

# THE STATUS OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN TEACHING - LEARNING BIOLOGY IN SOUTH-EAST OF NIGERIA

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## Abstract

This paper investigates the status of Information and Communication Technology (ICT) in teaching and learning of Biology in Colleges of Education in South –Eastern part of Nigeria. The study adopts survey research design. All the biology lecturers in the randomly selected Federal and State owned Colleges of Education in South – Eastern part of Nigeria form the population of the study. The study makes use of structured questionnaire for data collection. The instruments were face validated by two experts in Computer Department in Federal College of Education Eha-Amufu. Three research questions guided the study; research question one was answered using simple percentage while research questions two and three were answered using mean and standard deviation. Two hypotheses were tested at 0.05 level of significance using t-test. The results show that the quantity of ICT resources available for the teaching and learning of Biology in Federal and State owned College of Education is still low although ICT resources available in Federal Colleges of Education is slightly higher than the state owned Colleges of Education. Again mean response on the extent of utilization of the available ICT resources by biology lecturers in teaching and learning of biology is low since mean ratings are below 2.50. The mean response on ICT literacy level of biology lecturers in Federal College of Education is higher than that of their counterpart in the state .However, there is no significant difference on the mean response of biology lecturers in Colleges of educations located in the urban and rural areas on their ICT literacy level . Finally, recommendations and

conclusion are made in order to improve on the use of available ICT resources in teaching biology in Colleges of education.

Biology, the Science that study life is an instrument for national development. But according to study such as Ibe (2004) its teaching had not actually improved despite the child-centred approach advocated for the teaching and learning of science. This is because resources for effective biology teaching are still inadequate in schools (Akpan, 2008). Resources are both printed and non printed materials which enhance teaching and learning. The teaching of biology for the acquisition of life skills require a lot of these resources These include radio, television, telephone, compact disc, digital video, microscope, slides, handlens, internet, CDROMS etc. These are collectively called information and communication Technology (ICT). Since the world is fast becoming a global village, as a result of developments in ICT therefore, the key instrument to this globalization is computer It is however, difficult to study biological organisms without ICT resources .With ICT in Biology department there may be no need for library and laboratory. This is because ICTs allow for distance learning technique to large audience. According to Rahaman (2002) books could be converted to CDROMS to solve the problem of acute shortage of textbooks.

Information and Communication Technology (ICT) is what goes on in all human interaction and in teaching and learning process. ICT according to Macmillan, Bulus and Matthew (2003) is the application of computers and telecommunication technologies to improve learning by the students. It is the correlation of computer with technology. Rahman (2002) sees information and communication Technology as creation, processing, storage, retrieval and

transmission of data and information. According to Ibenyenwa (2011) ICT means all the electronic devices, computer hardware and software and telecommunication gadgets that enable the processing, storage and immediate dissemination of huge amount of information through computer networks ICT is therefore define in this study as those facilities such as microscope, websites, television and other information storage and delivery technologies which enhanced teaching and learning. However, the use of ICT resources in teaching in this part of the world is still at infancy level (Rahman, 2002). Therefore, the need to investigate the status of ICT resources in teaching biology in Colleges of Education.

### **Purpose of the Study**

The purpose of the study is to determine:

1. The quantity of ICT resources available for the teaching and learning of Biology in Federal and State Colleges of Education
2. The extent of the use of the available ICT resources in teaching biology in Federal and State Colleges of Education
3. The ICT literacy level of biology lecturers in urban and rural Colleges of Education.

### **Research Questions and Hypotheses**

The following research questions guided the study

1. What is the quantity of ICT resources available for teaching and learning biology in Federal and State Colleges of Education?
2. To what extent do biology lecturers in Federal and State Colleges of Education use the available ICT resources in teaching biology?
3. What is the ICT literacy level of biology lecturers in Federal and State Colleges of Education?

The hypotheses are tested at 0.05 levels of significance

**Ho<sub>1</sub>** There is no significant difference on the mean response of biology lecturers in Federal and State Colleges of Education on the extent of the use of available ICT resources.

**Ho<sub>2</sub>** There is no significant difference on the mean response of biology lecturers in urban and rural Colleges of Education on ICT literacy level.

### **Research Method**

The research method employed for the study was survey design. The instrument used for data collection was structured questionnaire which has three sections. The HOD of Computer Department and one computer educator face validated the instruments. The population sample of the study covered four randomly sampled Colleges of Education in South – East of Nigeria, two Federal Colleges of Education and two State Colleges of Education which was stratified into urban and rural metropolitan The Colleges used for the study were selected by balloting. In each of the Colleges, all the lecturers were used. Hence, twenty-nine biology lecturers were used for the study. Lecturers were used because they were expected to have been exposed to ICT resources. Again Federal and State Colleges of Education were used because they are owned and sponsored by government and stand in a better position to be equipped with various ICT resources.

