Integrating Assistive Technology For Students With Learning Disabilities In Universities In Nigeria

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Abstract- The study examined how assistive technologies are integrated to students with learning disabilities in universities in Nigeria. Two research questions were posed to guide the study. The study adopted a descriptive survey design. The study was carried out in Northern Region of Nigeria. The population of the study comprised a total of 269 respondents with learning disabilities in Northern Region of Nigeria. The instrument for data collection was structure questionnaire developed by the researchers. There was no any sampling technique since the populations was manageable. A 20 items structure questionnaire titled: Integrating Assistive Technology for Students with Learning Disabilities (IATSLD) was used as the instrument for data collection. The validity of the instrument was ascertained by subjecting the initial draft to face validation. The instrument was validated by three experts. The reliability of the instrument was further ascertain using Cronbach Alpha method to determine the internal consistency estimates for the items and the generated an overall reliability coefficient of 0.78 which shows that the instrument was reliable and can be used to collect the required data for the study. Data collected were analyzed using mean and standard deviation for the research questions. The findings of the study revealed challenges that hinder the use of assistive technology for students with learning disabilities. These include: instructors' views, lack of availability of resources, lack of trained instructors, lack adequate planning and collaboration time for instructors, absence of technical assistance, instructors working with outdated computers, lack of collaboration with family, lack of ICT specialist to teach students with learning disabilities, and limited flexibility in training options for children with learning disabilities. Based on the findings, it was recommended that parents of the children with learning disabilities should be supportive in terms of the provision of assistive technology devices for use in school.

Index Terms- Assistive technology, Students, Learning disabilities, Nigerian Universities

I. INTRODUCTION

Overseeing students with learning disabilities cause challenge to both families and professionals at homes and in schools. In an effort to discover the way outs to these challenges in this modern generation, one of the major challenges facing special education teachers and other professionals in meeting the social, behavioural, cognitive, perceptive and motor needs of students with learning disabilities in the classrooms is by using technology, it's appropriate use, how to select assistive technology, where to get it, use it and how to evaluate its efficiency (Liman, Adebisi, Jerry & Adewale, 2015). Assistive Technology (AT) is a derivative of Information and Communication Technology with the history linked to computer. History of computer was dated back to 1970s with the rise of micro-computers, with its basic concept traced to 20th century with the effort of Military and industries in the development of electronics, computers and information theories. Adebisi (2014) gave account that in Nigeria, the history is not clear, as there was no documented evidence in the history of development of education, but possibly the effect was made manifest on teaching aids and its improvisation like charts, boards, specimen, cards and collection of real objects, which later transformed to the demonstration of institutional support for the use of audio-visuals in late 1980s. Over the past decades, education sector has gained popularity of technology and expanded access to it. For a generation of young people, technology, particularly the Internet, has assumed a substantial stake in their social and educational lives (Owobi, 2008).

Assistive technology is as any equipment, item or product system either obtained, off the shelf, commercially or customized and used to maintain, increase or improve functional capacity for a person with disabilities (Alper, & Raharinirina, 2006). Assistive technology (AT) can be defined as any piece of equipment or device that may be used by a person with a disability to perform specific tasks, improve functional capabilities, and become more independent (Netherton & Deal, 2006). Assistive technology can be used in the classroom to help assist students become successful in tasks otherwise not possible. Operationally, assistive technology is defined as of equipment either acquired commercially, off the shelf, modified, or customized and utilized to enlarge, sustain, or get better useful competence for person with disabilities (Johnston, Beard, & Carpenter, 2007). Special education teachers, especially in middle and high school, should be exposed to technological tools that can help students to bypass their academic weaknesses (Mull & Sitlington, 2003). Teachers will help students by training them to use portable and cheap tools that, in most cases, could make students live and behave more independently when they leave

high school, which will increase their chances of maximizing their degree of achievement and independence, though it will still be behind their peers without disabilities (Blackorby & Wagner, 1996). On the other hand, a learning disability, according to the Individuals with Disabilities Act (IDEA), is a disorder in one or more of the basic cognitive abilities involved in understanding or using spoken or written language. This could lead to an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, reading disabilities, and developmental aphasia. The term does not include children who have learning problems that are primarily the result of visual, hearing, or motor handicaps; mental retardation; emotional disturbance; or environmental, cultural, or economic disadvantage. Learning disabilities cannot be cured, but children with learning disabilities grow up with learning differences and with persistence of proper instructions and assistive tools, they could greatly improve and attain their potentials (Raskind, 2000).

