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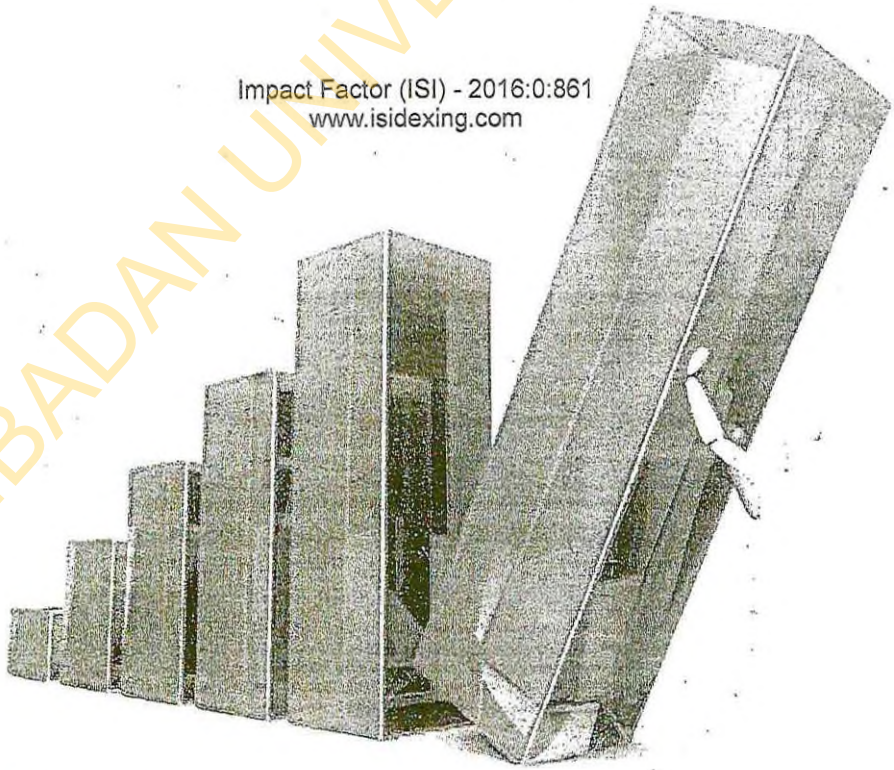

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Availability, Accessibility and Acceptance (3As) of Advanced Digital Technologies among Higher Education Students with Special Needs in Oyo State, Nigeria

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Abstract
The world has become a global village. It is now crystal clear that life at present is different from life few decades ago. Nowadays, every society is striving for apt knowledge that can be used as panacea to solve their myriad problems. Previous studies have focused largely on the use of digital technologies among students without special needs with little consideration to students with special needs. Therefore, this paper investigated the availability, accessibility and acceptance of advanced digital technologies among higher education students with special needs in Oyo State, Nigeria. The descriptive research method was employed while the multi stage sampling procedure was used to select the sample for the study. First, purposive sampling technique was used to select two higher education institutions that are owned by the federal government of Nigeria (one college of education and one university). Second, random sampling technique of the ballot method was used to select one hundred and forty (140) participants with special needs (those with hearing impairment were 125 and those with visual impairment were 15). Two structured questionnaires on availability, acceptance and accessibility of advanced digital technologies by higher education students with special needs were used for data collection. To guide the study, six research questions were raised and tested at 0.05 level of significance. The data was collated and analysed using the descriptive statistics of percentages, means and standard deviation. It was found that for higher education students with hearing impairment, digital technologies are poorly available and inaccessible. However, among higher education students with visual impairment, there is moderate availability, accessibility and acceptance of digital technologies. Based on the findings, it was recommended that the Nigerian government at all levels should brace up to their responsibilities and provide digital technologies for students with special needs particularly, those with hearing impairment in higher educational institutions in the country.

