

Assistive Technology for Inclusive Education Among Vocational Education Students with Physical Disabilities in Colleges of Education in South West, Nigeria

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Abstract:- Disability could either be acquired through life circumstances like accidents or natural in the sense that an individual could be born with a physical challenge. This study examined the use of Assistive Technologies for inclusive education among Vocational education students with physical disabilities in Colleges of Education in South west, Nigeria. Four research questions guided the study. Descriptive survey design was used for the study. Three Colleges of Education in Southwest, Nigeria were used for the study. Population comprised of fifty eight (58) Vocational Education teachers. A researcher's-designed checklist and questionnaire were used to collect data. Data was analyzed using frequency, mean and standard deviation. Results indicated that majority of the institutions do not have the necessary assistive technologies and some of the available ones are not functional, therefore are not enough to cater for the challenges faced by students with physical disabilities. Also, part of the strategies suggested for enhancing the use of Assistive technology was to make Vocational curriculum more technologically adaptive and integrated. Among recommendations made was that Assistive Technology should be made available and affordable so that parents, schools, State and Federal ministry of education can afford them for use, both in special and mainstream educational institutions in Nigeria.

Keywords:- Assistive Technology, Physical Disability, Inclusive Education.

I. INTRODUCTION

Education is bedrock for all irrespective of ability or disability as it enhances individual and national development. In general classrooms, teachers work with different categories of children as they engage in the teaching and learning process. Teachers are faced with learners individual differences and developmental capabilities especially in vocational education where skill acquisition is emphasised. Learning in vocational education focuses on practical demonstration of skills which involves

use of hands, brain and manipulative capabilities in achieving desired objectives. Federal Republic of Nigeria (2004) stated that among learners in an inclusive education are those with different intellectual and physical difficulties such as not being able to walk, manipulate objects, use one or both arms and legs, run or maintain balance. In recent times there are several educational facilities put in place to cater for educational development of learners with disability especially in an inclusive learning system. These modern educational facilities aimed at helping learners with disabilities are known as assistive technology.

Assistive Technology (AT) as used in the context of this study is any device that is specifically modified to suit the individual needs of students with a particular physical disability which will help them learn with ease, maintain communicative contact with others and keep abreast of what is happening within and around their immediate environment. AT is any equipment or device that helps learners by compensating for their learning disability. Adeniyi (2007) stated that AT enhances students self discovery and motivate them in schools. Vaughn and Lightfoot (2007), noted that speech language and voice therapy software make the students with hearing impairment more independent in their environment and not withdrawn and isolated from the society and dependent on others for their daily living activities through assisting them technologically.

The Convention on the Rights of Persons with Disabilities was adopted on 13 December 2006. In accordance with its article 42, Nigeria has signed and ratified the UN Convention on Rights of Persons with Disabilities, which provides that all schools must be inclusive of, and accessible to all children including those with disabilities. Nigeria has also signed-up to the 17 Sustainable Development Goals (SDGs), Goal 4 of which targets that by 2030, all school-age children including those with disabilities must have access to qualitative, functional and effective basic education.

Inclusive education means that schools should accommodate all children irrespective of their intellectual, physical, emotional, social, language, race or tribe. This means that a regular school should be made up of different categories of people which could be gifted, exceptional, disabled and working children, children from other rural areas or nomadic populations, children from linguistic, ethnic or cultural minorities and children from other disadvantaged or marginalised areas or group (UNESCO, 2012).

The ultimate goal of inclusive quality education is end all forms of discrimination and foster social cohesion (UNESCO, 2015). Inclusion education means more educational funds, improved educational facilities, and different teaching approaches to address the emerging challenges, being innovative and conversant on use of the technological technologies as well as ability to partner with other professionals. Knight (1999), opined that the inclusion involves all children with disabilities, full time participation in schools and communities with their neighbourhood. Inclusion does not infer putting the entire teaching responsibility on teacher alone, learners also have roles to play. Inclusive education should aim to provide support to teachers. The aim of inclusive education will not be achieved if the needed assistive technologies are not provided in schools.