For instance, training students to use a calculator can be more practical than beginning to teach middle and high school student's basic math (like adding two numbers). Furthermore, if students can use the calculator but have difficulty saying numbers correctly, they can use more advanced tools, such as a talking calculator, which helps students to say numbers correctly and can be used whenever or wherever they need it (Lankutis, 2004). The gradual involvement of Nigeria in this global trend, however, is highly commendable. Zayyad (2019) and Adebisi (2014) maintained that Section 11, subsection 101 of the National Policy on Education has mandated the tiers of government to institute educational resource centres, which "shall provide appropriate Information and Communication Technology (ICT) facilities to ensure that the benefits of the virtual library permeate all levels of education in Nigeria" with the inclusion to "provide for the need of special education and serve as foci for educational innovation" (NPE, 2004). ICT has become a very important part of the educational delivery and management processes and to great extent facilitates the acquisition and absorption of knowledge, and therefore could provide extraordinary opportunities to developing countries for enhancing their educational systems particularly for children with special needs. To really achieve these policies, the use of ICT by children with special needs in the family and school lives has become imperative. With these, the adoption and use of Assistive Technology (AT) is becoming popular and required attention of families and professionals as a result of its potential for improving the lives of children with learning disabilities. Right from the global embrace of computers, communication devices to environmental controls; the use of technology present many children with disabilities the necessary tools to be more successful in school, at work, and at achieving independence in daily living. Certainly, opportunities now abound nowadays to some children with disabilities with the support of new and emerging technology, raising new hopes, which had in the past unavailable.

As very important as AT to the learners at all levels of education has been, the use of computer and other technologies, as extended to children with learning disabilities, have benefited and enhanced lives and given many children with learning disabilities options of intervening in their various educational and cognitive problems, with available resources to assist both teachers and learners overcome classroom teaching–learning challenges. It is opined by Nkwoagba (2011) that technology can open doors and break down barriers for children, youth, and adults with disabilities. This could be whether in the classroom or workplace, assistive technology, including devices, software, recordings, and much more, can increase, maintain, or improve the capabilities of individuals with learning disabilities. Also, technology that is used for children with learning disabilities, such as spell check, can be principally useful to people with learning disabilities (Adebisi, Liman &Longpoe, 2015). This paper therefore will answer why the use of assistive technology for students with learning disabilities; discuss various types of assistive technology: written language, reading, listening, memory and mathematic technologies; and the need of selecting the right technology for the students with learning disabilities will be highlighted out.

Importantly, the proper means of integrating or implementation of assistive technology in the classroom to assist students with learning disabilities in the tasks they otherwise might not able to compete which requires training for the students and instructors. Thus, if teachers are not trained properly, then assistive technology may not be integrate properly, or may not be implemented at all. Importantly**,** IDEA (2004**)** demands the schools to examine students assistive technology needs, buy the technology, and teach the instructors and students to use the assistive technology. Notwithstanding the legal obligation to offer assistive technology, a number of barriers have restricted the use of assistive technology. Sami (2016) reviewed present literature on the utilization of assistive technology and identified several obstacles using assistive technology for students with learning disabilities. These obstacles include the instructors' views, lack of availability of resources, lack of instructor's training and student abandonment of technology. At present, barriers exist as well. As argued by Mason, (2014) there are barriers to AT use on the implementation and accessibility side, including issues specifically that instructors face such as troubleshooting support for malfunctioning technology, adequate planning and collaboration time for teachers, systems to check out technology for students, and an integrated approach across curriculum. These and other issues need to be addressed if progress is to be made. Furthermore, for instructors, many times the primary goal is for the benefit of the student, so even in spite of Individual Education Plan (IEP), which outlines the individual resources required for that every child to accommodate their needs mandates for the use of assistive technology. When instructors observe that barriers associated with integrating assistive technology interfere with students' education, they could likely abandon assistive technology. This is an underlying factor of the importance of dealing with such barriers.