Keywords: Availability, accessibility, acceptance, digital technologies, hearing impairment, visual impairment

Introduction

Digital technologies are used to leverage educational opportunities and make life a bit interesting for everyone in this information age. Many learners including those with special needs are able to learn, communicate, acquire and utilize functional skills by using digital technologies. Ajobiewe and Ojebode (2016) stressed that adequate and appropriate exposure to digital technologies leads to improved student academic performance and the development of coping strategies useful for independent life in society. Similarly, Atkinson and Castro (2008) itemized three categories of digital technologies designed to assist the inclusion of students with special needs in society as follows: assistive technology (improves a disabled person's functional capabilities); adaptive technology (allows people with disabilities to use devices that would otherwise be inaccessible to them); and accessible technology (has many broad

therefore submitted that higher education institutions should conceptualize and organize technology-related support services for students with special needs as this would promote access to equitable educational experiences and outcomes.

Furthermore, Pudaruth, Gunputh and Singh (2017) reported that students with visual impairment at the University of Mauritius were provided with Braille-printed examination papers and most of them (about 92%) overwhelmingly agreed that the adoption of e-learning and its associated tools could enhance and encourage better learning for students with special needs. Using one hundred and twenty secondary school students with blindness in Lagos State, Nigeria as participants, Komolafe (2015) conducted a study and found that only a very few devices are available for the students and that the available devices are mainly for the purpose of mobility. Devices such as optical character recognition, Braille translator, speech recognition, screen readers and lots more are not available for them to use. The study further showed that the most common technological devices used by the students are guiding canes, tape recorders, slate and stylus while the students refuse to use some devices due to age barrier, societal stigmatization, financial constraints and high cost. In contrast, Opara, Okoro and Iheme (2016) in a study involving twenty-five special education teachers, investigated the use of assistive technologies for teaching students with visual impairment. The study found that in Imo State, Nigeria, special education teachers make use of assistive technologies in teaching students with visual impairment. Available devices identified by participants are magnifier, Perkins Braille, talking calculator, talking book, voice recorder, speech synthesizer and scanners. Based on the foregoing, it is observed that studies on digital technologies and students with special needs revealed to a large extent inconsistent findings. This assertion is the focus of the present study.

Statement of the problem

Higher educational institutions in Nigeria practice some kind of inclusion because they accommodate all students notwithstanding their disability status. There appears to be an educational policy that supports social and cultural equality for all categories of students in higher educational institutions in Nigeria. Also, literature reviewed earlier has revealed that there is a general consensus concerning the essential roles that digital technologies play in the education and general wellbeing of students with special needs. However, despite these laudable goals, not much digital technologies have been put in place in higher educational institutions in Nigeria to cater for the needs of students with special needs. Thus, there is need to provide more insight into the availability, accessibility and acceptance of digital technologies among students with special needs in higher educational institutions in Nigeria.

Research Questions

1) What types of digital technologies are available for higher education students (HES) with hearing impairment?
2) How accessible are the digital technologies to higher education students (HES) with hearing impairment?
3) What is the level of acceptance of digital technologies by higher education students (HES) with hearing impairment?
4) What types of digital technologies are available for higher education students (HES) with visual impairment?
5) How accessible are the digital technologies to higher education students (HES) with visual impairment?
6) What is the level of acceptance of digital technologies by higher education students (HES) with visual impairment?

Methodology

A descriptive research design was adopted in this study. The multistage sampling procedure was adopted for the study. First, there was a purposive selection of two higher educational institutions out of the 19 higher educational institutions in Oyo State. The rationale for the purposive selection is that both institutions are owned by the federal government of Nigeria and persons with special needs are trained in these two institutions in Oyo State. The institutions are the University of Ibadan, a pioneer higher education institution in the field of special education in Nigeria and the Federal College of Education (Special), Oyo, Oyo State, the college with the largest number of students with special needs in Nigeria. The next stage involved random sampling (using the ballot method) of one hundred and forty (140) respondents with special needs (those with hearing impairment were 125 and those with visual impairment were 15 students). The distribution of the respondents at institutional level showed that only 12 (8.57%) were University of Ibadan students while majority of the respondents 128 (91.43%) were students of the Federal College of Education (Special) Oyo. The sample was almost evenly divided between males 68 (48.57%) and females 72 (51.43%). Out of the 140 respondents, those within the 16 to 20 age bracket were 34 (24.29%), those aged 21 to 25 years were 27 (19.29%) while those aged 26 years and above were the largest in number that is, 79 (56.42%). With respect to respondents' level of study, the majority overall were in 300 level, 80 (57.14%); 21 (15%) were in 100 level; 20 (14.29%) were 400 level students while 19 (13.57%) were 200 level students. All respondents were drawn from the Department of Special Education (University of Ibadan) and the School of Special Education (FCE, Special, Oyo). However, respondents offer different teaching subjects.

