

Availability and Utilization of ICT Facilities in the Effective Teaching of Biology in Secondary Schools in Minna, Nigeria

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Abstract

This study investigated the Availability and Utilization of ICT facilities for effective Teaching of Biology in Secondary Schools in Minna Metropolis. Four research questions and four hypotheses guided the study and were tested at 0.05 level of significance. A descriptive survey design was adopted. For the purpose of this research work, four secondary schools were randomly selected out of the total number of 26 Government Secondary schools in Minna, from each of the secondary schools, a sample size to collect data for this study were self-administered questionnaires. 45 items questionnaires were designed for data collection in three categories titled: Teachers Availability of ICTs facilities questionnaire (TAICTsQ), Students Utilization of ICTs facilities questionnaire (TUICTsQ), Teachers Utilization of ICTs facilities questionnaire (TUICTsQ). The questionnaire items were rated on 4 point like scale as follows: Strongly Agreed (SA-4 points), Agree (A – 3 points), Disagree (D - 2 points) and Strongly Disagree (SD – 1 point); these were responded to by the respondents. The data was collected and analyzed using descriptive statistic of mean (\bar{x}) and standard deviation (SD) and inferential statistics of t-test and Kruskai-Wallis. The result showed that ICT facilities are availability in some secondary schools in Minna metropolis

while some facilities are marked not available and this to an extent affects their usability in instructional delivery process, the available facilities are used by the Teachers for instructional delivery, the students were also utilizing the available ICT facilities. The result also showed that there was no significant difference between the mean responses of the teachers and students on utilization of ICT facilities. It was recommended among others that students should be properly trained to acquire basic knowledge on the utilization of ICT facilities to promote their learning achievements in most science subjects more importantly in Biology.

1.1 Introduction

Teaching of science subjects in secondary schools is to enable learners learn science, acquire problem solving skills, critical thinking skills and also help them to know how and where to obtain needed information, develop the spirit of learning and to prepare them for life-long education. Inomiesa and Osakwe, in (IAARR 2010). The discipline, Biology is a systematic study of the distribution, evolution, function, growth, origin structure, and taxonomy of species, human beings have always been so curious to know more about the existence of things around them especially those which have to do with the ones that have life which prompts the study of Biology as a discipline (Michael, 2008). Due to the frequent emergence of new concepts of learning, teachers are expected to facilitate learning and make it meaningful to individual learners rather than just to provide knowledge and skills. New developments of innovative technologies has provided new possibilities for teaching professions and to achieve the aim of blending up new technologies with new concept of learning, but it has also placed more demands on teacher to learn how to use these new technologies in their teaching (Robinson and Latchem, 2003).

These challenges have compelled teachers to continuously retrain themselves and acquire new knowledge and skills while maintaining their job (Carlson and Gadio, 2002). With all the inputs around, there is only hope for enhancing the quality of education at the elementary stage (Visscher, Wild, Smith and Newton, 2003) and these can only be achieved by integrating the new technologies offered by Information and Communication Technologies (ICTs) into the teaching and learning process. IAARR, (2010) viewed ICT in two respect "the New and Old Technologies, the New Technologies comprises of Communication Technologies which permits smooth communication between teachers and learners, (examples include, fax, radio, teleconferencing, video conferencing and the internet) and those which are primarily used by individuals on their own (human to computer interaction) called Learning Resource Technologists, these are used to convey subject contents such as printed materials, video tapes, audio tapes, television, computer based course wares or software and CD-ROM, (IAARR, 2010). Computer technology is becoming more useful and more cost effective for many fields of teaching and with this respect only the teacher and with this respect only the teacher can determine whether the use will prove effective in the classroom for effective in the classroom for effective instructional delivery with the Teacher bearing in mind that these technologies only