Furthermore, to be specific, in a study done by Rapp (2005), reported that the prime barrier to assistive technology use within the classrooms was the absence of technical assistance. On the same note, in a study done by Rohaan, Taconis and Jochems (2009), technical problems including computer malfunctioning, internet connections, slow internet connections, as well as, instructors having to work with outdated computers

were found to be a prime barriers for instructors. Moreso, another barrier to effective use of assistive technology, according to Schoepp (2005), is the lack of collaboration with family. More often than not, assistive services and devices are most likely to be effectively identified and adopted in social and academic environments when individualized educational program teams handled family objectives connected to assistive technology (Sami, 2016). In another study carried out by Mishra, Sharma and Tripathi (2010), also detailed some of the problems towards effective use of AT in teaching students with learning disabilities such as: lack of specialized ICT teachers for the students with learning disabilities; limited flexibility in training options for children with learning disabilities; limited availability of specialized disabled friendly hardware and software resources in developing countries; lack of formal involvement of the government organizations and support structure for ICT for the persons with learning disabilities; attitude barriers towards children with disabilities; lack of appropriate disabled legislation and policies and their implementation; and limitation of finances. Importantly, in other to address the problems or barriers for effective use of assistive technology in teaching students with learning disabilities, the next step of the study is to highlight some of the assistive technologies or tools that could help students with learning disability.

Studies carried out by Adebisi, Liman and Longpoe (2015) listed various types of assistive technology for students with learning disabilities. According to the author, assistive technology is developed capable of addressing many types of learning difficulties in the society. Higgins and Raskind (2000) stated that a child who has difficulty in writing could compose a school report by dictating it and having it converted to text by special software. Moreso, a child who struggles with arithmetic problem can use a hand-held calculator to keep score while playing a game with a friend. Also, a teenager with dyslexia ay benefit from AT to read aloud from the textbook guide. A child who cannot speak may need a communication device such as a language board or a device with a speech synthesizer to participate in class. Additionally, a child with a learning disability may need a computer programmes to learn to read. However, below are skills listed by Adebisi, Liman and Longpoe (2015) and how AT could help to solve the learning skills.

However, the first AT as listed by Adebisi, Liman and Longpoe (2015) is written Language assistive technologies. These are written language AT tools that help children with learning disabilities which include: Spell Checkers Tool: They are part of word processing programmes with vary sizes which could be portable or stationed. They could be attached to word processors to scan written documents and display to the user or children the misspelled words and speak the words by ways of speech synthesizer. Proofreading Tool: The tool, check errors in grammar, capitalization and word usage. The errors are identified on the computer screen and the child corrects. Speech Synthesizers: These are tools that give children the opportunity to hear spoken text on the computer monitor.
Speech Recognition: This system allows the child to speak to the computer through microphone, and the spoken words show as texts on the computer monitor.

The Reading Assistive Technologies include: Microsoft Word Tool: One of the easiest differentiation tools for a reading passage is a software programme that most teachers have readily at hand, Microsoft Word. Tape Recorders: These tools are used to play audio taped text by children with reading disabilities. The child listens to the recorded texts in books or printed materials rather than reading it. Speech Synthesis: This tool can serve the purpose of reading engine. It could be available on computer disc loaded to the computer and then the child read back by the speech synthesizer. Optical Character Recognition: This tool could be connected with speech synthesis. It enables the child to type printed text to the computer, while the speech synthesizer reads the text back and aloud for the child to hear and alongside see the text. Variable Speech Control (VSC): This tool is in form of tape recorder, which enable the child to play the texts recorded in audio tape very fast than the originally recorded, with all the sounds of the words still intact (Adebisi, Liman & Longpoe, 2015).