Research Instruments

Two self-structured questionnaires were used in this study to elicit information from the participants. One was titled availability, accessibility and acceptance of digital technologies among higher education students with hearing impairment (AAADTHESHI) while the second was titled availability, accessibility and acceptance of digital technologies among higher education students with visual impairment (AAADTHESVI). The AAADTHESHI comprised four sections. Section A assessed demographic information of participants while sections B, C and D, each had twenty-one questions. Section B gathered information on availability of digital technologies. Section C elicited information on accessibility of digital technologies and Section D assessed acceptance of digital technologies by participants. The AAADTHESVI equally comprised four sections. Section A: demographic information of participants, Section B: availability of digital technologies, Section C: accessibility of digital technologies and Section D: acceptance of digital technologies. Each of sections B, C, and D had twenty-eight items. After a trial-test using 30 respondents who were not included in the scope of the study, the Cronbach's alpha method was used to determine the reliability coefficient of the two instruments which yielded the values of ($r = 0.71$ for AAADTHESHI) and ($r = 0.75$ for AAADTHESVI) respectively.

Procedure for Data Collection and Analysis

The instruments were administered by the researcher with the assistance of four sign language interpreters for students with hearing impairment and three tutors of the blind students. The data was analysed using percentages, means and standard deviations.

Results

Research Questions 1: What types of digital technologies are available for HES with hearing impairment?

Table 1: Availability of digital technologies for HES with hearing impairment

S/N	Item	A&F (%)	ABNF(%)	NAA(%)	Mean	Rank
1	Signaling Devices	17(13.6)	15(12.0)	93(7.7)	2.61	21
2	Electronic Hearing Aids	17(13.6)	36(28.8)	72(57.6)	2.44	5
3	Telecommunication Device for the Deaf	22(17.6)	24(19.2)	79(63.2)	2.46	6
4	Adapted Door Bell	19(15.2)	24(19.2)	82(65.6)	2.50	15
5	Video conferencing Technologies	24(19.2)	8(6.4)	93(74.4)	2.55	17
6	Computer Systems	24(19.2)	17(13.6)	84(67.2)	2.48	12
7	Subtitles for Video	23(18.4)	19(15.2)	83(66.4)	2.48	11
8	Mobile Telephones	21(16.8)	36(28.8)	68(54.4)	2.38	4
9	Smartphones	20(16.0)	18(14.4)	87(69.6)	2.54	16
10	Short Message Service (SMS)	23(18.4)	20(16.0)	82(65.6)	2.47	8
11	Text Telephone	28(22.4)	25(20.0)	72(57.6)	2.35	2
12	Telecommunication relay services	23(18.4)	16(12.8)	86(68.8)	2.50	14
13	Closed and open captioning applications	20(16.0)	26(20.8)	79(63.2)	2.47	9
14	Audiometer	26(20.8)	12(9.6)	87(69.6)	2.49	13
15	Typanometer	23(18.4)	20(16.0)	82(65.6)	2.47	10
16	Motion Film	27(21.6)	30(24.0)	68(54.4)	2.33	1
17	Alerting Devices	32(25.6)	16(12.8)	77(61.6)	2.36	3
18	Interactive White Board	24(19.2)	20(16.0)	81(64.8)	2.46	7
19	Sound Amplifiers	21(16.8)	10(8.0)	94(75.2)	2.58	19
20	Video Relay service	23(18.4)	10(8.0)	92(73.6)	2.55	18
21	Telecoil	21(16.8)	7(5.6)	97(77.6)	2.61	20

Key: A&F=available & functional, ABNF=available but not functional, NAA= Not available

Table 1 revealed that 32(25.6%) and 27(21.6%) and 28(22.4) respectively pointed out that alerting devices, motion film and text telephone are available and functioning while a significant number of participants 97(77.6), 94(75.2%), 93(7.7%) and 92(73.6%) indicated that telecoil, sound amplifiers, signaling devices and video relay services are not available at all. It implies that for students with hearing impairment, digital technologies are poorly available or not available.

