



Availability and Utilization of ICT Resources for Increasing Competency among Lecturers in Bauchi State College of Education

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ABSTRACT

The study assessed the availability and utilization of information and communication technology (ICT) by science teachers of the school of science Aminu Saleh College of Education Azare, Bauchi State Nigeria. A descriptive, survey research design was employed for the study. Three research questions and one hypothesis were formulated to guide the study. The population comprised of one hundred and one teachers of the school. Sixty four samples were drawn using disproportionate stratified sampling for the study. Three and four point Likert scale type questionnaire was developed by the researchers respectively, validated by experts and internal consistency calculated using SPSS and used for data collection. Data collected were analyzed using mean, standard deviation and Spearman's rank correlation. The findings revealed that there were inadequate ICT resources for teaching Science subjects. Science teachers of Aminu Saleh College of Education Azare possess ICT skills but do not utilize it especially in lesson delivery. The study found that there was no relationship between availability of ICT resources $r = 0.609$; $p = 0.062$ and utilization of ICT resources $r = 0.527$, $p = 0.117$ to teachers competence. The results also revealed challenges faced by the science teachers as: poor students ICT background, unreliable power supply etc. It was recommended among others based on the findings that the government should embark on a massive ICT training program for students as well and provide more ICT resources for teachers and students as well as provide constant electricity to schools.

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INTRODUCTION

Our world is constantly changing, it is becoming increasingly characterized by technology driven communication, which has transformed the world into a large global connected community with ever-increasing outreach of information and communication technology (ICT) (Danner and Pessu, 2013). Today, we are living in 21st century as we move through the information age, technological advances are changing including our educational sector. Use of ICT resources in classrooms for teaching science has recently increased

dramatically in many developed countries and proved to be very effective tool in the teaching of science related subjects (Aramide, Olajojo and Adekanye, 2013). In recent years, Joint Admission and Matriculation Board (JAMB) implemented computer based testing (CBT) for Unified Tertiary Matriculation Examination (UTME) with the objective of eliminating all forms of examination malpractices and promote use of ICT in Nigeria (Abubakar and Adebayo, 2014). In this regard, students in secondary school should be exposed to the use of Information and



Communication Technology to confront CBT (Osadebe and Ojukonsin, 2018). Successful teaching with the use of Information and Communication Technologies in schools can help students to develop skills both specific to computer, and more generally, that will be useful for them in their future professional and academic lives. Such students will have the advantage of being able to use these computer skills to access, generate, compile, distribute and exchange information effectively. In the developed world today, numerous experiences with educational technology in higher education exist which resulted in new opportunities in the integration of pedagogical and technological resources, and has enlarged flexibility across the learning process (Danner and Pessu, 2013). It has been widely acclaimed that for Nigeria's vision 20:2020. Danner and Pessu, (2013) reported that to achieve vision 20: 2020 in education, especially teacher development, ICT will play a key role.

Nigerian government has made frantic effort to infuse information technology in all its sectors including the education sector. This was brought to limelight through National Information Technology Development Agency (NITDA) and Nigerian Communications Commission (NCC) interventions on ICT in educational sector. The ICT interventions of NITDA to education include: 660 ICT centres established in secondary and tertiary schools across the federation, 399 scholarship awarded and over 200 disability training on ICT (NITDA, 2019). The NCC (2019) pointed out their current ICT in educational sector initiatives and milestones as follows:

i. The Advanced Digital Awareness Programme for Tertiary Institutions (ADAPTI) is aimed bridging the digital gaps that exists in academia by providing computers, other ICT equipment and the necessary facilities to provide lecturers, staff and students with the requisite ICT skills

essential for the 21st Century. The NCC supplies computers and other ICT equipment, including scanners and printers to the beneficiary institutions. This includes also, the provision of suites of E-Learning applications for academics and students in tertiary institutions across the country. As at 2015, a total of 21,928 beneficiaries across institutions in Nigeria were benefited.

- ii. Digital Awareness Programme designed to bridge digital information knowledge gap among the youths. Internet access is provided for both teachers and students. Currently supports 229 Secondary schools across the six-geo political zones.
- iii. The Wireless Cloud Project provides a platform for supporting campus-wide wireless access to internet service for teaching, learning, research and development to faculty staff and students of the nation's Colleges of Education, Polytechnics and Universities. The Commission provides the necessary infrastructure, including masts, antennas, networking and twelve (12) months bandwidth supply and maintenance support. The Wireless Cloud project has benefitted numerous tertiary institutions in all six of the nation's geopolitical zones and the Federal Capital Territory. Pilot project covers five schools in each geo political zone.
- iv. Telecoms based Research and Development publications which funded four research proposals from academia and many more on-going.
- v. Research on New and Emerging Technologies: four research works so far have been conducted. These are wearable technologies, survey on Drone technology, comparative analysis between LTE and WIMAX, and next generation network convergence.

