

## **Availability of Assistive Technologies in Nigerian Educational Institutions**

**By**

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### **Abstract**

*This study investigated the availability of assistive technologies for special education in Nigerian educational institutions. The respondents comprised 1,115 teachers drawn from primary, secondary and tertiary institutions in Nigeria. A researchers-designed instrument was used to collect data. Results indicated that majority of the institutions do not have required assistive technologies for students with disabilities. The implication is that assistive technologies which are essential for quality education for people with disability are not being utilized in Nigeria. Recommendations were outlines regarding the use assistive technologies in both special and mainstream educational institutions in Nigeria.*

### **Introduction**

Education is globally recognized as the bedrock for individual and national development. This especially true irrespective of ability or disability (Bosick, Starcher, Kelly, & Hapke, 2008). In general education classrooms, teachers work with children who have different intellectual, physical, sensory, or emotional abilities (Heward, 2009). Some children may have visual, hearing, or physical difficulties leading to some not been able to walk, manipulate objects, use one or both arms and legs, run or maintain balance. 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”. The document noted under section 5, subsection 4(2) among others advocated improvement of facilities and equipment in educational institutions to facilitate the education of the disabled; establishment of a National Institute of Special Education, strengthening of cooperation and collaboration among relevant authorities, organs, institutions to ensure early and coordinated education of the disabled; and interaction and exchange between disabled children in special schools and children in ordinary schools, among others.

Special education is defined as “a formal special education training given to people (children and adult) with special needs... who fall into the categories: the disable, the

disadvantaged and the gifted” (Federal Republic of Nigeria [FRN], 2004). Thus, special education deals with the education of the disabled who may have visual impairment, hearing impairment, physical and health impairment, mental retardation, emotionally disturbed, speech impairment, learning disabled or multiple impairments.

Disability defines persons with impairments (blind or visually impaired, deaf or hard of hearing), learning disabilities, motor functioning problems, or neurological impairments (Bosick, Starcher, Kelly, & Hapke, 2008). Advances in technology have provided a surfeit of opportunities, tools, and resources that can address the needs of individuals with various forms of disabilities so that they can be educated. Assistive technologies are hardware, software and devices, which help people with disabilities and special needs to overcome the challenges of communication and learning. Adaptive technology is the use of hardware and software to assist individuals who have difficulty accessing information systems using conventional methods, increasingly referred to as “enabling technologies” or “assistive technology” (Clarke & Kirton, 2003; Hogg, Minikan, & Sullivan, 2005; Worth, 2001).

Certain ICT applications have been shown to have positive effects on the educational development of students exhibiting great variety of special needs (blind, deaf, learning disabled students, etc.). Some of these are available either as hardware or software. These include synthetic speech device which gives students with visual impairments direct access to information through voice output; reading devices like the Xerox/Kurzweil personal reader a computer-based device that converts printed material into synthetic speech; paperless Braille equipment that stores information on a cassette tape, on a disk or in a micro computer and presents it tactually on a play back unit with a Braille display strip; and Optacon a small electronic device that converts print into vibrating textual images, Braille note taking devices that allow individuals to take notes in Braille and review them using a speech synthesizer, and so on (Osatuyi, 2003). Others include overlay keyboard that can provide visually impaired students with a combination of overlays, which can enhance access when used with speech feedback or visual representation; scanners that can scan text into a computer for enlargement on the screen, conversion to Braille or ‘read’ aloud by a speech synthesizer attached to the computer. Speech input and output software which enables digital speech to be built into programmes such on-screen grids and word processors, calculators, thermometers and electronic dictionaries with in-built speech (British Educational Communication Technology Agency [BECTA], 2001). Also, there are trackball which is easier to control than a mouse; and standard graphics tablet for touching locations directly with a pen which is easier than sliding a mouse. Others include, head tracking, screen magnifier software that enlarges everything on the screen to a more manageable size, screen reader software that reads text out loud (Bosick et al., 2008).

The disabled can acquire education in the integrated/mainstream schools or through special schools. Yuen and Westwood (2001) stated that the terms integration and mainstream are virtually synonyms, referring to the placement of a student with a disability or difficulty into ordinary school environment and regular curriculum. The students usually receive some additional support to help them do the required work in the classroom (Mittler, 1995). Integration in the mainstream enables students with disabilities to benefit from the stimulation

of mixing with relatively more able students thus they have the opportunity to observe higher models of social academic behaviour (Elkins, 1998; Knight, 1999).