RQ_2: How accessible are the digital technologies to HES with hearing impairment?

Table 2: Accessibility of digital technologies to HES with hearing impairment

S/N	Item	YES	NO	Mean	Rank
1	Signalling Devices	21(16.8)	104(83.2)	1.83	16
2	Electronic Hearing Aids	25(20.0)	100(80.0)	1.80	8
3	Telecommunication Device for the Deaf	26(20.8)	99(79.2)	1.79	7
4	Adapted Door Bell	21(16.8)	104(83.2)	1.83	17
5	Video Conferencing Technologies	21(16.8)	104(83.2)	1.83	18
6	Computer Systems	22(17.6)	103(82.4)	1.82	11
7	Subtitles for Video	22(17.6)	103(82.4)	1.82	12
8	Mobile Telephones	26(20.8)	99(79.2)	1.79	6

9	Smartphones	35(28.0)	90(72.0)	1.72	2
10	Short Message Service (SMS)	22(17.6)	103(82.4)	1.82	13
11	Text Telephone	18(14.4)	107(85.6)	1.86	21
12	Telecommunication relay services	26(20.8)	99(79.2)	1.79	5
13	Closed and open captioning applications	24(19.2)	101(80.8)	1.81	10
14	Audiometer	19(15.2)	106(84.8)	1.85	20
15	Typanometer	21(16.8)	104(83.2)	1.83	14
16	Motion Film	25(20.0)	100(80.0)	1.80	9
17	Alerting Devices	19(15.2)	106(84.8)	1.85	19
18	Interactive White Board	30(24.0)	95(76.0)	1.76	4
19	Sound Amplifiers	35(28.0)	90(72.0)	1.72	1
20	Video Relay service	34(27.2)	91(72.8)	1.73	3
21	Telecoil	21(16.8)	104(83.2)	1.83	15

Table 2 revealed that: 35(28.0%) and 35(28.0%) participants agreed that sound amplifiers, and smartphones, are accessible to students with hearing impairment while participants 107(85.6%), 106(84.8%) and 106(84.8%) indicated that text telephone, audiometer, and alerting devices are not accessible to them. It implies that accessibility of digital technologies for students with hearing impairment is low or not accessible.

RQ_3: What is the level of acceptance of digital technologies by higher education students with hearing impairment?

Table 3: Acceptance of digital technologies by HES with hearing impairment

S/N	Item	H A(%)	MA(%)	LA(%)	Mean	Rank
1	Signalling Devices	28(22.4)	14(11.2)	83(66.4)	2.44	13
2	Electronic Hearing Aids	26(20.8)	23(18.4)	76(60.8)	2.40	9
3	Telecom. Device for the Deaf	21(16.8)	12(9.6)	92(73.6)	2.57	21
4	Adapted Door Bell	21(16.8)	20(16.0)	84(67.2)	2.50	16
5	Video Conferencing Technologies	27(21.6)	18(14.4)	80(64.0)	2.42	12
6	Computer Systems	42(33.6)	29(23.2)	54(43.2)	2.10	1
7	Subtitles for Video	33(26.4)	22(17.6)	70(56.0)	2.30	6
8	Mobile Telephones	24(19.2)	8(6.4)	93(74.4)	2.55	20
9	Smartphones	23(18.4)	10(8.0)	92(73.6)	2.55	19
10	Short Message Service (SMS)	24(19.2)	12(9.6)	89(71.2)	2.52	17
11	Text Telephone	34(27.2)	22(17.6)	69(55.2)	2.28	5
12	Telecommunication relay services	35(28.0)	27(21.6)	63(50.4)	2.22	2
13	Closed and open captioning apps.	29(23.2)	16(12.8)	80(64.0)	2.41	10
14	Audiometer	35(28.0)	23(18.4)	67(53.6)	2.26	4
15	Typanometer	25(20.0)	10(8.0)	90(72.0)	2.52	18
16	Motion Film	28(22.4)	12(9.8)	85(68.0)	2.46	14
17	Alerting Devices	24(19.2)	17(13.6)	84(67.2)	2.48	15
18	Interactive White Board	30(24.0)	18(14.4)	77(61.6)	2.38	7
19	Sound Amplifiers	35(28.0)	24(19.2)	66(52.8)	2.25	3
20	Video Relay service	27(21.6)	20(16.0)	78(62.4)	2.41	11
21	Telecoil	25(20.0)	26(20.8)	74(59.2)	2.39	8