There are innovations in the development of certain technological applications for assistive technology aimed at enhancing inclusive education. These technology applications are aimed at having positive effects on the educational development of learners with special needs such as blind, deaf and hard of hearing, children with physical disability, and children with vision problems). Some AT tools are available in hardware or software. Typical examples are synthetic speech device which gives learners having visual impairment information through voice output; reading devices like voice amplifiers; printed converters that converts printed materials into a synthetic speech; paperless Braille, keyboard overlay that can provide visual impaired learners with a variety of feedback mechanisms, speech input and output software (Osatuyi, 2003). Other examples are calculators, thermometers and electronic dictionaries with in-built speech (British Educational Communication Technology Agency [BECTA], 2001). Bosick, Starcher, Kelly & Hapke, (2008) described some sets of AT for teaching and learning. According to the authors, the assistive technologies include trackball for controlling mouse, graphic tablet for touching locations, screen magnifiers, voice decoders, voice amplifiers and screen reader software.

When the needed assistive technologies are provided, inclusive education will be achieved to a large extent as the learners with disabilities will be integrated in regular classrooms. In vocational education where skill acquisition is emphasised, Woods (2014) stated that the AT used include special software for different purposes, power lifts,

eye-gaze and head trackers, pencil holders, self-help aids for home maintenance, amplification devices, ATs for environmental controls (such as switch controls), scooters, adapted knobs, adapted timers and watches used in completing vocational tasks, adapted books, talking calculators and electronic worksheets. Vocational students with disability are expected to combine AT towards making their learning process interesting. Smith, Austin, Kennedy, Lee & Hutchinson, (2005) noted that architectural designs in schools or physical barriers like absence of elevators, automatic doors, access to labs through lifts, braille signage and other AT in schools can be said to restrict the participation of students with disabilities in school work.

In most schools in South West Nigeria, there is hardly any provision for learners with physically disability. UNICEF (2013) reported that teachers should be trained to recognize the special need of the challenged children in normal classrooms. Also, most schools do not have the necessary physical infrastructural facilities, needed inclusive education. For instance, some classrooms are not constructed to admit students on wheelchair. American Institutes for Research (2008) reported that learners with disabilities are at risk of dropping out of school because they are marginalised. Schools do not have equipment for eye test or hearing effectiveness. Despite the global SDG goal 4 sub-targets and urge to enhance inclusive education, one then wonders why the situation is farfetched in Nigeria. The study therefore focused on AT for inclusive education among vocational education students with physical disabilities in Colleges of Education in Southwest, Nigeria.

➤ *Study Objectives*

The study objectives were to:

- determine the types of Assistive Technology available in the schools for students with physical disabilities
- determine the availability and functionality of Assistive Technology in the schools.
- ascertain the challenges faced in the use of Assistive Technologies for students with physical disabilities
- suggest strategies for enhancing use of Assistive Technologies for inclusive education among Vocational education students with physical disabilities.

II. STUDY METHODOLOGY

Descriptive survey design was adopted for the study. The study was carried out in three Colleges of Education located in Lagos State and Oyo State in Southwest, Nigeria. Population consisted of 58 Vocational Education Teachers chosen purposively. Validated questionnaire and checklist were the instruments used for data collection. Split half reliability method was used to estimate the reliability of the instrument and it yielded a reliability coefficient of 0.99 for questionnaire and 0.92 for checklist. Data was analysed using descriptive statistics (frequency, mean and standard deviation).