The Mathematics Assistive Technologies include: Electronic Mathematics Worksheets: These worksheets could assist children with arithmetic problems to arrange, ally and route through the basic mathematical sums with the use of computer. Talking Calculators**:** These are tools used to speak number, symbols and other operation keys with the use of speech synthesizer, especially when a child presses the keys (Adebisi, Liman & Longpoe, 2015).

The Listening Assistive Technologies include: FM Listening Systems: These tools are used with the help of a small-sized transmitter unit, together with the microphone. The tool redirects child's voice straight to his or her ear. This makes the child/speaker's voice louder.

Tape Recorders: These tools are used by children with listening problems to capture spoke information of the speaker or teacher's lesson (Adebisi, Liman & Longpoe, 2015).

The last but not the list, is the Memory Assistive Technologies, which include: Personal Data Managers: These data managers could be in form of software packages, which could be used for a computer or as electronic devices. Free-form databases: These databases allow children with memory problems to type or enter notes or pieces of information into the computer, rather than or as written down in a piece of paper. Prewriting organizers: The writing process involves a number of stages. Many children have difficulty with the preparation stage, which integrates brainstorming, clustering, and listing ideas, themes, or keywords. Some children with memory problems find graphic organizers helpful in mapping ideas during the planning stage (Adebisi, Liman & Longpoe, 2015).

Importantly, for individuals to choose the right technology for students with learning disabilities, there is no fast rule in choosing the right ones for the child even though, the availability of these tools poses problems for instructors and parents in the developing world on like Nigeria, as the tools are scarce and not provided for in schools, and not available in most of the local shops and markets, for them to choose and purchase (Liman, Adebisi, Jerry & Adewale, 2015). However, the few stores and markets found the cities and metropolis sell at high cost for parents and schools. This places children with disabilities in these areas the choice of wrong AT that would enable adequate supports. It is also important to note that, the developing countries lack experts to manage and apply these devices, as teachers managing children instructions are ill-trained on the use

of assistive technology. However, this leads the teachers with learning disabilities to improvise or source for local tools in lieu of low-tech devices.

To achieve this commendable achievement in improving the learning of students with learning disabilities, Allan (2015) identified the principles behind the introduction of this technology into the teaching and learning process. These include: assistive technology can only enhance basic skills, and not replacing them; assistive technology for students with disabilities is more than an educational tool; it is a fundamental work tool that is comparable to pencil and paper for non-disabled children; students with disabilities use assistive technology to access and use standard tools, complete educational tasks, and participate on an equal basis with their developing peers in the regular educational environment; the use of assistive technology does not automatically make educational and commercial software/tools accessible or usable; an assistive technology evaluation conducted by a professional, knowledgeable in regular and assistive technology, is needed to determine whether a child requires assistive technology devices and services and should be specified in the children's instructional plans; assistive technology evaluation must address the alternative and augmentative communication needs; and to be effective, an assistive technology evaluation should be ongoing process (Raskind, 2000). To achieve this commendable achievement in improving the learning of students with learning disabilities, there is need to look at the challenges that hinder the use of assistive technology for children with learning disabilities. Therefore, the study focuses on instructors and their attitudes toward using assistive technology in the classroom to teach students with disabilities and the level of training or professional development on how to successfully integrate technology in the classroom.

Purpose of the Study

The general purpose of the study is to examine how assistive technologies are integrated to students with learning disabilities in universities in Nigeria. Specifically, the study sought to:

1. Ascertain various types of assistive technology to help students with learning disabilities.
2. examine problems that hinder the use of assistive technology for students with learning disabilities.

Research Questions

The following research questions guided the study

1. What are the various types of assistive technology to help students with learning disabilities?
2. What are the problems that hinder the use of assistive technology for students with learning disabilities?