Key: HA= High Acceptance; MA: Moderate Acceptance; LA: Low Acceptance

Table 3 revealed that: 42(33.6%), 35(28.0%), and 35(28.0%) pointed out that students with hearing impairment have high acceptance for computer systems, telecommunication relay services and sound amplifiers while students with hearing impairment have low acceptance for telecommunication device for the deaf [92(73.6%)], mobile telephones (93(74.4), smart phones

(92(73.6)..It implies that the level of digital technologies acceptance by students with hearing impairment is low.

RQ4: What types of digital technologies are available for HES with visual impairment?

Table 4: Availability of digital technologies for HES with visual impairment

S/N	Item	A& F (%)	ANF(%)	NAA(%)	Mean	Rank
1	Perkin's Brailler	11(73.3)	2(13.3)	2(13.3)	1.40	5
2	Braille Display Strip	5(33.3)	1(6.7)	9(60.0)	2.27	19
3	Braille note taking devices	3(20.0)	6(40.0)	6(40.0)	2.20	18
4	Paperless Braille equipment	1(6.7)	0(0.0)	14(93.3)	2.93	28
5	JAWS software	13(86.7)	0(0.0)	2(13.3)	1.27	2
6	Computer Systems	13(86.7)	2(13.3)	0(0.0)	1.13	1
7	Screen Reading software	7(46.6)	4(26.7)	4(26.7)	1.80	15
8	Mobile Telephones	9(60.0)	1(6.7)	5(33.3)	1.73	12
9	Smartphones	7(46.7)	2(13.3)	6(40.0)	1.93	13
10	Optical Character Recognition Devices	4(26.7)	5(33.3)	6(40.0)	2.13	17
11	Stylus	11(73.3)	0(0.0)	4(26.7)	1.53	7
12	Synthetic Speech Device	9(60.0)	3(20.0)	3(20.0)	1.60	10
13	Smart pens (for capturing spoken word)	0(0.0)	1(6.7)	14(93.3)	2.93	27
14	Headphones	10(66.7)	2(13.3)	3(20.0)	1.53	8
15	Overlay Keyboard	3(20.0)	1(6.7)	11(73.3)	2.53	21
16	Alternative mouse	4(26.7)	2(13.3)	9(60.0)	2.33	20
17	Screen Magnification device	4(26.7)	7(46.6)	4(26.7)	2.00	14
18	Tape Recorder	9(60.0)	3(20.0)	3(20.0)	1.60	9
19	Adjustable Table	2(13.3)	1(6.7)	12(80.0)	2.67	24
20	Wrist rests	3(20.0)	1(6.7)	11(73.3)	2.53	22
21	Talking Computer	11(73.3)	3(20.0)	1(6.7)	1.33	4
22	Scanner	10(66.7)	2(13.3)	3(20.0)	1.53	6
23	Writing tool/Computer companion	2(13.3)	2(13.3)	11(73.4)	2.60	25
24	Mouth and Chin Sticks	0(0.0)	3(20.0)	12(80.0)	2.80	26
25	Tablets (iPad, iPhone or iPod)	3(20.0)	2(13.3)	10(66.7)	2.47	23
26	MP3 Players and Recorders	6(40.0)	1(6.7)	8(53.3)	2.13	16
27	Adapted and Virtual Keyboards	9(60.0)	1(6.7)	5(33.3)	1.73	11
28	Guiding cane	12(80.0)	1(6.7)	2(13.3)	1.33	3

Table 4 revealed that: 13(86.7%), 13(86.7%), 12 (80.0%), 11 (73.3%) and 11(73.3%) pointed out that computer systems, JAWS software, guiding cane, talking computer and Perkin's Brailler are available and functioning while 14(93.3%), 14(93.3%), 12(80.0%), 11(73.4), indicated that paperless Braille equipment, smartpens, mouth and chin sticks and writing tool/computer companion respectively are not available at all. It implies that availability of digital technologies for students with visual impairment is moderate.