In addition, the college established an indigenous college portal/website



applications for online registration and internet access to students and staff to help upgrade its systematic operations and address inadequacies of traditional method of the college. Similarly, the college benefited donation (from NCC) of e-Pads with learning suits distributed to staff to create digital awareness and enhance the use of ICT for academic development. This is also help to facilitate easier access to globally available intellectual resources that improves teaching, learning, research and development in the College.

It is against these several ICT initiatives this research is triggered by the fact that availability and utilization of ICT for science teaching needs to be assessed; hence the researchers study lecturers of school of science, Aminu Saleh College of Education as a case study. This work will also give an insight into the level of ICT competencies among the science lecturers of school of science, Aminu Saleh College of Education, Azare.

Objectives

The main purpose of the study is to assess teachers' level of competency in the utilization of ICT tools for teaching science courses in Aminu Saleh College of Education, Azare, Bauchi State. Specifically, the study examined the:

- i. Lecturers opinion on the level of availability of ICT resources the departments of school of science, Aminu Saleh College of Education, Azare (ASCOEA),
- ii. Lecturers opinion on their level of ICT utilization,
- iii. Lecturers opinion on their level of ICT Competency,
- iv. Lecturers opinion on the challenges to ICT Utilization in teaching Science courses.

Research Questions

The following questions were raised for the study and answered:

- i. What is the lecturers opinion on the level of Availability of ICT resources

various departments of school of science, Aminu Saleh College of Education, Azare?

- ii. What is the lecturers' opinion on the level of ICT utilization in school of science, ASCOEA?
- iii. What is the lecturers' opinion on their level of ICT Competency?
- iv. What are the lecturers' opinions on the challenges to ICT Utilization in teaching Science courses at ASCOEA?

Research Hypothesis

Based on the research questions raised and answered the following hypotheses were formulated and tested in the study:

H₀: There is no significant status of joint relationship of availability of ICT, level of ICT utilization (independent variables) and ICT competency (dependent variable) by science teachers in Aminu Saleh College of Education, Azare.

METHODOLOGY

The study employed a descriptive survey method. The population of the study comprised all 101 lecturers from school of science, Aminu Saleh College of Education, Azare where the study was conducted. A sample of 80 was calculated (out of 101) at 95% confidence level and 0.05 margin of error (adopted from The Research Advisors, 2006). However 64 (80% of the targeted sample) science lecturers were reachable at the time of the study. Stratified (disproportionate) sampling technique was used to sample the subjects.

Three research questions and two hypotheses guided the study. The instrument for data collection was a 40 items questionnaire structured on a 3 and 4 – points modified Likert-type scale developed by the researchers. A modified instrument tagged Teachers ICT use survey adapted from ICT survey indicator for teachers and staff by UNESCO, (2013) and Ngwu, (2014) were adopted and used to gather data on the study. The instrument consists of two sections. The section 1



request the respondents' demographic information like gender, department, highest qualification and teaching experience. The second instrument was a questionnaire of four parts. Part one contains 10 items to elicit information on the extent of availability of ICT resources by science teachers. The instrument was designed on a three point scale, thus Available (3), fairly available (2) and not available (1) for availability of ICT resources for teaching science courses. Part two contains 10 items to elicit information on the level utilization of ICT resources by science teachers. It was designed on three point scale; thus frequently used (3), rarely used (2) and not used (1). Part three contains 10 items to elicit information on the level science teachers ICT competency. Also designed on three point scale; thus highly skilled (3), skilled (2) and not skilled (1). The last part also contain 10 items to elicit information on the challenges to utilization of ICT in teaching science courses. It was designed on 4 point scale; thus Strongly Agree – SA (4), Agree –A (3), Disagree –D (2) and Strongly Disagree – SD (1).

To establish the validity, the instrument was subjected to the scrutiny of three experts who evaluated the relevance of each item in the instrument to the objectives. The experts rated each item as suitable or otherwise on a scale. Once the questionnaire was designed and rated, the content validity index (CVI) was then computed as follows:

$$CVI = \frac{t_i \quad n_i \quad o \quad i \quad t \quad b \quad j \quad i}{t_i \quad n_i \quad o \quad q}$$

A content validity index of 0.88 was established. The instrument was trial

tested on 32 (32) lecturers drawn randomly from other schools of the college. The result was used to compute the internal consistency of the instrument using SPSS deploying Cronbach's Alpha method of internal consistency to measure instrument's consistency. A reliability index of 0.86 was established.