II. MATERIALS AND METHOD

The study adopted a descriptive survey design. The study was carried out in Northern Region of Nigeria. The population of the study comprised a total of 269 respondents with learning disabilities in Northern Region of Nigeria. The instrument for data collection was structure questionnaire developed by the researchers. There was no any sampling technique since the populations was manageable. A 27 items structure questionnaire titled: Integrating Assistive Technology for Students with Learning Disabilities (IATSLD) was used as the instrument for data collection. A four point rating scale of Strongly Agree (SA) – 4 points, Agree (A) – 3 points, Disagree (D) – 2 points and Strongly Disagree (SD) – 1 point, was used for responses. 2.50 were the criterion mean. The decision rule was that any item with mean score from 2.50 and above would be accepted while items with mean scores below 2.50 would not be accepted. The validity of the instrument was ascertained by subjecting the initial draft to face validation. Out of the three experts, one is from the Department of Psychology and Guidance and Counselling, School of General Education, Aminu Kano College of Islamic and Legal Studies, Kano state; one from the Special Education Unit, University of Nigeria, Nsukka and one from Measurement and Evaluation Unit, Department of Science Education, University of Nigeria, Nsukka. The reliability of the instrument was further ascertain using Cronbach Alpha method to determine the internal consistency estimates for the items and the generated an overall reliability coefficient of 0.78 which shows that the instrument was reliable and can be used to collect the required data for the study. Data collected were analyzed using mean and standard deviation for the research questions.

III. RESULTS

Research Question One: What are the various types of assistive technology to help students with learning disabilities?

Table 1: Mean and Standard Deviation of the rating on various types of assistive technology to help students with learning disabilities

S/N	Item Statement	X	SD	Decision
1	Spell Checkers Tool	3.00	0.43	**A**
2	FM Listening Systems	2.66	0.45	**A**
3	Tape Recorders	2.67	0.45	**A**
4	Personal Data Managers	3.22	0.41	**A**
5	Free-form databases	2.85	0.44	**A**
6	Prewriting organizers	2.77	0.44	**A**
7	Talking Calculators	2.99	0.43	**A**
8	Electronic Mathematics Worksheets	2.67	0.45	**A**
9	Variable Speech Control	2.76	0.44	**A**

10	Optical Character Recognition	3.11	0.48	**A**
11	Tape Recorders	2.89	0.43	**A**
12	Microsoft Word Tool	3.14	0.42	**A**
13	Speech Recognition	3.17	0.42	**A**
14	Speech Synthesizers	2.69	0.45	**A**
15	Proofreading Tool	2.68	0.45	**A**
	Aggregate Mean Scores	**2.82**	**0.44**	**A**

Table 1 shows the mean rating of the respondents on various types of assistive technology to help students with learning disabilities. It shows that the mean rating on item 1 to 15 is more than the 2.50 criterion mean. This is indicates that the respondents agree statements of item 1 to 15 are types of assistive technology to help students with learning disabilities. However, the overall mean ratings of 2.82 with a standard deviation of 0.44 showed that spell checkers tool, proofreading tool, speech synthesizers, speech recognition, Microsoft word tool, tape recorders, optical character recognition, variable speech control , electronic mathematics worksheets, talking calculators, fm listening systems, tape recorders, personal data managers, free-form databases and prewriting organizer are various types of assistive technology to help students with learning disabilities.

Research Question Two: What are the problems that hinder the use of assistive technology for students with learning disabilities?