RQ5: How accessible are the digital technologies to HES with visual impairment?

Table 5: Accessibility of digital technologies to HES with visual impairment

S/N	Item	YES	NO	Mean	Rank
1	Perkin's Brailler	15(100.0)	0(0.0)	1.00	1
2	Braille Display Strip	5(33.3)	10(66.7)	1.67	19
3	Braille note taking devices	5(33.3)	10(66.7)	1.67	20
4	Paperless Braille equipment	3(20.0)	12(80.0)	1.80	26

5	JAWS software	15(100.0)	0(0.0)	1.00	2
6	Computer Systems	15(100.0)	0(0.0)	1.00	3
7	Screen Reading software	10(66.7)	5(33.3)	1.33	7
8	Mobile Telephones	9(60.0)	6(40.0)	1.40	15
9	Smartphones	6(40.0)	9(60.0)	1.60	17
10	Optical Character Recognition Devices	5(33.3)	10(66.7)	1.67	18
11	Stylus	13(86.7)	2(13.3)	1.13	4
12	Synthetic Speech Device	9(60.0)	6(40.0)	1.40	14
13	Smartpens (for capturing spoken word)	4(26.7)	11(73.3)	1.73	25
14	Headphones	10(66.7)	5(33.3)	1.33	6
15	Overlay Keyboard	1(6.7)	14(93.3)	1.93	27
16	Alternative mouse	1(6.7)	14(93.3)	1.93	28
17	Screen Magnification device	9(60.0)	6(40.0)	1.40	16
18	Tape Recorder	10(66.7)	5(33.3)	1.33	8
19	Adjustable Table	3(20.0)	12(80.0)	1.80	24
20	Wrist rests	4(26.7)	11(73.3)	1.73	23
21	Talking Computer	10(66.7)	5(33.3)	1.33	9
22	Scanner	10(66.7)	5(33.3)	1.33	10
23	Writing tool/Computer companion	5(33.3)	10(66.7)	1.67	21
24	Mouth and Chin Sticks	5(33.3)	10(66.7)	1.67	22
25	Tablets (iPad, iPhone or iPod)	9(60.0)	6(40.0)	1.40	13
26	MP3 Players and Recorders	9(60.0)	6(40.0)	1.40	12
27	Adapted and Virtual Keyboards	10(66.7)	5(33.3)	1.33	11
28	Guided cane	13(86.7)	2(13.3)	1.13	5

Table 5 revealed that: 15(100.0%), 15(100.0%), 15(100.0%), 13(86.7%), 13(86.7%) and 10(66.7%) pointed out that Perkin's Brailler, JAWS software, computer systems, stylus, guided cane and headphones are accessible to students with visual impairment while 14(93.3%), 14(93.3%), 11 (73.3), 12 (80.0%), 11(77.3) 10 (66.7%) and 10 (66.7%) indicated that alternative mouse, overlay keyboard, smartpens, adjustable table, wrist rests, writing tool/computer companion and mouth and chin sticks respectively are not accessible to them . It implies that accessibility of digital technologies for students with visual impairment is moderate.

RQ6: What is the level of acceptance of digital technologies by higher education students with visual impairments?

