



Research Article

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Digitization of Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria

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Abstract

The purpose of this study was to assess the level of digitization of Educational Technology Centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria in order to provide information that will help solve problems of incompetence of public school students in Information and Communication Technology (ICT). The study, guided by two research questions and two hypotheses was conducted in six Colleges of Education in North Eastern Nigeria using descriptive survey research design. The sample of the study was 50 comprising of 15 non-teaching Educational Technology Centres staff and 35 Electrical and Electronics Technology lecturers from five colleges of education in North Eastern Nigeria. Checklist containing 103 expected digital facilities based on National Commission for Colleges of Education (NCCE) minimum standard for Educational Technology Facilities in Colleges of Education in North Eastern Nigeria was used as instrument for data collection. Respondents were required to fill in observed facilities in the required column. Arithmetic percentage and Chi-square test of goodness-of-fit and were used determine the extent of digitization of the Educational Technology Centres in Colleges of Education in North Eastern Nigeria. Findings of the study revealed among others that analog technologies has higher number of frequency counts compared to digital technologies, hence there was low digitization of hardware facilities in Educational Technology Centres in Colleges of Education in North Eastern Nigeria. The study therefore concluded that Educational Technology Centres in Colleges of Education in North Eastern Nigeria were not digitized for instructional purposes; therefore, Government should digitize Educational Technology Centres in Colleges of Education in North Eastern Nigeria by adequately providing both digital hard and soft ware facilities.

Keywords: Digitization, Educational Technology, Centres, Teaching, Colleges of Education

1. Introduction

Education is dynamic and tends to follow the pattern of development in the world and industrial revolution taking place in the global arena. To be relevant in a in speedily changing society in which

technology transform every sector, learners are expected to; beside having mastery in art of communication, maths technology and sciences, it is imperative to have skills and competencies in areas such as critical thinking, problem-solving, persistence, and collaboration. However, learners in many countries are not attaining these skills. The World Economic Forum has observed a multi-year initiative, "New Vision for Education", to evaluate the pressing issue of skills and competency gaps and explore ways to address such gaps through provision of recent digital educational facilities for teaching (World Economic Forum, 2015).

The call for the application of digital technologies learning facilities in instructional delivery in COEs is a means of infusing and injecting efficiency and effectiveness in curriculum implementation in technical education. However, in developing countries like Nigeria, the use of digital technologies in instructional delivery is challenged with problems ranging from lack of trained personnel, digital technologies learning materials such as computers, on-line internet computers, telephones, wireless scanners, printers, e-mail facilities, multimedia television, multimedia projectors, digital Libraries, computer assisted instructions (CAIs) among others (Global Information Technology Report, 2005 in Atueyi & Ikemelum, 2014).

Colleges of Education have not discharged their duties well in equipping present day youths with relevant teaching skills necessary for effective instructional delivery in the 21st Century (Ololube, Ubogu & Egbezor, 2006). The inability to integrate recent digital technologies in instructional delivery in may put the Colleges of Education at a global competitive disadvantage as the colleges would probably be producing low quality teachers at higher cost. The danger here is that if analog and absolute facilities remain in instructional delivery in the Colleges of Education, the objectives of Technical Education in Nigeria may become an illusion and may have a ripple effect on higher education. This situation will eventually bring the Colleges of Education to a halt and eventually pose serious limitations to students' learning (Ibidapo-Obe, 2007).

The development and impact of digital technologies necessitated educational technology centres in Colleges of Education in North Eastern Nigeria to migrate from analog to digital technologies for the sole purpose of equipping teachers with relevant skills (such as digital technologies and information technology literacy; problem-solving skills and the ability to use digital technology in evaluating and utilizing information and communication technologies for problem-solving in addition to knowledge of subject's contents) as stipulated in the National Policy on Education (FRN,2013). These knowledge components often considered as ICT-literacy has become part of basic labour requirements in knowledge driven societies and a necessary foundation for higher and lower levels of education and professional development.

Information and Communication Technology (ICT) has produced changes in the economic, political and educational sphere of our daily lives, such that it has become an important index of national and economic development and basic building block of modern society. Globally, the ICT world has initiated a transition of emphasis from analog educational research based technological development to that of digital knowledge based technological development in education (Jude & Dankoro, 2012). Digital technologies for teaching and learning became the strategic alternatives for the Colleges of Education to enhance effective and efficient delivery of quality education.