complements, but does not fundamentally alter the elements of teaching (Uddin, 2003). They also have the potential to transform the nature of education-where and how learning takes place and the roles of students and teacher in the learning process (Bowse, 2003). Information and Communication Technology (ICT) has helped significantly in transforming educational standard from an analogue educational research base technological development to that of a digital knowledge based technological development in education thus, serving as the building blocks of modern society (Wisdom & Joyce, 2012). This rapid technological advancement brought new attempts and needs in terms of the teaching and learning processes. Among these new attempts called ICT in instructional processes are considered very effective communication and individual learning tools. Although ICT facilities have been viewed to serve as tools which engineers the growth and development of the quality and standard of education in any nation, the level of integration, availability and utilization of ICT facilities in instructional development process calls for much emphasis in Nigeria education system, particularly, in the primary and secondary schools.

ICT facilities are instructional delivery tools used to discover, investigate, solve problems, interact, reflect, reason, and learn concepts, in the classroom. This innovation permits alternative types of educational platform for facilitating the teaching/learning process (Umoren, 2013). The researcher conceived the idea of ICT resources as the e-learning which is most commonly accompanied with education and corporate training that uses an information network through the internet, an intranet, Local Area Network (LAN) or extranet, Wide Area Network (WAN). Fatimoh (2010) opined that electronic learning (e-learning) is used in both formal and informal educational settings for facilitation, instruction, interaction, and for instructional delivery. Web based learning is also a subset of e-learning. Another type of ICT facilities is the virtual teaching which entails instructional delivery through teleconferencing and the video conferencing technique (Taleb, 2013). Web based instructions use internet and the world wide web (www) as the major component of learning materials and instructional resources for effective instructional delivery (Font, 2002). Audio media (instructional slides and tutorials) are teaching or learning aids made and written into compact disks, graphs and texts. Through the power point, instructional delivery is impactful to slow and fast learners (Gambari, 2012).

The efficacy of ICT in education has been proved to improve students understanding of concepts in biology. It has been known to enhance educational opportunities of individuals and constrained from attending traditional universities as well as the use of computers as tutors for drill and practice as well as instructional delivery (Potashnik and Capper, 1998, Font, 2002 and Umoren, 2006). In spite of all these benefits, ICT facilities have been beyond the reach of teachers and students in secondary schools and as such, they cannot access them for the purpose of delivering and receiving instructions. Ezeoba (2007) carried out an investigation of ICT availability in schools in Onitsha on 100 nursery schools teachers, the result revealed that the media availability average was less than 20% and over 50% do not have ICT facilities at all. He also found out that the degree of utilization in

instructional delivery was that teachers used mostly books and over 60% did not use ICT resources at all. Onasanya, Shehu, Ogunlade and Adefuye (2011) investigated science and health education teacher's awareness and extent of utilization of ICTs. It also examined the relationship between awareness, extent of utilization and teachers' gender. The research subject were 240 science and health education teachers drawn from 40 secondary schools randomly selected from 10 local government arrears of Oyo State. Two instruments were designed by the researcher and used for the study. These were 40 item computer literacy test and 20 item questionnaire on teachers' level of utilization of ICTs. Data were analyzed using weighed means scores standard deviation and t-test. The result showed that the level of utilization of ICT resources was also found to be very low. Utilization of ICT with regards to gender according to Onasanya, et al. (2011), the males perform better than their female counterparts.

The researchers conceived the idea of the level of ICT resources availability and utilization in Nigeria secondary schools and thus intend to conduct an investigation into the effective teaching of biology in the secondary schools in Minna.