Table 6: Acceptance of digital technologies by HES with visual impairment

S/N	Item	HA(%)	MA	LA	Mean	Rank
1	Perkin's Brailler	11(73.3)	4(26.7)	0(0.0)	1.27	2
2	Braille Display Strip	2(13.3)	5(33.3)	8(53.3)	2.40	26
3	Braille note taking devices	4(26.7)	5(33.3)	6(40.0)	2.13	20
4	Paperless Braille equipment	3(20.0)	5(33.3)	7(46.7)	2.27	25
5	JAWS software	11(73.4)	2(13.3)	2(13.3)	1.40	6
6	Computer Systems	13(86.7)	2(13.3)	0(0.0)	1.13	1
7	Screen Reading software	6(40.0)	6(40.0)	3(20.0)	1.80	17
8	Mobile Telephones	9(60.0)	3(20.0)	3(20.0)	1.60	12
9	Smartphones	10(66.7)	2(13.3)	3(20.0)	1.53	9

10	Optical Character Recognition Devices	3(20.0)	7(46.7)	5(33.3)	2.13	21
11	Stylus	10(66.7)	5(33.3)	0(0.0)	1.33	4
12	Synthetic Speech Device	6(40.0)	7(46.7)	2(13.3)	1.73	15
13	Smartpens (for capturing spoken word)	2(13.3)	3(20.0)	10(66.7)	2.53	28
14	Headphones	6(40.0)	8(53.3)	1(6.7)	1.67	14
15	Overlay Keyboard	2(13.3)	10(66.7)	3(20.0)	2.07	18
16	Alternative mouse	3(20.0)	6(40.0)	6(40.0)	2.20	22
17	Screen Magnification device	8(53.3)	4(26.7)	3(20.0)	1.67	13
18	Tape Recorder	9(60.0)	6(40.0)	0(0.0)	1.40	7
19	Adjustable Table	3(20.0)	6(40.0)	6(40.0)	2.20	23
20	Wrist rests	2(13.3)	8(53.3)	5(33.3)	2.20	24
21	Talking Computer	10(66.7)	3(20.0)	2(13.3)	1.47	10
22	Scanner	10(66.7)	5(33.3)	0(0.0)	1.33	3
23	Writing tool/Computer companion	4(26.7)	6(40.0)	5(33.3)	2.07	19
24	Mouth and Chin Sticks	2(13.3)	4(26.7)	9(60.0)	2.47	27
25	Tablets (iPad, iPhone or iPod)	5(33.3)	8(53.4)	2(13.3)	1.80	16
26	MP3 Players and Recorders	10(66.7)	3(20.0)	2(13.3)	1.47	8
27	Adapted and Virtual Keyboards	8(53.3)	5(33.2)	2(13.3)	1.60	11
28	Guiding cane	9(60.0)	6(40.0)	0(0.0)	1.40	5

Table 6 revealed that: 13(86.7%), 11(73.3%), and 10(66.7%) respectively pointed out that have high acceptance for computer systems, Perkin's Brailler and scanner while 10(66.7%), 9(60.0%) and 8(53.3%) indicated that smartpens, mouth and chin sticks and Braille Display strip are not acceptable to them. It implies that digital technologies acceptance by students with hearing impairment is moderate.

Discussion of Findings

The findings of research questions 1-3 showed that among students with hearing impairment in higher educational institutions, digital technologies are unavailable and inaccessible. The findings also indicate low acceptance of digital technologies among higher education students with hearing impairment. These findings agree with the findings of Ogunwale and Oyewumi (2015) that technological devices are unavailable and inaccessible to students with hearing impairment in secondary schools in Oyo State, Nigeria. The findings also support that of Georgeeson et al (2015) that higher education students do not have the correct digital capital to succeed in their studies. This implies that students with hearing impairment do not have the right tools to succeed in their academics. Stakeholders should address this shortfall.

However, the findings of research questions 4-6 revealed that students with visual impairment agreed that digital technologies are moderately available in their institutions and moderately accessible to them. They also demonstrated that they have moderate acceptance for digital technologies. The present findings corroborate the findings of Opara, Okoro and Iheme (2016) on availability of devices to students with visual impairment in secondary schools in

Imo State, Nigeria but contradict the finding of Komolafe (2015) that very few devices are available to secondary school students with visual impairment. However, despite participants' moderate agreement to the state of digital technologies in their institutions, they still identified that devices such as paperless Braille equipment, smartpens, mouth and chin sticks are not available; alternative mouse, overlay keyboards, smartpens, adjustable tables, wrist rests, writing tool/computers companion and mouth and chin sticks are not accessible to them. These findings again suggest the need for urgent intervention by stakeholders. The reason is because when digital technologies are provided to all students including those with special needs, students find it easier to engage in independent, individualized and small group learning activities for improved academic achievement and functioning in society.