64 Questionnaires were administered and retrieved on the spot thereby ensuring 100% return of the questionnaire. Data were analysed using Statistical Package for Social Science (SPSS) version 23. The 3 research questions were answered using means and standard deviation. In the first part of the questionnaire, a mean of 2.50-3.00 and above indicated availability (adequate) of ICT resources, 2.0-2.49 indicated availability but inadequate and less than 2.00 indicated non-availability. On the second part, a mean of 2.50-3.00 indicated frequent utilization of ICT resources, 2.00-2.49 indicated rare utilization and less than 2.00 indicated non utilization. On the third part, a mean of 2.50-3.00 indicated high ICT competence (skilled), 2.00-2.49 indicated average competence (skilled) and less than 2.00 indicated non competence. On the last part, a mean of 2.50-4.00 indicated that the respondents agreed with the item on the questionnaire while a mean of 2.49 and below indicated disagreement with the item on the questionnaire.

Spearman's rank correlation coefficient was used to show significant status of joint relationship of availability of ICT, level of ICT utilization (independent variables) and ICT competency (dependent variable) by science teachers in Aminu Saleh College of Education, Azare.



RESULTS AND DISCUSSION

Table 1: Availability of the ICT resources in the Department

S/N	Item	Total	Mean	Interpretation
1	Computer Laboratories	142	2.22	Inadequate
2	Internet Facilities/ Wireless Network Technology	129	2.02	Inadequate
3	Video conferencing equipment	101	1.58	Not available
4	Multimedia projector	170	2.66	Available
5	Projection Screen	192	3.00	Available
6	Smart/Interactive Board	145	2.27	Inadequate
7	Computer/Electronic Workshop	111	1.73	Not available
8	ICT Spare parts and Accessory Room	86	1.34	Not available
9	Standby Generator/Solar Power	120	1.88	Not available
10	School Portal/Website	147	2.30	Inadequate
Mean aggregate			2.10	

Table 2: Level of ICT utilization by the respondents

S/N	Item	Total	Mean	Interpretation
1	Use of Microsoft Office for preparing lecture notes	170	2.66	Frequent
2	Use of Spreadsheet (Microsoft Excel) for computing and recording students' scores	157	2.45	Fairly used
3	Use of Microsoft Access for generating students database	110	1.72	Not used
4	Use of PowerPoint in preparation of slides for lesson delivery	101	1.58	Not used
5	Use of Projector for PowerPoint, Animation/Video presentation during teaching	101	1.58	Not used
6	Use of Smart/Interactive board for lesson delivery	88	1.38	Not used
7	Provide course materials online for students access	107	1.67	Not used
8	Give online-based assignments to students	85	1.33	Not used
9	Obtain students feedback through email or fax machines	77	1.20	Not used
10	Use various search engines to download current information for lesson delivery	132	2.06	Fairly used
Mean aggregate			1.76	Not used



Table 3: Respondents Level of ICT Competency

S/N	Item	Total	Mean	interpretation
1	Use of Microsoft Office for preparing lecture notes	156	2.44	Competent
2	Use of Spreadsheet (Microsoft Excel) for computing and recording students' scores	148	2.31	Competent
3	Use of Microsoft Access for generating students database	146	2.28	Competent
4	Use of PowerPoint in preparation of slides for lesson delivery	142	2.22	Competent
5	Use of Projector for PowerPoint, Animation/Video presentation during teaching	142	2.22	Competent
6	Use of Smart/Interactive board for lesson delivery	114	1.78	Not Competent
7	Provide course materials online for students access	120	1.88	Not Competent
8	Give online-based assignments to students	114	1.78	Not Competent
9	Obtain students feedback through email or fax machines	109	1.70	Not Competent
10	Use various search engines to download current information for lesson delivery	138	2.16	Competent
Mean aggregate			2.08	Competent

Table 4: Challenges to ICT Utilization in teaching Science courses

S/N	Item	Total	Mean	Interpretation
1	Insufficient number of computers/functional laboratories	187	2.92	Agreed
2	Insufficient number internet/intranet connected computers	187	2.92	Agreed
3	Insufficient internet speed/bandwidth/unreliable internet connectivity	207	3.23	Agreed
4	Insufficient number interactive/smart board/other educational software	196	3.06	Agreed
5	Inadequate ICT skills	118	1.84	Disagreed
6	Insufficient technical support /training of teachers for using ICT in classroom	133	2.08	Disagreed
7	Restrictive timetable/lack of flexibility in organizing and utilizing ICT for lessons	135	2.11	Disagreed
8	Lack of interest	160	2.50	Agreed
9	Unreliable power supply	184	2.88	Agreed
10	poor students ICT background	213	3.33	Agreed
Mean aggregate		26.88	2.69	Agreed



Table 5: Relationship of availability of ICT, level of ICT utilization and ICT competency by science teachers in Aminu Saleh College of Education, Azare.