1.2 Statement of the Problem

Students' inability to comprehend most of the concepts of biology taught in secondary schools has become a major source of concern for most Teachers and Parents. Some students view Biology as being abstract; others view it as wide and too elaborate resulting into most of their failures. The external examination bodies such as NECO (2009) and WAEC (2009 - 2012) continually reported the poor performances of students in Biology and it has been found that various concepts in Biology such as, hormone, genes and chromosomes, mitosis and meiosis, nervous system and mendelian genetics are perceived to be difficult to learn by secondary students. Experiencing difficulties in so many topics in Biology negatively affects students' motivation and achievement (Ozcan, 2003). As new concepts of learning have evolved, teachers are expected to facilitate learning and make it more meaningful to individual learners rather than just to provide abstract knowledge and skills. (Valckre & van Braak, 2008). It is hoped that using the various ICTs available for teaching and learning of biology can help increase students' perceptions of the various concepts in biology and thereby, increase their understanding considering enormous advantage offered by ICTs to the field of education as a whole. The problem of this study therefore, is to investigate empirically the extent to which there is a relationship between ICT facilities availability and utilization for effective teaching of biology in secondary schools in Minna metropolis.

1.3 Purpose of the Study

The purpose of this study is to investigate the extent of ICTs availability and utilization for effective teaching of biology in secondary schools in Minna metropolis. Specifically, the study intends to:

1. Determine the availability of ICTs in government secondary schools in Minna metropolis;
2. Ascertain the extent of utilization of ICTs by the teachers in government secondary schools in Minna metropolis;
3. Determine the level of utilization of availability of available ICTs by students in government secondary schools in Minna metropolis;
4. Ascertain the level of differences in the mean response of teachers and students on the utilization of ICT facilities.

1.4 Research Questions

The following research questions were formulated to guide this research:

1. Are ICT facilities available in government secondary schools for teaching biology?
2. What is the level of utilization of available ICTs by teachers in secondary schools in Minna?
3. What is the level of utilization of available ICTs by students in secondary schools in Minna?
4. Are there any differences in teachers and students response on their level of utilization of available ICTs in schools for effective teaching and learning?

1.5 Research Hypotheses

The following research hypotheses were formulated to guide the study:

HO_1 : There is no significant difference between schools responses on the level of availability of ICT facilities in the schools.

HO_2 : There is no significant differences between male and female teachers' responses on their level of utilization of the available ICT facilities in schools for teaching of biology.

HO_3 : There is no significant difference between male and female students response on their level of utilization of the available ICT facilities in schools in learning biology.

HO_4 : There is no significant difference between teachers and students response on their level of utilization of the available ICT facilities in schools for teaching and learning biology.

1.6 Methodology

A descriptive survey research was chosen for this research conducted in selected secondary schools in Minna. The design is that the data are collected so that facts and events can be better understood, interpreted, and described for the benefit of any system., (Akpokiere, 2006). The study covers four (4) government secondary schools in Minna metropolis of

Niger State. Confirmation of the total of 26 government secondary schools and a population of 4,500 students (Niger State Ministry of Education, Test and Measurement and Statistics Units). For the purpose of this research work, four secondary schools were randomly selected out of the total number of 26 government secondary schools in Minna. From each of the secondary schools, a sample size of 30 students and 10 Biology teachers were randomly selected, using simple random sampling technique. The four randomly selected secondary schools are:

- Zarumi Model School
- Bosso Secondary School
- Government Day Secondary School, and
- Ahmadu Bahago Secondary School.

The instruments used to collect data for this study were self-administered questionnaires. 45 item questionnaires were designed for data collection in three categories, titled, Teachers Availability of ICT facilities questionnaire (TAICTsQ), Students Utilization of ICTs facilities (SUICTsQ), Teachers Utilization of ICTs facilities Questionnaire (TUICTsQ). The questionnaire items were rated on 4 point likert scale as follows: Agreed (SA – 4 point), Agree (A – 3 points), Disagree (D – 2 points) and Strongly Disagree (SD – 1 point). These were accurately responded to by the respondents. The instruments were validated by three experts in the School of Science and Technology Education. Two lecturers from the Department of Science Education and one from the Department of Library and Information Technology, Federal University of Technology, Minna in which 45 item questionnaire were submitted and are certified to be valid.

1.7 Results

Research Question 1: *To what extent are ICTs available in secondary schools in Minna for effective teaching of Biology?*

Table 1: Mean and Standard Deviation for items that measure ICTs availability in secondary schools in Minna for effective teaching of Biology.

