability of Computers for assisting attention and listening abilities of pupils with learning disabilities, 4 (2.09%) for Tape recorder, 60 (31.41%) for IPAD, 6 (3.14%) for Personal FM device systems, screen readers 2(1.05%), Audio books 3(1.57%), while none of the teachers reported the availability of Optical character recognition.

The available assistive technology in schools for listening and attention deficits were personal FM device system, Tape recorders, Screen readers, audio books, Ipads and computers. There was no availability of optical character recognition.

Table 5: Inventory of Assistive Technology available for Spelling and handwriting difficulties

Spelling and Handwriting Technology:	No. of schools	School type Private	School type: Public	Frequency	Percentage
Portable word processors	2	1	1	2	1.05
Alternative keyboards	5	2	3	6	3.14
Pencil grips	6	3	3	50	26.18
Speech-to-text devices	0	0	0	0	0.00
Word-prediction/auto-correct software	7	3	4	29	15.18
Computers					
IPAD	7	3	4	44	23.04
Computers	7	3	4	60	31.41
Total				191	100.0

Table 5 reveals descriptive analysis of different assistive technology available for spelling and handwriting disabilities. The results reveal that 60 (31.41%) of the selected teachers of pupils with learning disabilities reported the availability of computers for improving the handwriting and spelling abilities of pupils with learning disabilities, 44 (23.04%) for IPAD, 50(26.18%) for pencil grips, 29 (15.18%) for Word-prediction/auto-correct Software. None of the teachers reported the availability of speech-to-text devices for pupils with spelling and handwriting difficulties.

In total, the result showed that Portable word processors, Alternative keyboards, Pencil grips, Word-prediction/auto-correct software, IPADs and Computers were available in the schools while speech to text devices were not available.

Table 6: Inventory of Assistive Technology available for Mathematical/Calculating disabilities

Mathematics technology:	No. of schools	School type: Private	School type: Public	Frequency	Percentage
Talking Calculators	7	3	4	36	18.85
Electronic math work sheets	6	3	3	9	4.71
Graphing calculators	5	3	2	13	6.81
Math Dictionary for kids	2	2	0	2	1.05
IXL Math	1	1	0	3	1.57
IPAD	7	3	4	24	12.56
Computers	7	3	4	104	54.45
Total				191	100.0

Table 6 is a descriptive analysis of different assistive technologies available for mathematical/calculating disabilities. The results revealed that 104 (54.45%) of the selected teachers of pupils with learning disabilities reported the availability of computers for assisting pupils with mathematical disabilities, 36(18.85%) for Talking Calculators, 24(12.56%) for iPads, 13 (6.81%) for Graphing Calculators, 9 (4.71%) for electronic math work sheets, 2((1.05%) for math dictionary for kids and 3(1.57%) for IXL Math. In total, Talking Calculators, Electronic math work sheets, Graphing calculators, Math Dictionary for kids, IPAD, IXL Math, and Computers were available in the schools for improving mathematical and calculating abilities of pupils with learning disabilities.

Research question 2: What is the perception of teachers on assistive technology utilization for pupils with learning disabilities?

This was analysed using descriptive statistics of frequency and percentages

Table 7: Descriptive analysis of the perceptions of teachers on the utilization of assistive technology for pupils with learning disabilities.

Statement (AT Tools)	Never	Rarely	Sometimes	Often	Always	**Average %**
Writing Language Technologies	44(23.03%)	13(6.81%)	103(53.93%)	15(7.85%)	16(8.38%)	19.24
Reading technologies	40(20.94%)	99(51.83%)	26 (13.61%)	22(11.52%)	4(2.09%)	19.76
Organization / Memory Technology	41(21.47%)	34(17.80%)	7(3.66%)	99(51.83%)	10(5.24%)	19.63
Listening technologies	25(13.09%)	28(14.66%)	13 (6.81%)	26(13.61%)	99(51.83%)	21.73
Handwriting technologies	34(17.80%)	112(58.64%)	18(9.42%)	14(7.33%)	13(6.81%)	20.55
Mathematics technologies	43(22.51%)	40(20.94%)	92(48.17%)	6(3.14%)	10(5.24%)	19.37

The results on table7 revealed that in terms of assistive technologies that are often and always utilised, listening technologies ranked highest. This was followed in a decreasing order of

utilization by Organization/Memory Technologies, Writing Language Technologies, handwriting technology, reading technology and the least was Mathematics). It is important to note that about 52% of the respondents believed that assistive technology for reading is rarely used which means it is used once in a week. The same applied to handwriting technology where about 59% asserted that assistive technology is used for hand writing for about once a week.