Among the issues that permeate the educational literature in 21st century include: the need to provide youths with necessary tool to succeed by providing them with a means to understand how to gain cognizance with the subject matter effectively and develop problem solving skills which are significant and adaptive, to produce students who are creative, communicative and inventive as well as been culturally compassionate and conscious in all situations and conduct themselves in a socially responsible way, and the demand for developing in the learners, digital literacy in order to keep in phase with recent technological developments which present numerous promises and also needs the opinion to make sure the influence of technology is utilized reliably in what Gardner (2012) called " good work". Educational resources are crucial in curriculum development and implementation in Nigerian technical colleges. This is evident in the movement of developing countries to develop STEM curriculum to train learners for the challenges of the information age. Some have proposed that (STEM) acronym should be expanded to that of Science, Technology, Engineering, Arts, Language, and Mathematics (STEAM) if educators truly wish to embrace creativity and innovation in all its forms (Catchan, 2013). In contemporary society Colleges of

Educations have transformed to encompass dual modes where both online and on-campus learning options are available (Power, 2008). New digital facilities allow more flexible and innovative educational technology and course design solutions (Olofsson & Lindberg, 2012; Schneckenberg, 2009). This is also the case in Education, where the use of digital facilities to enhance students' learning has grown rapidly (Maley, Harvey, De Boer, Scott, & Arena, 2008).

In order to cope effectively with challenge of equipping teachers with knowledge that bears relevance to the present need of 21st century of digital ICT age, ETCs that contain analog facilities in Colleges of Education in North Eastern Nigeria need to migrate from analog technologies to digital technologies at all levels. Such migration need to reflect on meaningful changes in infrastructure, educational technology facilities, curriculum and pedagogical practices (Emmanuel, Chiaka, & Edna, 2014). This transformational in the mode of imparting knowledge to students is the prime concern of educational business ((Ololube, Ubogu & Egbezor, 2006). The compelling need therefore to know the level of digitization of educational technology centres to accommodate the wide range of digital literacy shift in for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria cannot be overemphasized.

1.1 Purpose of the Study

The purpose of this study was to investigate the level of digitization of Educational Technology Centres for teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria and specifically to determine the:

1. Extent of digitization of hardware in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?
2. Extent of digitization of software in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?

1.2 Research Questions

To achieve the above stated specific purposes, the following research questions were used to guide the study:

1. To what extent are hardware digitized in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?
2. To what extent are software digitized in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?

1.3 Research Hypotheses

Two hypotheses guided the study as follows:

HO₁: There is no significant difference between the number of digital and analog hardware in Educational Technology Centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria.

HO₂: There is no significant difference between the number of digital and analog software in Educational Technology Centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria.

2. Methodology

The study which employed a descriptive survey design was carried out in North Eastern Nigeria which lies between Latitude 6° 18' to 14° 32' N and Longitude 10° 11' to 14° 35' E (Mohammed, 1999). The area of the study was chosen because there are adequate colleges of education where electrical and electronics technology education is taught. The population of the study was 50, comprising of 15 non-teaching educational technology centres staff and 35 electrical and electronics technology lecturers from five colleges of education in North Eastern Nigeria. The whole population was used for the study hence, there was no sampling.

The instrument used for data collection was a checklist containing 103 expected facilities based on National Commission for Colleges of Education (NCCE) minimum standard for educational technology facilities in Colleges of Education in North Eastern Nigeria. Respondents were required to fill in observed facilities in the required column against the column for expected facilities.

Data collected for the study was analyzed the arithmetic percentage and chi-square test of goodness-of-fit. The arithmetic percentage was used to answer the two research questions while the chi-square test of goodness-of-fit was used to test the two null hypotheses at 0.05 level of significance. All the data analyses were conducted using Statistical Package for Social Sciences (SPSS) version 20.0 for windows. The decision on the extent of digitization of facilities for teaching electrical and electronics technology in educational technology centres based computed percentages of observed facilities was as follows: 76-100%; Very High Extent, 51-75%; High Extent, 26-50%; Low Extent and 00-25%; Poor Extent.

3. Results

Results of the study were presented as follows:

3.1 Research Question 1

To what extent are hardware digitized in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?