		Availability of ICT Resources	Utilization of ICT Resources	Decision
		0.609	0.527	H ₀
		0.062*	0.117*	accepted
ICT Competency	Correlation Coefficient			
	Sig. (2-tailed)			
	N	10	10	
Spearman's rho				

*Not significant at 0.05 level

Tables 1, 2, 3 and 4 answered questions 1, 2, 3 and 4 respectively. The results in table 1 indicated inadequate ICT resources in their department as shown in the mean aggregate. However, multimedia projector and projection screen were available as indicated in items 4 and 5 respectively. On the ICT utilization, table 2 indicated non utilization of ICT resources in teaching science subjects as shown in the mean aggregate. Response of item 1 of the table however, indicated frequent use of Microsoft office (MS) word for preparing lecture notes; items 2 and 10 indicated fair usage of MS Excel and various search engines for computations and recording students' scores and downloading current information for lesson delivery. These results showed that the teachers used ICT resources (computers) in word for preparing lecture notes, computing and recording students' scores and accessing internet to download recent information related to their areas of specialization but fail to use these ICT resources in lesson delivery. This indicated availability of some ICT resources but they are not fully utilized especially in teaching. This corresponds to the study of Tsakatsa, Oyedele, Chikwature and Oyedele, (2019) who stated that ICT resources like, desktop computers, PC computers and data enabled cell phones are available but they are not being fully utilized for teaching and learning purposes. The result also concur with the findings of Aramide, Olajojo and Adekanye (2013), who revealed a low level of ICT use among science teachers while also revealing a low

level of ICT use for laboratory-based/experiment-based activities. Similarly, Ifeakor and Okoli, (2010), found that new technological resources are not sufficiently utilized in science teaching. This has serious implications for the quality of graduates from Nigerian university and colleges' of education system. Many graduates fail to acquire the relevant skills needed for the world of work in this 21st century.

The results in table 3 indicated that science teachers were moderately competent in utilizing ICT resources as shown in mean aggregate. However, they were not competent in items 6, 7, 8 and 9 which indicated non competence in the use of Smart/Interactive board for lesson delivery, provide course materials online for students' access, give online-based assignments to students and obtain students feedback through email or fax machines. This is justified in responses of items 4, 1 and 2 of table 4 which indicated insufficient number interactive/smart board/other educational software, insufficient number of computers/functional computer laboratories and insufficient number internet/intranet connected computers for lesson delivery. This corresponds to the findings of Sabina (2012), who observed that in public secondary schools there is acute shortage of e-learning materials such as on-line/internet connected computers, e-mail facilities, multimedia television, multimedia computer and digital library. Hence, non-availability of



these ICT resources were the cause of teacher incompetence in utilizing them.

In table 4, the teachers agreed that poor students ICT background challenge the teacher utilization of ICT resources. This is in line with the findings of Adako and Aturamu (2006), who reported that more than 80% of Nigerian undergraduates and graduates are unable to adequately utilize the computer and more than 90% by conservative estimate of the Nigerian secondary school students are unable to use computer. Unreliable power supply is another challenge to the utilization of ICT resources as agreed in item 9. This is supported by the findings of Mohammed and Yarinchi (2013), who reported that inadequate power supply is one of the major problems confronting teaching and learning process in Nigeria with particular reference to computer among others as it brings about digression. According to Osakwe (2012), failure to achieve the desired goals and objectives in time, electricity is essential for the operation of all ICT appliances without which they cannot function effectively

A spearman's rank order correlation was run to determine the relationship of availability of ICT, level of ICT utilization and ICT competency (dependent variable) by science teachers in Aminu Saleh College of Education, Azare. The results indicated that there was no relationship between availability of ICT resources $r = 0.609$; $p = 0.062$ and utilization of ICT resources $r = 0.527$, $p = 0.117$ to teachers competence.

CONCLUSION

Based on the findings of the study, it is concluded that teachers of School of Science ASCOEA were competent in ICT resources but do not utilized them in the lesson delivery. The challenges faced in the utilizing ICT resources included Unreliable power supply, poor students ICT background among others. There was no relationship between availability of ICT resources, utilization of ICT resources to teachers' competence.

RECOMMENDATIONS

Based on the findings the following recommendations were made:

- i. Government or school authority to provide additional ICT resources for teachers and students,
- ii. Government and/or school authority to massively train students on ICT so as to give room for teachers utilization in lesson delivery,
- iii. School authority to identify and reward ICT compliance lecturers to serve as motivation and enhance their competency.
- iv. Government to look for alternative to current electricity like solar power to provide constant electricity to schools to address some challenges to ICT utilization in teaching science courses.

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