Conclusion

This study has found that among higher education students with hearing impairment, there is low availability, accessibility and acceptance of digital technologies. However, the study has showed that higher education students with visual impairment agreed that there is moderate availability, accessibility and acceptance of digital technologies. Thus, this study concludes that availability, accessibility, and acceptance of digital technologies should be the concern of government, administrators, lecturers, technologists and students with special needs themselves in order to harness the opportunities provided by digital technologies.

Recommendations

In view of the findings of this study, the following recommendations were made:

1. The Nigerian government at all levels should brace up to their responsibilities and provide digital technologies for students with special needs in higher educational institution in the country, particularly those with hearing impairment.
2. 'Non-governmental organisations, religious bodies, parents, philanthropists should assist in the provision of digital technologies for students with special needs.
3. In order to raise the level of digital technologies acceptance among higher education students with special needs especially, those with hearing impairment, higher educational institutions should organize regular sensitization programmes in form of workshops, seminars, digital technology fairs and exhibitions for students with special needs.
4. Administrators and technologists should put in place proper maintenance system to ensure the durability of available digital technologies in higher educational institutions in Nigeria.

References

Ajobiewe A.I. & Ojebode P.A. (2016) Assistive technology for persons with special needs. In S. Kabue, H. Ishola-Esan and I. D. Ayeboyin (Eds.). Perspectives on disability: A resource for theological and religious studies in Africa, Ibadan: Baptist Press, pp. 15-,26.

Atkinson, R. D., & Castro, D. D. (2008). Digital quality of life: Understanding the personal and social benefits of the information technology revolution. Washington, DC: Information Technology and Innovation Foundation (ITIF). Retrieved on March 5, 2018 from http://www.itif.org

British Educational Technology Agency (BECTA, 2001). Visual impairment and ICT. Milburn Hill Road, Science Park, Coventry. Retrieved from March 7, 2006, from http://www.aten.scps.k.12.fl.us/.URL:http://wwwbectaorg.uk.

Federal Republic of Nigeria (2013). *National Policy on Education.* Abuja: Government Press.

Georgeson, S. J. Mamas, C. & Swain, J. (2015). Not the kind of "digital capital"? an examination of the complex relationship between students with disabilities, their technologies and higher education institutions, *Computers and Education,* 82, 118-128.

Hayes, H. B. (2013). How technology is helping special-needs students excel. Retrieved on March 2, 2018 from https:edtechmagazine.com/k12/article/2013/03/how-technology-helping-special-needs-students-excel

Komolafe, A. F. (2015). A survey of the types, availability and usage of assistive technological devices by students with blindness in Lagos State, Nigeria. *Journal of Special Education,* 13(1), 59-68.

Ogunwale, O. R. & Oyewumi, M. A. (2015). Usage and accessibility of assistive technology among teachers of students with hearing impairment in Oyo State. *Paper presented at University of Kishi Conference, Kenya,* between 23rd-27th June 2015.

Opara, U., Okoro, U. N., & Iheme, M. A. (2016). The use of ICT and assistive technology as an integral teaching and learning tools for learners with visual impairment in inclusion in Nigeria. *Journal of Special Education,* 14 (1), 138-146.

Pudaruth, S., Gunputh, R. P. & Singh, U. G. (2017). Forgotten, excluded or included? Students with disabilities: A case study at the University of Mauritius, *African Journal of Disability,* 6(0), a359. https://doi.org/10.4102/ajod.v6i0.359

Sultan, N. & Hayhoe, S. (2013). Assistive technologies for students with special needs at the Higher Colleges of Technology, UAE. In S. Dowling, C. Gunn, J. Raven and S. Hayhoe (Eds.). eLearning in action: Redefining learning. Abu Dhabi. HCT Press.