Table 1. Extent of Digitization of Electrical and Electronics Hardware Facilities in Educational Technology Centres

S/N	Items	No. Observed	No. Expected	Percentage Observed	Remarks
1	CCTV (Closed Circuit Television)	5	12	42	LE
2	VCD (Video Compact Disc) player	15	2242	0.7	LE
3	CD-RW (Rewritable Media)	12	2242	0.5	LE
4	On-Line Computers	1	2073	0	LE
5	Opaque Projectors with accessories	30	468	6	LE
6	Slide Projector with Accessories	42	468	9	LE
7	Over Head Projector with Accessories	44	429	10	LE
8	Duplicating Machine	17	46	37	LE
9	Photocopiers	40	66	61	HE
10	Video Home System (VHS)	28	225	12	LE
11	16 mm Film Projectors	32	81	40	LE
12	35mm Film Projectors	40	56	71	HE
13	Film Strips Projectors	32	441	7	LE
14	Off-Line Computers	18	282	6	LE
15	Scanners	4	60	7	LE
16	Printers	4	78	5	LE
17	Multi-Media Television	17	233	7	LE
18	Multi-Media Projector	21	124	17	LE
19	Digital Photographic Equipment	3	264	1	LE
20	Motion Pictures Layer 3 (MP 3)	4	2244	0	LE
21	Motion Pictures Layer 4 (MP 4)	0	2038	0	LE
22	Interactive Boards	4	274	2	LE
23	Still Cameras	16	2076	1	LE
24	Video Cameras	18	654	3	LE
25	Converters	0	2055	0	LE
26	Optical Readers	0	445	0	LE
27	Multi-Media digital Storage	3	2244	0	LE
28	i-pads	1	2244	0	LE

Key: HE = High Extent, LE = Low Extent

Table 1 indicated low digitization in 26 items while two items which includes item 9; photocopiers and item 12; 35mm film projectors which are analog facilities had high percentages, indicating that 26 out of 28 hardware for teaching Electrical and Electronics Technology in Educational Technology Centres in Colleges of Education in North Eastern Nigeria are not digitized.

3.2 Research Question 2

To what extent are software digitized in Educational Technology Centres for Teaching Electrical and Electronics Technology in Colleges of Education in North Eastern Nigeria?

Table 2. Extent of Digitization of Electrical and Electronics Software in Educational Technology Centres

S/No	Items	No. Observed	No. Expected	Percentage Observed	Remarks
29	Multi-Sim	0	82	0	LE
30	Electronics Work Bench	0	82	0	LE
31	Web 2.0	0	82	0	LE
32	Wikis	0	82	0	LE
33	Podcast	0	82	0	LE
34	Blogs	2	82	2	LE
35	Stencils	38	82	46	LE
36	Audio Tapes	143	82	174	HE
37	Video Tapes	272	82	331	HE
38	Slides	479	82	584	HE
39	16 mm Films	49	82	60	HE
40	35 mm Films	14	82	17	LE
41	Video Cassettes	261	82	318	HE
42	Tempo Markers	37	82	45	LE
43	Poster Colors	22	82	27	LE
44	Over Head Transparencies	73	82	89	LE
45	Transparency Pens	93	82	113	HE
46	Micro Soft Power Point	6	82	7	LE
47	Micro Soft Excel	3	82	4	LE
48	Magnifier	3	82	4	LE
49	Micro Soft Out Look	4	82	5	LE
50	E-microscopes	4	82	5	LE
51	Micro Soft Picture	4	82	5	LE
52	Smart Board	4	82	5	LE
53	Online Images	2	82	2	LE
54	Online Posters	0	82	0	LE
55	Online Graphics	2	82	2	LE
56	Clip Arts Images	1	82	1	LE
57	Internet Protocol Camera	0	82	0	LE
58	Online Maps	0	82	0	LE
59	Graphics software	5	82	6	LE
60	Web Cams	0	82	0	LE
61	Dictionary	5	82	6	LE
62	Computer Assisted Instruction Packages	3	82	4	LE
63	E-Mail Facilities	0	82	0	LE

Key: HE = High Extent, LE = Low Extent

Table 2 indicated low digitization of 29 items while six analog items had high extent of digitization, indicating that 29 out of 35 software items for teaching Electrical Electronics Technology in the Educational Technology Centres and are low digitized. This indicated that digitization of software is yet to be embraced in Educational Technology Centres for teaching Electrical and Electronics Technology in Colleges of Education in Northeastern Nigeria.

3.3 Hypothesis 1

There is no significant difference between the number of digital and analog hardware in Educational Technology Centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria.

Table 3. Chi-Square Test of Difference in the Number of Hardware in Educational Technology Centres

S/N Technology	Total	χ^2 cal.	χ^2 crit.	Df	Decision
1 Digital	23	23315.3	40.113	26	Rejected
2 Analog	5				

In table 3 above, Chi-square statistics result showed that $\chi^2_{cal.} = 23315.3$ was greater than $\chi^2_{crit.} = 40.113$ hence the null hypothesis was rejected indicating a significant difference in the number of digital and analog electrical and electronics hardware in Educational Technology Centres in Colleges of Education in North Eastern Nigeria.