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**Results**

**Table 1: Availability of ICT Resources and Quantity**

S/N	Resources (Items)	Federal			State		
		Available	Not available	Quantity	Available	Not available	Quantity
1	Computer sets	15	0	6	14	0	4
2	Computer printers	15	0	4	14	0	2
3	Television set	15	0	2	6	8	1
4	Video cassettes	6	9	1	0	14	0
5	Computer based learning packages	7	8	1	8	7	2
6	Internet facilities	0	15	0	0	14	0
7	Over head projector	15	0	2	0	14	0
8	Telephone	6	9	1	8	7	1
9	Programming packages	0	15	0	8	7	1
10	Power point software	0	15	0	0	14	0
11	Computer assisted instruction software	0	15	0	8	6	1
12	Video player	6	9	2	0	14	0
13	Audio tape player	0	15	0	0	14	0
14	Audio cassettes	7	8	1	0	14	0
15	Video projector	0	15	0	0	14	0
16	Transparency	4	11	0	0	14	0
17	Slide projector	0	15	0	0	14	0
18	DVD Player	15	0	2	0	14	0
19	CDROMS	7	8	5	0	14	0
20	Dark room	8	7	1	14	2	0
21	Hand lens	15	0	40	14	0	130
22	Microscope	15	0	50	14	0	20
23	Slide	6	9	15	7	8	10
24	Film strip	0	15	0	0	14	0
25	Projector	0	15	0	0	14	0

The above table shows that out of the 25 ICT resources listed 15 items were available and the quantity noted in Federal owned Colleges of Education. The items and their quantities include; computer (6); computer printer (4) television set (2); item 4 (1), 5(1); 7(2); 8(1); 12(2); 18(2); 19(2); 20(1); 2 (4); 22(50); 23(15).while 10 items were not available .For the state owned Colleges only ten ICT resources are available for teaching biology. These are computer (4); computer printer (1), television set (1). Others include item 5(1); 8(1); 9(1); 11(1); 20(0); 21(130); 22(20), while 15 items were not available. The items that were not available at all in both Federal and State owned Colleges include internet facilities, power point software, slide projector and film strip. These observations indicate that some ICT resources are available in Biology department, in Colleges of Education in south- Eastern part of Nigeria. But the quantities are not encouraging expect hand lens and microscope.

**Table 2: Teachers Mean Rating on the Extent of the Use of the Available ICT Resources in Federal and State Colleges of Education**

S/N	ITEM	Federal				State			
		N (16)	Mean	Std.	Remark	N (13)	Mean	Std.	Remark
1	Computer sets	3.33	.81	High	3.07	.61	High		
2	Computer printers	3.20	.61	High	2.64	.63	High		
3	Television set	2.26	1.16	Low	2.07	.61	Low		
4	Video cassettes	2.46	1.30	Low	1.28	.46	Low		
5	Computer based learning packages	2.55	1.03	High	1.57	.30	Low		
6	Internet facilities	2.33	1.34	Low	2.00	.67	Low		
7	Over head projector	2.93	.88	high	1.92	.47	Low		
8	Telephone	1.53	.99	low	1.78	.99	Low		
9	Programming packages	2.73	.88	high	1.28	.46	Low		
10	Power point software	2.20	1.26	low	1.21	.42	Low		
11	Computer assisted instruction	2.00	1.14	Low	1.42	.85	Low		
12	Video player	1.86	.75	Low	1.21	.42	Low		
13	Audio tape player	2.00	.51	Low	1.84	.89	Low		
14	audio cassettes	1.46	.63	Low	1.50	.52	Low		
15	Video projector	2.06	.59	Low	1.42	.51	Low		
16	Transparency	1.60	.91	Low	1.42	.51	Low		
17	Slide projector	1.31	.47	Low	1.69	.85	Low		
18	DVD Player	2.00	1.13	Low	2.14	.77	Low		
19	CDROMS	2.00	.92	Low	2.64	.74	High		
20	Dark room	1.26	.59	Low	2.71	.82	Low		
21	Hand lens	3.33	.61	High	2.71	.61	High		
22	Microscope	3.33	.61	High	2.50	.85	High		
23	Slide	1.73	.79	Low	1.42	.51	Low		
24	Film strip	1.26	.45	Low	1.36	.50	Low		
25	Projectors	1.13	.35	low	1.07	.27	Low		

Table 2 indicates that in Federal Colleges the mean scores of 7 items were 2.50. The implication is that the extent of the use of available ICT resources in teaching Biology is high for only few resources. The remaining 18 items had mean rating below 2.50 showing that the extent of ICT resource utilization in biology department is still very low. For State Colleges of Education 6 items were rated 2.50 and above which indicates that the extent the available ICT resources is used is high for few ICT resources. On the same table the remaining 19 items are rated below 2.50 and this implies that ICT resource utilization is still very low in biology department.