The levels in applying the assistive technology application depends on whether the item is to be used personally, developmentally or as instructionally necessary (Judd-Wall, 1999). Personally refers to assistive technology as devices that are used by an individual student such as a pair of colour blind glasses to enable learners to effectively interact with their environment. Developmentally devices may be shared among individuals so that these devices help meet students' educational need based on developmental delay, which ideally would be improved, eliminating the need for the item in an individual's future. Instructionally, important devices are those that modify the instructional process at a course or grade level and do not need to be moved with the user as they progress to the next level.

Globally, there is relatively little research published in academic journals regarding the use of ICT to support inclusive practice (BECTA, 2003). Most studies that examined the availability of assistive technologies were conducted outside Nigeria; in fact, very few have examined the application of ICT for students with disability within the African context (Farrell & Shafika, 2007; Yusuf & Fakomogbon, 2008). Gaining an appreciation of the availability of assistive technology may provide useful insight into the future of technology integration, acceptance and usage for teaching and learning in Nigerian special and mainstream schools for students with disability. This study investigated the availability of assistive technologies for special education in Nigerian educational institutions.

### **Research Questions**

In this study, the following research questions were answered.

1. What are the available assistive technologies for special education in Nigerian educational institutions for students with visual impairment?
2. What are the available assistive technologies for special education in Nigerian educational institutions for students with hearing impairment?
3. What are the available assistive technologies for special education in Nigerian educational institutions for the students with mental and learning disability?

### **Methodology**

A descriptive research type using survey method was adopted for this study. This study employed an adapted questionnaire and observation guide to gather data.

### **Sample and Sampling Techniques**

The target population for this study consisted of all the special tertiary educational institutions that offer special education programme in Nigeria and all primary and secondary schools designated for students with disability either in mainstream or special schools. Purposive sampling technique was used to select all the tertiary educational institutions that offer special education programmes. These are Universities of Calabar, Ibadan, and Jos, Kaduna Polytechnic and Federal College of Education (Special) Oyo. Purposive sampling was also used to select all primary and secondary schools designed for students with disability either mainstream or special schools in South West Nigeria (Ekiti, Kwara, Lagos, Ogun, Ondo, Osun, and Oyo). These seven states were selected as representative sample for the other 29 states and Federal capital territory. First, the area is probably the most educationally advanced part of Nigeria, with longer history of western education, particularly special education than other parts of Nigeria. Secondly, two tertiary institutions in the area, Federal College of Education (Special), Oyo and University of Ibadan are pioneer institutions in the area of special education. The Federal College of Education (Special), Oyo, Oyo State, is the first and still the only of its kind in Africa, specially devoted to the education of middle level teachers for lower secondary and primary schools. Third, the area has more special educational institutions (private and public) than all other parts of Nigeria.

### **Instrumentation**

The major instrument used for the research developed by the researchers. It was an observation checklist "Inventory of Assistive Technological Devices in Special Educational Institutions". The checklist has four major sections. Section One provides the biodata on the educational institutions. Section Two with 28 items focuses on assistive technological devices for students with visual disability; while Section Three contains 11 items on assistive technologies for students with hearing disability. Section Four which asks questions about assistive technological devices for students with mental and learning disability has 10 items. The checklist scoring ranged from Available and Functional, available but not functional and not available at all.

For validation, the instrument was given to the lecturers in selected tertiary institutions in the areas of special education, computer science and educational technology. Based on their comments, necessary amendments were made on the drafts of the instrument before final version was developed. The checklist is as shown in the appendix.

### **Procedure for Data Collection and Analysis**

The researchers personally used the checklist verify available assistive technologies. These data were analysed using descriptive statistics, that is, frequency counts that were converted to simple percentages.

### **Results**

The analysis was done using the research question which had been stated for the study.