III. RESULTS

➤ Data for answering objective 1 and 2 are presented in table 1

S/NO	Types of Assistive Technologies in Schools	Available	Not Available	Available and Functional	Available but not Functional
1.	Adjustable Table	58 (100%)	-	58 (100%)	-
2.	Wrist Rest	-	58 (100%)	-	-
3.	Mouth and Chin Sticks	-	58 (100%)	-	-
4.	Key guards	58 (100%)	-	30 (52%)	28 (48%)
5.	Sticky Keys	58 (100%)	-	58 (100%)	-
6.	Enhanced Keyboard inputs	58 (100%)	-	58 (100%)	-
7.	Slow Keys	58 (100%)	-	50 (86%)	8 (14%)
8.	Repeat Keys	58 (100%)	-	58 (100%)	-
9.	Mouse Key	58 (100%)	-	58 (100%)	-
10.	Bounce Keys	58 (100%)	-	13 (22%)	45 (78%)
11.	Toggle Keys	58 (100%)	-	30 (52%)	28 (48%)
12.	Miniature Keyboards	58 (100%)	-	22 (38%)	36 (62%)
13.	Switch input	58 (100%)	-	40 (69%)	18 (31%)
14.	Scanners	58 (100%)	-	58 (100%)	-
15.	Mouse code or Mouse Alternatives	58 (100%)	-	58 (100%)	-
16.	Talking Computers	58 (100%)	-	20 (34%)	38 (66%)
17.	Overlay Keyboards	-	58 (100%)	-	-
18.	Speech Input/output	58 (100%)	-	58 (100%)	-
19.	Programmable Keyboards	-	58 (100%)	-	-
20.	Qwerty Keyboards	-	58 (100%)	-	-
21.	Oral Computer Keyboards	-	58 (100%)	-	-
22.	Writing tool/Computer companion	-	58 (100%)	-	-
23.	Video of Screen Magnification	58 (100%)	-	58 (100%)	-
24.	Video of an alternative Mouse	58 (100%)	-	58 (100%)	-
25.	Video of a refreshable Braille Display	58 (100%)	-	58 (100%)	-
26.	Video of a screen reader	58 (100%)	-	58 (100%)	-
27.	Video of an alternative keyboard	58 (100%)	-	58 (100%)	-
28.	Signaling Devices	58 (100%)	-	58 (100%)	-
29.	Electronic Hearing Aids	58 (100%)	-	58 (100%)	-
30.	Telecommunication Device for the Deaf (TDD)	58 (100%)	-	58 (100%)	-
31.	Adaptable Door bell	-	58 (100%)	-	-
32.	Telephone/sign Device	58 (100%)	-	58 (100%)	-
33.	Audiometer	58 (100%)	-	58 (100%)	-
34.	Tympanometry	-	58 (100%)	-	-
35.	Computer	58 (100%)	-	58 (100%)	-
36.	Motion Film	58 (100%)	-	58 (100%)	-
37.	Amplification	58 (100%)	-	58 (100%)	-
38.	Alerting Devices	58 (100%)	-	30 (66%)	28 (34%)
39.	Optical Braille recognition Software	-	58 (100%)	-	-
40.	Track Balls	-	58 (100%)	-	-
41.	Mouth or Head stick	-	58 (100%)	-	-
42.	Wheel Chair	58 (100%)	-	58 (100%)	-
43.	Left Handed and Right Handed Keyboards	-	58 (100%)	-	-
44.	Ramps	58 (100%)	-	58 (100%)	-
45.	Elevators	58 (100%)	-	40 (69%)	18 (31%)

46.	Automatic Doors	58 (100%)	-	-	58 (100%)
47.	Braille Signage	-	58 (100%)	-	-
48.	Telecommunications Devices	58 (100%)	-	58 (100%)	-
49.	Lifts	-	58 (100%)	-	-
50.	Adjustable Washroom Sinks	-	58 (100%)	-	-

Table 1:- Frequency of Assistive Technologies Available and Functional in Schools

Table 1 shows the different types of assistive technologies available in schools for physically challenges persons. From the analysis, most of the assistive technologies are available in the schools. Some are not available while some that were available were not functional.

S/N	Challenges in the use of Assistive Technologies	Mean	SD	Remark
1.	There is insufficient training of teachers and support staff on the use of assistive Technology	3.93	0.85	Accept
2.	Ineffective and inefficient use of assistive technology is a major hindrance to inclusive education	3.02	0.92	Accept
3.	Most schools are not equipped with the necessary assistive technological devices for students with physical disabilities	3.96	0.99	Accept
4.	There is inadequate funding from government on the purchase of Assistive Technological devices for schools	2.80	0.86	Accept
5.	Government policies and legislation to support inclusive education is limited	2.78	0.82	Accept
6.	Lack of awareness on available assistive technologies	3.00	1.02	Accept
7.	Inadequate service delivery for assistive technologies	2.91	0.94	Accept
8.	Learners with disabilities inability to access assistive technology	2.87	1.03	Accept
9.	Inaccessible learning environment for learners with disability	3.35	0.88	Accept

Table 2:- Analysis on Challenges in use of Assistive Technologies for Inclusive Education among Students with Physical Disabilities

Table 2 reveals that the highlighted challenges in the use of assistive technologies for inclusive education among students with physical disabilities were all accepted. The mean values ranged from 2.78 to 3.96. Standard deviation ranged from 0.82 to 0.99 implying that the opinions were close.