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**Table 3: Literacy Level of Biology Lecturers in Federal and State Colleges of Education**

S/N	Item	Federal			State		
		Mean	Std	Remark	Mean	Std	Remark
26	Ability to operate computer	3.26	.70	High	3.07	.82	high
27	Can access e-mail	3.46	.63	High	3.00	.87	high
28	Has browsed internet site eg education	3.33	.77	High	2.55	.48	High
29	Have attended workshop; seminar ;conference	2.53	.99	High	2.28	.99	Low
30	Ability to use computer generic programme like Msword, Excel PTP	2.73	.88	High	2.78	.86	high
31	Ability to use computer assisted instruction packages to teach biology concept	2.44	.98	Low	1.71	.61	low
32	Gives computer based project for students	2.33	.97	Low	2.00	.97	low
33	Use ICT for research	2.66	.81	High	1.64	.63	low

3 shows that the mean response of biology lecturers in Federal Colleges on ICT literacy level is above 2.50 while only two items are rated below 2.50, this is commendable. For State owned Colleges ,teachers response show that 4items are rated high while the remaining items the mean response was below 2.50 which is the cutoff point. It can be deduced from the observations that ICT literacy level of biology teachers are higher in Federal owned Colleges of Education than their counterparts in State owned Colleges of Education. This may be as a result of incentive, sponsorship and school ownership

**Ho<sub>1</sub> Hypothesis**

**Table 4 t-test on the on the Mean Response of Biology Lecturers in Federal and State Colleges in Relation to Extent of the Use of Available ICT Resources for Teaching and Learning Biology.**

Ownership	Number	Mean	SD	Df	t-cal	Sig. (2-tailed)
Federal College	15	2.33	.37	27	3.45	0.02
State College	14	1.92	.24			

The above table shows that there is significant difference in the mean response of biology lecturers in Federal and State owned Colleges of Education on the extent of use of ICT resources since the probability value of 0.02 is less than 0.05 level of significance.

**Hypothesis 2**

**Table 5: t-test on the Mean Response of Biology Lecturers in Urban and Rural Located Colleges of Education on ICT Literacy Level**

Location	Number	Mean	SD	Df	t-cal	Sig. (2-tailed)
Urban	16	2.22	.35	27	1.32	.19
Rural	13	2.03	.39			

Table 5 above shows that the value 0.19 is greater than 0.05 level of significant. So there is no significant difference on the mean response of biology lecturers in urban and rural Colleges of Education on ICT literacy level .since the probability value of 0.19 is greater than the 0.05 level of significance. The null hypothesis of no significant is rejected while the alternative hypothesis is accepted. This implies that there is no significant difference on the mean ICT literacy level of lecturers in urban and rural colleges of Education. Hence school location has nothing to do with ICT literacy level of biology teachers.

**Discussion and Findings**

Table 1 shows that the quantity of available ICT resources is low in the Sampled federal and state colleges of education except microscope and hand lens Although many of the resources are not available in the colleges, but non –availability of these resources is more pronounced in the State Colleges of Education than Federal Colleges .for instance internet facilities, power point software, projector and film strip are not available in these colleges .This finding confirms the study that assessed Science, Technology and Mathematics with ICT in Nigeria. (Adeyegbe, Modupe and Ayo (2003).Also Cirfat, Zumyil and Ezema (2003) in similar study noted complete absence of internet facilities ,fax machines and telephone in all departments in school of sciences in two colleges of education in plateau state. Ibenyenwa (2011) found out that most ICT resources are not available especially in public schools. However, it seems that there is a little improvement in the status of ICT resources. Worthy to note is that state college of education had large quantity of handlens for teaching and learning biology. Generally the quantities of ICT resources available are few to cater for large class size that characterized biology classroom.

Furthermore, table 2 shows the extent teachers use the available ICT resources in teaching biology in Colleges of Education. The mean response of Teachers in Federal Colleges indicate that 7items had mean rating above 2.50.The implication is that even though ICT resources are available only few of these resources are used in teaching biology. The problem is more in state College of Education where only 5 of the available resources are used in teaching biology. That is 20 of the items listed are not utilized in teaching since the mean rating is less than 2.50.Threfore most ICT resources are not utilized in teaching biology in both federal and state colleges of education . Table 4

further indicates that there is significant difference in the mean response of teachers in Federal Colleges of education compared with their counterpart in the state. This is also in line with finding of Ibenyenwa (2011) that available ICT resources are grossly utilized in both public and private schools and that most of the ICT resources are underutilized