Discussion findings

This study took inventory of assistive technologies available in schools for pupils with learning disabilities. Many AT tools for the different areas of learning disabilities such as written language, reading, memory deficit and executive functioning, attention, spelling and handwriting and mathematics were considered. The analyses revealed that not all the tools required for addressing the different areas of learning disabilities were available in all schools. For written language disabilities, there were no speech synthesizers and abbreviation expanders while talk spell checks, word predictions programs and proof reading were barely available, ipad and computers were mostly available. In Reading; inspiration software, kurzwell 3000 were not available while Ipad computers and tape recorders were primarily available. The results also revealed that for Memory deficit and executive functioning, graphic organizers were not available, again the dominant ATs were the ipads and the computers while every other type of AT were barely available. Similar explanations go for attention deficits, spelling and handwriting. For mathematics the major AT tools available were computers and talking calculators, ipad was hardly available. The findings of this study are in line with Samaila, Chukwwuemeka and Babatunde (2020) who conducted a study on assessment of the availability, adequacy and conditions of high tech assistive technology resources in special education schools in North-west, Nigeria whose work revealed that 56% of the high-tech assistive technology resources necessary for quality teaching and learning in special education schools were not available and the 44% of the resources found available were grossly inadequate to guarantee better education delivery for students with learning disabilities.

The findings of the current study also align with Vitalis and Moses (2015) who reported that assistive technology devices are either not available or insufficient possibly due to the high price of the assistive resources and this prevents pupils with learning disabilities from active participation in the classrooms. Further in support of this study is the work of Matter and Eide (2018) who investigated access to assistive technology in two African countries namely Botswana and Swaziland and discovered that in Botswana 44% of people who needed AT did not receive it and in Swaziland 67% did not receive. This may not be surprising given the lower development indicators for Swaziland compared to Botswana. As noted earlier despite the inadequacy of these assistive technology tools, Ipad and computers seem to be more available in schools for people with learning disabilities. Congruent to these findings, Yusuf (2022) reported that 75.6% of 115 teachers involved in his study indicated the availability of computers though some of them were outdated. Furthermore, in line with this current study Shikden (2015) on availability and functionality of assistive technology in North central Nigeria revealed that more than half of the respondents agreed that computers were available but other tools like the electronic organizers, Math and talking dictionaries were completely absent. The availability of computers even in the absence of every other needed assistive technology in schools may be due to the fact that computers have a lot of in built functions, for example, word processors, spell checkers just to mention a few. More also, software can be purchased or even downloaded free for an upgrade. The use of computers therefore solves the problem of carrying different gadgets that perform different functions. In addition, it saves the confusion that a pupil with learning disabilities might encounter if required to use different tools every day for different areas that the child has challenges.

This study equally revealed that though the schools have made appreciable efforts in acquiring assistive technologies for children with learning disabilities, the actual implementation in classroom instructional delivery has remained a problem. This problem of utilization of assistive technologies in the classroom as shown in the study is a multifactorial challenge which may be attributed to some barriers. Apart from listening technology with over 51% utilization, the rest of the subject areas have less than 10% utilization with the lowest being reading technology. This is very disturbing seeing that reading disability constitute about 80% of learning disabilities (Orim and Uko, 2017) The implication is that if reading problem is not properly addressed, learning disabilities will continue to be a problem. There is hardly much that you can achieve in this modern world if you cannot read. Also, technologies for Mathematics are poorly utilized, for scientific discoveries and development the knowledge of mathematics is very essential. Low utilization of written and handwriting technologies does not encourage building up the power of expression especially for pupils with learning disabilities who are already struggling. If there is any technology that pupils with LD need to be familiar with, is organization and memory technology which provides the essential tools that can help pupils plan their work and also to retain and retrieve information. The overall utilization of AT tools for pupils with learning disabilities is low and calls for urgent attention.

Conclusion

The perception of teachers in the areas covered by this study revealed that the availability and the utilisation of the assistive technology in primary schools is not adequate. Different types of assistive technology are made available in schools but not in sufficient quantities which limits the usage in both public and private schools. Teachers in the public schools reported high utilization of assistive technology than the private schools. However, more than half of the participants in this study revealed that Assistive technology facilitates learning by compensating for the pupils' cognitive deficiencies which eventually may result to good results and overall healthy experience in school. The study also reveals that the most used form of assistive technologies are the iPADs and the computers.

Recommendations

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

1. Education stakeholders should commit more resources to providing assistive technologies for children with learning disabilities.
2. More funding options should be explored by schools to meet AT needs of children with learning disabilities.

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