S/N	Strategies for enhancing use of Assistive Technologies	Mean	SD	Remark
1.	Assistive technologies should be provided to schools by government and other agencies	3.00	0.88	Accept
2.	There should be more awareness on the rights of students with physical disabilities to remove fear, misconceptions, stereotyping and labelling of this group of students	3.42	0.85	Accept
3.	Laws and legislations should be implemented to make regular schools accessible and convenient for physically challenged students	3.59	0.95	Accept
4.	School curriculums could be more adapted and integrated to Technology and assistive technologies	2.90	0.74	Accept
5.	Effective monitoring, periodic review and regular maintenance of assistive technologies are needed for successful implementation of inclusive education for students with physical disabilities.	3.98	0.97	Accept
6.	Assistive technologies should be available for all learners	2.75	1.82	Accept
7.	Assistive technologies should be affordable by learners	3.44	0.99	Accept
8.	Assistive technologies should be easily adapted by all learners with different forms of disabilities	3.71	1.10	Accept
9.	Assistive technologies should be accepted by learners	2.99	0.93	Accept

Table 3:- Analysis on Strategies for enhancing use of Assistive Technologies for Inclusive Education among Students with Physical Disabilities

Table 3 indicates that the listed strategies for enhancing use of assistive technologies for inclusive education among vocational education students with physical disabilities were all accepted. The mean values were from 2.75 to 3.98. The standard deviation values were from 0.74 to 0.97 implying similar mean responses.

IV. DISCUSSION OF FINDINGS

The findings indicate that most of the AT were available and functional in the sampled schools. Few of the AT were available but not functional. This shows that there are many types of AT available for learners with disabilities. The enhanced keyboard, sticky keys and screen magnifiers to mention a few were available since some of these functionalities can be found in modern day computers. Some Assistive technologies like the wrist rest, mouth chin sticks, adaptable door bells and elevators were not available for the students. The implication is that the need of those particular students will not be catered for. To support these findings, Osatuyi (2003) noted that some AT tools for learners in disabilities are available in hardware or software. Typical examples according to the authors include synthetic speech device which gives learners having visual impairment information through voice output; reading devices like voice amplifiers; printed

converters that converts printed materials into a synthetic speech; paperless Braille, keyboard overlay that can provide visual impaired learners with a variety of feedback mechanisms, speech input and output software. In the same vein, British Educational Communication Technology Agency (BECTA) (2001) reported that examples of AT for learners with disabilities includes calculators, thermometers and electronic dictionaries with in-built speech. Bosick, Starcher, Kelly & Hapke, (2008) described some sets of AT for teaching and learning. According to the authors, the assistive technologies include trackball for controlling mouse, graphic tablet for touching locations, screen magnifiers, voice decoders, voice amplifiers and screen reader software.

The study also revealed that some of the challenges facing inclusive education among vocational education students include: lack of adequate funding by the Governments, poor training of teachers, inefficient and inadequate use of technologies, lack of legislations and laws to support inclusive education, lack of awareness on available assistive technologies, inadequate service delivery for assistive technologies, learners with disabilities' inability to access assistive technology and inaccessible learning environment for learners with disability. To buttress the findings, Smith, Austin, Kennedy, Lee &

Hutchinson (2005) noted that architectural designs in schools or physical barriers like absence of elevators, automatic doors, access to labs through lifts, braille signage and other AT in schools can be said to restrict the participation of students with disabilities in school work. In most schools in South West Nigeria, there is hardly any provision for learners with physical disability such as schools having equipment for eye test or hearing effectiveness. Also, American Institutes for Research (2008) reported that learners with disabilities are at risk of dropping out of school because they are marginalised.

The study indicates that strategies for enhancing inclusive education of the said students should be that the Federal and State Governments would enact more laws, provide more funding, and make the curriculum more technologically integrated this would create more awareness about inclusive education of physically challenged vocational education students. In line with this, UNICEF (2013) reported that teachers should be trained to recognize the special need of the challenged children in normal classrooms. Schools should have the necessary physical infrastructural facilities needed for inclusive education. Classrooms should be constructed to admit students on wheelchair.

V. CONCLUSION

The study was carried out to investigate AT for inclusive education among physically challenged vocational education students in Colleges of Education in Southwest, Nigeria. The checklist developed to observe the availability and functionality of these devices revealed that there is a need for more assistive technologies to be made available to Colleges of Education. There is also need to train teachers to effectively use the technologies, enact Laws and legislations to support inclusion so that all schools must be inclusive of, and accessible to all children including those with disabilities aimed at achieving SDG Goal 4 which targets that by 2030, all school-age children including those with disabilities must have access to qualitative, functional and effective basic education.

RECOMMENDATION

- Assistive technology software should be provided for all Colleges of Education in Nigeria.
- The provision of assistive technologies, their maintenance and monitoring could be incorporated within institutional strategies and operational plans.
- Teachers and laboratory support staff should be trained and retrained on the efficient and effective use of assistive technology devices and equipment.
- Assistive Technology should be made available and affordable so that parents, schools, State and Federal ministry of education can afford them for use, both in special and mainstream educational institutions in Nigeria.

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