Moreso, table 3 reveals that ICT literacy level of biology teachers in Federal Colleges of Education is higher than their counterparts in the State where the ICT literacy level is low. For teachers in the Federal Colleges most of the items relating to ICT literacy level scored above 2.50 except 2 items. hence federal colleges proved superior over state colleges on ICT literacy level. Finally, table 5 shows no significant difference on the mean response of biology teachers in colleges of education located in the urban and rural areas in relation to literacy level. Similar studies on ICT such as Dogara, Ahmadu and Lawal (2003) showed that majority of NCE lecturers are not ICT literate. However after about nine years of the study much change has not been observed especially in State colleges of Education studied in South-Eastern part of Nigeria. This has serious implication to biology teacher preparation.

### **Conclusion**

The study was carried out to investigate the status of ICT in teaching and learning in Colleges of Education in South-Eastern part of Nigeria. The findings revealed that most of the ICT resources are not available in biology department for teaching and learning biology concept. But this is worst in State Colleges of Education. The resources available are poorly utilized in teaching. In addition ICT literacy level of lecturers in federal colleges is high compared with those in State colleges of Education. Finally recommendations are made for improvement.

### **Recommendations**

In order to improve the status of ICT in teaching and learning of biology in Colleges of Education the following recommendations are made based on the findings of the study.

1. Every biology lecturers in Colleges of Education (COE) need to be trained in ICT so as to enable them acquire the necessary skills and knowledge in ICT. The lecturers should make effort to acquire computer and have access to internet.
2. The biology lecturers in COE should make effort to register for ICT training in private firms so as to be conversant with computer accessories necessary for teaching and learning.
3. Biology lecturers should be encouraged to improve their ICT literacy level through attendance to workshop, seminars and conferences in ICT as it relate to teaching and learning. The management should release fund to sponsor the lecturers.
4. Government and other agencies that manage educational institutions should provide computer and ICT resources and make all the departments in the various institutions to own websites and e-mail address to facilitate quick and easy access to scientific information.
5. Science Teacher Association of Nigeria biology panel should organize workshops and seminars on ICT yearly for biology educators to enable them apply ICT resources in teaching and learning.

### **References**

- Adeyegbe, S., Modupe ,O & Ayo,O.(2003).The Teaching and Assessing Science, Technology and Mathematics with Information and Communication Technology in Nigeria: Teachers and

- Students Perspective. *44<sup>TH</sup> STAN Annual Conference Proceeding*. Abuja. HEBN.
- Akpan, B.B. (2008) *Nigeria and Future of Science Education*. Ibadan. Oluseyi Press Ltd.
- Anekwe, M.C. (2003). Identification of some information and technology enhancing skills pupils needed for sustainable science technology and mathematics education. *44<sup>th</sup> Annual Conference Proceeding of STAN*. Abuja. HEBEN. 18-21
- Cirfat, A.B., Zumyil & Ezema, M.A. (2003). The Status of ICT In Colleges of Education. *Proceedings of annual conference of STAN. Abuja* HEBN 53-57.
- Dlamini, H. (1996). Information and communication technology (ICT) in education. *UNESCO Bulletin*. Nairobi Office 3(2)16-17.
- Dogara, M.M, Ahmadu & Lawal, K.K. (2003). The Use of ICT in Teaching and Learning Science and Mathematics in Colleges of Education: A challenge to teacher education in Nigeria. *STAN 44<sup>TH</sup> annual conference proceedings*. Abuja. HEBEN. 95-98.
- Ibe, E. (2004). *Effect of guided inquiry and demonstration on science process skills acquisition among biology secondary school students*. Unpublished M.ED Thesis. Faculty of Education UNN.
- Ibenyenwa, C.N. (2011). *Availability and utilization of information and communication technology (ICT). Resources by secondary school teachers In Enugu Education Zone*. An Unpublished MED. Thesis .Enugu State University of Science and Technology.
- Lawal, k. k, Ahmdu, H.O. & Dogara, M.M. (2003). The status of ICT in teaching science technology and mathematics in selected secondary schools in Kano metropolis. *STAN 44<sup>TH</sup> Conferenc Proceedings*. Abuja. HEBEN. 37- 40.
- Macmillan, M.J., Bulus, D.P. & Matthew, A.O. (2003). The Status of Computer Education And Science Learning in Plateau State Secondary Schools :A Case of Plateau Central Senatorial District. *Proceedings of 44<sup>th</sup> annual conference*. Abuja. HEBN 25-28.
- Rahman, T. (2002). Strengthening information and technology infrastructure in Bangladesh. *Proceedings of STAN Conference and Inaugural Conference of CASTME Africa*. Ibadan. HEBN.

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