S/N	Items	\bar{x}	SD	Remark
1.	School computer laboratory are well equipped	2.83	1.17	Agree
2.	Television are available	3.25	2.23	Agree
3.	School is equipped with internet facilities	2.45	1.17	Agree
4.	Subscriptions used to access the internet are affordable and reliable	2.75	1.24	Agree
5.	Biology online books are available on the internet	2.55	1.17	Agree
6.	School is equipped with photocopy and fax machine	2.43	1.15	Disagree
7.	Printers are available	2.48	1.20	Disagree
8.	Interactive whiteboard are available for use	2.50		
9.	School has its own internet	2.50		

10.	The school has its own website	2.53	1.09	Agree
11.	School is equipped with multimedia projectors	2.28	1.06	Disagree
12.	The school provides flash drives, external hard disks for transferring	2.53	1.01	Agree
13.	Computer laboratory is equipped with scanning machine	2.65	1.12	Agree
14.	Computers are readily available for use in Biology Laboratory	2.63	1.15	Agree
15.	Interactive Radio are available for instructional communications	2.63	1.05	Agree
Grand Mean			2.61	

In the Table 1 above, items 1, 2, 4, 5, 8, 9, 10, 12, 13, 14 and 15 show the mean response of teachers on the availability of ICT in secondary schools for teaching Biology and their mean value lies between 3.25 to 2.53 for items 2, 10 and 12 respectively. The grand total mean of the response is 2.61 which is a little above the criterion value of 2.50. This means that there is availability of ICT facility in secondary schools in Minna metropolis to be used for teaching Biology. While the results for items 3, 6, 7, 11 show mean response that lies between 2.45 to 2.28 which is below the criterion value of 2.50 showed that the result for items 3, 6, 7, 11 are not available for teaching and learning of Biology.

Research Question 2: What is the level of utilization of availability of ICTs by Teachers in secondary schools in Minna?

Table 2: Mean and Standard Deviation for items that measure utilization of ICTs by Teachers in secondary schools in Minna.

S/N	Items	\bar{X}	SD	Remark
1.	Biology teacher can operate computer	2.75	1.17	Agree
2.	Biology teacher provide recorded audio/video lessons to students	2.55	1.20	Agree
3.	Teacher provide instruction through Television/Radio broadcast to enhance the teaching of Biology	2.55	1.20	Agree
4.	Teacher individually have personal website, e-mails and blogs for storing Biology solutions for students	2.75	1.15	Agree
5.	Teacher provide interactive platform such as "classrooms" for simultaneous instructional delivery and solutions to difficult aspect of Biology	2.63	1.21	Agree
6.	Biology teacher source for Biology materials online	2.38	1.10	Disagree
7.	Computerized diagnostic assessment is used by Biology teacher to monitor and assess students' performances	2.55	1.20	Agree
8.	Biology teacher source current instructional materials from e-journals	2.73	1.15	Agree
9.	Teachers have mobile communication devices to promote communication between them and their students	2.28	1.20	Disagree
10.	Teacher provide printed instructional materials	2.55	1.11	Agree
11.	Teacher use electronic devices such "microscope" to facilitate understanding of practical aspect of Biology	2.48	1.20	Disagree

12.	The teacher can operate and set up multimedia projectors for instructional delivery	2.43	1.20	Disagree
13.	Biology teacher make use of interactive whiteboard for teaching	2.80	1.11	Agree
14.	Biology teacher can download, upload and browse learning materials on the school website	2.83	1.13	Agree
15.	Teacher make available Biology instructions to students in soft copies	2.48	1.22	Disagree
Grand Mean			2.58	

In the Table 2 above, items 1, 2, 3, 4, 5, 7, 8, 10, 13, 14 shows the mean response of teachers on the utilization of ICT facilities in secondary schools for teaching Biology with mean value ranging from 2.80 to 2.55. The Grand Mean of the response is 2.58 which is a little above the criterion value of 2.50 which revealed that teachers utilized ICT facilities in secondary schools for teaching Biology in Minna metropolis. While, the results for items 6, 9, 11, 12, 15 with mean response ranging from 2.48 to 2.28 which is below the criterion value of 2.5 shows that the results for 6, 9, 11, 12, 15 are not utilized by the teachers.