**Research Question 1:**

*What are the available assistive technologies in Nigerian special educational institutions for students with visual disability?*

The analyses related to this research question are as shown in Table 1. As can be seen from Table 1, out of the 78 sampled schools, only five institutions have adjustable tables and key guards that were available and functioning. This represented only 6.41% while 93.59% of the schools do not have them. Two institutions (5.13%) have wrists rests and mouth and chin sticks available and functioning, while 94.87% do not them. Three institutions have video of screen magnification, Video of refreshable Braille display and video of screen reader was found in 2.56% of the institutions, while 97.44% do not have them.

**Table 1: Assistive Technology Hardware and Equipment in the Special Educational Institutions for Students with Visual Impairment**

S/ N	Equipment	Available & Functional		Available but not Functional		Not Available at all	
		No.	%	No.	%	No.	%
1.	Adjustable table	5	6.41	-	0	73	93.59
2	Wrist Rests	4	5.13	-	0	74	94.87
3	Mouth and Chin sticks	4	5.13	-	0	74	94.87
4	Key guards	5	6.41	-	0	73	93.59
5	Sticky Keys	-	0	-	0	78	100
6	Enhance Keyboard inputs	1	1.28	-	0	77	98.72
7	Slow Key	-	0	-	0	78	100
8	Repeat Key	1	1.28	-	0	77	98.72
9	Mouse Key	1	1.28	-	0	77	98.72
10	Bounce Key	1	1.28	-	0	77	98.72
11	Toggle Keys	1	1.28	-	0	77	98.72
12	Miniature key boards	1	1.28	-	0	77	98.72
14	Switch input	1	1.28	-	0	77	98.72
15	Scanners	1	1.28	-	0	77	98.72
16	Mouse code or mouse alternatives	1	1.28	-	0	77	98.72
17	Talking computers	58	74.36	-	0	20	25.64
18	Overlay keyboards	1	1.28	-	0	77	98.72
19	Speech input/output	1	1.28	-	0	77	98.72
20	Programmable keyboards	1	1.28	-	0	77	98.72
21	Qwerty keyboard	1	1.28	-	0	77	98.72
22	Oral computer keyboards	1	1.28	-	0	77	98.72
23.	Writing tool/computer companion	1	1.28	-	0	77	98.72
24.	Video of screen magnification	2	2.56	-	0	76	97.44

25	Video of an alternative mouse	1	1.28	-	0	77	98.72
26.	Video of a refreshable Braille display	2	2.56	-	0	76	97.44
27	Video of a screen reader	2	2.56	-	0	76	97.44
28.	Video of a alternative keyboard	-	-	-	0	78	100

Other items such as enhance key board, repeat key, mouse key, bounce key, toggle key, miniature key board, switch input, scanners, mouse code or mouse alternatives, overlay key boards, speech input/output, programmable key board, Qwerty keyboard, oral computer keyboard, writing tool/computer companion are only an institution (1.28%) were almost non-existent. Of the institutions surveyed, 98.72% do not have them. In addition, 58 special educational institutions had talking computers representing (74.36%). A large number 25.64% of the institutions do not have these items at all. It can be deduced from these results that the institutions do not have necessary assistive technology hardware for the use of students with disability.

### Research Question Two:

*What are the available assistive technologies for special education in Nigerian educational institutions for students with hearing impairment?*

The results related to this research question are as reflected in Table 2.

**Table 2: Assistive Technologies for the Hearing Impaired**

S/N	Equipment	Available & Functional		Available but not functional		Not Available at all	
		No.	%	No.	%	No.	%
1	Signalling Devices	1	1.28	-	0	77	98.72
2	Electronic Hearing Aids	1	1.28	-	1.28	76	97.44
3	Tele communication Device for the Deaf (TDD)	1	1.28	1	1.28	76	97.44
4	Adapted Door Bell	1	1.28	1	0	77	98.72
5	Telephone/sign Device	1	1.28	-	0	77	98.72
6	Audiometer	3	3.85	-	1.28	74	94.87
7	Typanometer	1	1.28	1	1.28	76	97.44
8	Computer	59	75.64	1	0	19	24.36
9	Motion film	1	1.28	-	0	77	98.72
10	Amplification	1	1.28	-	0	77	98.72
11	Alerting devices	-	0	-	0	78	100

Results in Table 2 show that only 75.64% of the institutions have computers available and functional. In addition, most of these schools with computers use them only for administrative purposes. Nineteen institutions (24.36%) have no computers at all. Also, signalling device, electronic hearing aids, telecommunication device for the deaf, adapted door bell, telephone/Sign device, typanometer, motion film and amplification are only

available and functional in 1.28 percent of the institutions. Items such as electronic hearing aids, telecommunication device for the deaf and tympanometer are available but not functional in only one institution. Alerting devices are not available at all in all the 78 institutions. Only three institutions have audiometer available and functional.