3.4 Hypothesis 2

There is no significant difference between the number of digital and analog software in Educational Technology Centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria.

Table 4. Chi-Square Test of Difference in the Number of Software in Educational Technology Centres

S/N Technology	Total	χ^2 Cal.	χ^2 Crit.	Df	Decision
1 Digital	24	4772.1	46.194	33	Rejected
2 Analog	11				

Table 4 showed Chi-square statistics result with $\chi^2_{cal} = 4772.1$ which is greater than $\chi^2_{crit.} = 46.194$ hence the null hypothesis was rejected indicating that there was significance difference in the number of the digital and analog electrical and electronics software in Educational Technology Centres in Colleges of Education in North Eastern Nigeria

3.5 Findings of the Study

Based on the data analyzed with respect to the two research questions and two null hypotheses that guided the study, the following findings emerged.

1. There is low digitization of hardware facilities for teaching electrical and electronics technology in educational technology centres in Colleges of Education in North Eastern Nigeria.
2. There is low digitization of software facilities for teaching electrical and electronics technology in educational technology centres in Colleges of Education in North Eastern Nigeria
3. There was significant difference between the expected digital and analog hardware for teaching electrical and electronics technology in educational technology centres in Colleges of Education in North Eastern Nigeria
4. There was significant difference between the expected digital and analog software for teaching electrical and electronics technology in educational technology centres in Colleges of Education in North Eastern Nigeria

3.6 Discussion

Findings of the study regarding research question 1 revealed low extent of digitization of hardware facilities for teaching electrical and electronics technology in Educational Technology Centres in Colleges of Education in North Eastern Nigeria. The finding showed that both analog and digital hardware facilities are low digitized in the Educational Technology Centres. Longe, (2013) argue in support of the findings of the study, public and private colleges have inadequate analog/digital facilities for teaching in ETCs. In response to the condition of Educational Technology Centre for effective teachers education in Nigeria, Udo (2006), agreed that availability, relevance and adequacy of hardware contribute to perceived students' learning outcome. The findings of this study however, disagreed with the findings of Oyeronke, Ogunlade, and Amos (2013), that facilities and equipment in educational technology centres in some selected Universities in Nigeria were averagely adequate. The difference in these findings was seen to be largely due to the fact that the study conducted by Oyeronke, Ogunlade, and Amos (2013), was conducted in the Universities where the National Universities Commission (NUC) placed more emphasis on educational technology.

Findings on research question 2 revealed low extent of digitization of software facilities for teaching electrical and electronics technology in Educational Technology Centres in Colleges of Education in North Eastern Nigeria. It was found out that a wide difference exists between the analog and digital software expected in Educational Technology Centres in Colleges of Education in North Eastern Nigeria. Both analog and digital software are not adequate in the Educational Technology Centres, an indication that the process of digitization of software in the Educational Technology Centres is slow. This finding was in agreement with findings of Tella (2011), who in his study found that software such as compact disks (CDs) and other digital and analog software were not available, let alone, being used for instructional purpose in colleges of education in South Western Nigeria. The findings also agreed with the findings of Wodi (2009), on the concept of educational technology and the problems prospects of Information and Communication Technology (ICT) in Nigeria. Wodi (2009) found out that soft wares produced overseas are grossly unavailable for teaching and learning in the nations' undergraduate programmes.

Findings of the study on hypotheses 1 and 2 revealed that a significant difference existed between the expected digital and analog electrical and electronics hard and soft wares in educational technology centres in for teaching electrical and electronics technology Colleges of Education in North Eastern Nigeria. The inadequacies of most of the facilities are absoluteness and non-functionality. In line with these findings was that of Oshinaike and Adekunmisi, (2012), whose findings indicated that multimedia hard and soft wares in Nigerian University System are grossly inadequate.

4. Conclusion

Based on the results of this study, it can be concluded that both hard and soft ware facilities in educational technology centres for teaching electrical and electronics technology in Colleges of Education in in North Eastern Nigeria are not digitized hence cannot be connected with the computer for classroom instruction. Both hard and software facilities in the educational technology centres are not adequate when compared to the number of students that utilize the facilities. The study also concluded that significant difference existed between the expected digital and analog hard and soft wares in educational technology centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria.

5. Recommendations

Based on the conclusions, the following recommendations were drowned to the issues addressed by the research questions and hypotheses of this study:

1. Government should digitize the educational technology centres in Colleges of Education in North Eastern Nigeria by adequately providing both digital hard and soft wares facilities

2. More digital hard and soft ware facilities should be procured in educational technology centres for teaching electrical and electronics technology in Colleges of Education in North Eastern Nigeria

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