Research Question 3: To what extent are the available ICTs utilized by secondary school students in Minna metropolis?

Table 3: Mean and Standard Deviation for items that measure ICTs by Students in secondary schools in Minna.

S/N	Items	\bar{x}	SD	Remark
1.	Student can operate computers that are available in the computer laboratory	2.63	1.12	Agree
2.	Biology student can use audio/video instructions provided by the teacher	2.28	1.08	Disagree
3.	Students have direct access to internet facilities provided by the school for accessing instructions	2.46	1.15	Disagree
4.	Student have mobile phone can help them browse the internet for Biology instructions	2.44	1.07	Disagree
5.	Student can understand the Biology instructions provided by the teacher	2.73	1.08	Agree
6.	Student use school computer for group work and communication with other students	2.49	1.09	Disagree
7.	Student can use the computer to download, upload or browse the internet for Biology materials	2.60	1.06	Agree
8.	Student actively participate in online communities provided by their Teacher, e.g., chat rooms	2.62	1.09	Agree
9.	Student have individual Laptops through which they can access the internet	2.53	1.16	Agree
10.	Student can log onto their school internet services out of school time, anytime, anywhere	2.40	1.17	Disagree
11.	Student have interactive Radio/Television through which information provided by the Teacher can be transmitted	2.40	1.02	Disagree
12.	Student can successfully use the school computer to do homework	2.83	1.03	Agree
13.	Student prefer e-books on the internet to physical textbook when studying Biology	2.53	1.10	Agree

14.	Student can use electronic devices such as microscope to facilitate their understanding of Biology practical	2.18	1.03	Disagree
15.	Student can operate multimedia projectors provided	2.60	1.00	Agree
Grand Mean			2.51	

In the Table 3 above, items 1, 5, 7, 8, 9, 12, 13, 15 shows the mean response of students on the utilization of ICT facilities in secondary schools in learning Biology with the mean value ranging from 2.83 to 2.53, the Grand Mean of the response is 2.51 which is a little above the criterion value of 2.50. This means that students are utilizing the ICT facilities in their schools for learning Biology in Minna metropolis. While the results for items 2, 3, 4, 6, 10, 11, 14 with mean value ranging from 2.49 to 2.18 is lower than the criterion value of 2.50, shows mean value ranging from 2.49 to 2.18 is lower than the criterion value of 2.50, shows that the result for ICT facilities 2, 3, 4, 6, 10, 11, 14 are not utilized for learning by the students.

H_{O_1} : There is no significant difference between schools response on the level of availability of ICTs facilities in the schools.

Table 4: Kruskal-Wallis in the mean response rating of schools on the availability of ICTs facilities in the schools

School	N	Mean Rank	Df	H-value	P-value
School A	10	19.15			
School B	10	22.05	3	4.367N	0.224
School C	10	25.65			
School D	10	15.15			
Total	40				

Ns: Not significant at $p > 0.05$.

Result of Kruskai-Wallis test in Table 4 showed the mean rankings 19.15, 22.05, 25.65 and 15.15 of the respondents on their opinions on availability of ICTs facilities in the schools and on their schools response. Also, Kruskai-Wallis test showed H-value of 4.367 at $p > 0.05$. Hence H_{O_1} was not rejected. That is, there was no significant difference between schools on the level of availability of ICT facilities in them.

H_{O_2} : There is no significant difference between male and female teachers response on their level of utilization of available ICT facilities in schools for teaching Biology.