Table 2: Mean and Standard Deviation of the rating on problems that hinder the use of Assistive Technology for students with learning disabilities

S/N	Item Statement	X	SD	Decision
16	Lack of collaboration with family.	3.25	0.41	**A**
17	Lack of availability of resources	3.11	0.42	**A**
18	Lack of instructor's training	3.22	0.41	**A**
19	Student abandonment of technology	2.89	0.43	**A**
20	Lack of adequate planning for instructors	3.00	0..43	**A**
21	Absence of technical assistance	2.66	0.45	**A**
22	Attitude barriers towards children with disabilities	3.44	0.40	**A**
23	Lack of appropriate disabled legislation and policies and their implementation	2.44	0.46	**A**
24	Limited availability of specialized disabled friendly hardware and software resources	2.58	0.45	**A**
25	Lack of specialized ICT teachers for students with learning disabilities;	2.86	0.44	**A**
26	Limited flexibility in training options for children with learning disabilities	2.99	0.43	**A**
27	Instructors working with outdated computers	3.10	0.42	**A**
	Aggregate Mean Scores	**2.96**	**0.43**	**A**

Data presented in table 2 showed the mean rating of the respondents on problems or obstacles that hinder the use of assistive technology for students with learning disabilities. Based on the results, the respondents' mean responses are above the cut-off point of 2.50 criterion mean. The results on the table shows that the respondents agree to statements of items from 16 – 27 as the problems or challenges that hinder the use of assistive technology for students with learning disabilities with the mean rating of 2.96 and standard deviation of 0.43 respectively.

IV. DISCUSSION

The findings of the study revealed relevant assistive technology tools to help students with learning disabilities. These tools include: spell checkers tool, proofreading tool, speech synthesizers, speech recognition, Microsoft word tool, tape recorders, optical character recognition, and variable speech control, electronic mathematics worksheets, talking calculators, fm listening systems, tape recorders, personal data managers, free-form databases and prewriting organizer. The findings are an agreement with the views of Adebisi, Liman and Longpoe (2015) who listed various types of assistive technology for students with learning disabilities. According to the author,

assistive technology is developed capable of addressing many types of learning difficulties in the society. The findings is also in line with the viewed of Higgins and Raskind (2000) who posited that a child who has difficulty in writing could compose a school report by dictating it and having it converted to text by special software.

The findings of the study revealed challenges that hinder the use of assistive technology for students with learning disabilities. These include: instructors' views, lack of availability of resources, lack of instructor's training, student abandonment of technology, lack adequate planning and collaboration time for teachers, systems to check out technology for students, absence of technical assistance, instructors having to work with outdated computers, lack of collaboration with family, lack of specialized ICT teachers for the students with learning disabilities, and limited flexibility in training options for children with learning disabilities. The findings are consistent with the view of Mishra, Sharma and Tripathi (2010) who detailed some of the problems towards effective use of AT in teaching students with learning disabilities such as: lack of specialized ICT teachers for the students with learning disabilities; limited flexibility in training options for children with learning disabilities; limited availability of specialized disabled friendly hardware and software resources in developing countries; and lack of formal involvement of the government organizations towards ICT facilities to enhance students with learning disabilities in the classroom.

V. CONCLUSION

Globally, individuals have been trained and very helpful with the present tools available to support students with learning disabilities in the society. The findings has investigated how the use information and communications technologies cum assistive technology can influence the learning of students with special needs and as well revealed that technology can take important role in their learning process. Specifically, the use AT can assists students with learning disabilities to: build up independence in academic; participate in the classroom discussion; gain access to peer-groups and teachers; gain access to full diversity of educational options and as well secure high levels of independent learning. Conversely, selecting the accurate AT for students requires carefulness, time and endurance. Thus, for every student with learning disabilities, obliges assistive technology can reduce their difficulty in learning.

VI. RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. They should be training for students with learning disabilities in using the assistive technology properly to help them increase their educational gains.
2. Low technology tools should be the first option when looking for assistive technology that will help to promote students with learning disability.
3. The most expensive tools are not always the best choice to determine on student's needs and prior skills.
4. Small adjustments to existing technologies would make a difference for students with disabilities.
5. The use of assistive technology tools to teach students with learning disabilities with help to eliminate difficulty to learning.
6. Parents of the children with learning disabilities should be supportive in terms of the provision of assistive technology devices for use in school.
7. Technological devices should not be abusively used; rather it should be appreciated in educational endeavour of individual learners with disabilities.

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