### Research Question Two:

*What are the available assistive technologies for special education in Nigerian educational institutions for the students with mental and learning disability?*

**Table 3: Assistive technologies for students with mental retardation & learning disability**

S/N	Equipment	Available & Functional		Available but not Functional		Not Available At all	
		No.	%	No.	%	No.	%
1.	Computer	59	75.64	-	0	19	24.36
2.	Models and mock-ups	2	2.56	1	1.28	75	96.15
3.	Word processing machine (programme)	2	2.56	1	1.28	75	96.15
4.	Art activities	-	0	-	0	78	100
5.	Talking dictionary	2	2.56	-	0	76	97.44
6.	Disc recordings	1	1.28	-	0	77	98.72
7.	Electronic organiser	3	3.85	-	0	75	96.15

From Table 3, it could be seen that computers are available in 59 schools representing 75.64% of the institutions surveyed. However, most of the available computers are used for administrative purposes and not for instruction. Models and mock-ups and word processing machines are available and functional in only two institutions representing 2.56%. Between 96.15% and 98.72% of these devices are not available at all indicating that most of the assistive technology devices for students with intellectual disabilities are not available at all.

### Discussion

From the sampled schools, most of the equipment and devices are not available at all. Only talking computers, talking calculators, adjustable tables, and wrists wrists mouth and chin sticks are available few special educational institutions. Most schools have computers but they are used for administrative purposes only and not for instruction. The findings indicate gross inadequacy of assistive technologies for use in special education in Nigeria. Despite the immense benefit of assistive technologies in rehabilitating and assisting the students with special educational needs, these devices are not provided for the students. Our results are similar to those of Izu and Atolagbe (2003) and Yusuf and Fakomogbon (2008). Because of the expensive nature of the instructional materials for the blind, federal government has stopped the supply of basic equipment over ten years ago. Most of the instructional materials and equipment for the students with special needs are grossly inadequate in the schools (Izu & Atolagbe 2003). Most of the existing pieces of equipment are outdated; most of these schools have to depend on philanthropists for the supply of basic materials. Yusuf and Fakomogbon

(2008) also noted the gross inadequacy of assistive ICTS in Nigerian special educational institutions.

The findings have the following implications. First, students with various forms of disability do not have access to the required assistive technologies in their institutions. Second, teachers' positive attitude towards assistive technologies with this positive attitude of teachers to assistive technologies in schools implies that the teachers will be ready to integrate the required assistive technologies if provided for the institutions.

## **Conclusions**

From the results, it can be noted that there was gross inadequacy of assistive technologies for special education in Nigeria. Based on these findings it is recommended that assistive technology hardware and software should be provided for all the special educational institutions in Nigeria. The provision of assistive technologies, their maintenance and updating could be incorporated within institutional strategies and associated operational plans. Also, special education teachers should be retrained to acquire knowledge and skills on effective and efficient use of assistive technology devices and equipment. Finally, non-governmental organizations concerned with people with disability should be involved in the promotion and integration of assistive technologies in Nigerian schools by assisting the government in providing some of these devices and equipments to schools.



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**SECTION C**

## Assistive Technologies for the Hearing Impaired

S/No	Equipment	Available & Functional	Available but not Functional	Not Available at all
1	Signalling Devices			
2	Electronic Hearing Aids			
3	Tele communication Device for the Deaf (TDD)			
4	Adapted Door Bell			
5	Telephone/sign Device			
6	Audiometer			
7	Typanometer			
8	Computer			
9	Motion film			
10	Amplification			
11	Alerting devices			

**SECTION D**

## Assistive Technologies for Students with Mental Retardation and Learning Disability

S/No	Equipment	Available & Functional	Available but not Functional	Not Available at all
1.	Computer			
2.	Models and mock-ups			
3.	Word processing machine (programme)			
4.	Art activities			
5.	Talking dictionary			
6.	Disc recordings			
7.	Electronic organiser			