Table 5: Shows Mean, Standard Deviation and t-test on the Teachers' Gender on their level of utilization of ICTs for effective teaching of Biology

Variable	N	Df	X	SD	t-value	P-value
Male	18		38.22	8.29		
Female	22		39.14	5.78		

Ns: Not significant at $p > 0.05$

Table 5 revealed that the mean for male teachers and female teachers on their level of utilization of available ICT facilities in teaching Biology are 38.22 and 39.14 respectively. The male did not differ significantly from their female counterparts when both responded to the level of utilization of the available ICT facilities in teaching Biology. On this basis, hypothesis 2 is not rejected. Therefore, there was no significant difference between male and female teachers on their level of utilization of the available ICT facilities for teaching Biology.

HO_3 : There is no significant difference between male and female students response on their level of utilization of available ICT facilities in schools for learning Biology.

Table 6: Shows Mean, Standard Deviation and t-test on the Students' Gender on their level of utilization of ICT for teaching.

Variable	N	Df	X	SD	t-value	P-value
Male	58		38.14	5.81		
Female	62	118	37.31	5.73	0.789	

NS: not significant at $p > 0.05$

Table 6 revealed that the mean for male students and female students on their level of utilization of available ICT facilities in learning are 38.14 and 37.31 respectively. The male did not differ significantly from their female counterparts when both responded to the level of utilization of the available ICT facilities in learning. On this basis, hypothesis 3 is not rejected. Therefore, there was no significant difference between male and female students on their level of utilization of the available ICT facilities for learning.

HO_4 : There is no significant difference between teachers and students response on their level of utilization of available ICT facilities in schools for teaching and learning.

Table 7: Shows Mean, Standard Deviation and t-test on Teachers and Students on their level of utilization of ICT for teaching and learning.

Variable	N	Df	X	SD	t-value	P-value
Male	40	158	38.73	6.94	0.917	0.360
Female	120		37.71	5.76		

NS: not significant at $p > 0.05$

Table 7 revealed that the mean for teachers and students on their level of utilization of available ICT facilities for teaching and learning are 38.73 and 37.71 respectively. The teachers did not differ significantly from students when both responded to their level of utilization of the available ICT facilities. On this basis, hypothesis 2 is not rejected.

Therefore, there was no significant difference between teachers and students on their level of utilization of the available ICT facilities for teaching and learning.

Discussion

The purpose of this study was to investigate the availability and utilization of ICT facilities for effective teaching of Biology in secondary schools in Minna metropolis. Four research questions were generated with four research hypotheses formulated and answered using descriptive statistics (mean and standard deviation) and inferential statistic (Kruskai-Wallis and t-test).

The result from Table 1 shows the mean response of teachers on the availability of ICT in secondary schools for teaching Biology. The Grand Mean of the response is 2.61 which is a little above the criterion value of 2.50. this means that there is availability of ICT facility in secondary schools in Minna metropolis while results varied for item 3 which states that 'school is equipped with internet facilities' item 6 which states that 'school is equipped with photocopy and fax machine' item 7 which states that 'printers are available for use' and item 11 which states that 'school is equipped with multimedia projectors' in their mean value that ranges between 2.45 to 2.28 which is below the criterion value of 2.50 and this shows that results for items 3, 6, 7 and 11 are not available in secondary schools in Minna metropolis for effective teaching of Biology.

The results of the hypothesis tested in Table 4 on the level of significance in the mean responses of schools availability of ICTs revealed that there was no significant difference between schools on the level of availability of ICT facilities in their schools using Kruskai-Wallis which showed H-value of 4.367 at $p > 0.05$ and thus the hypothesis was retained, the finding disagree with the earlier findings of Idoko and Adeolu (2010) who found out that ICT facilities were not available for teaching and learning in the investigation he

carried out in three secondary schools in Kogi state on the challenges of ICTs in teaching and learning process.

The result from Table 2 shows the mean response of teachers on the utilization of ICT facilities in secondary schools for teaching Biology. The Grand Mean of the response is 2.58 which is a little above the criterion value of 2.50. This means that teachers utilized ICT facilities in secondary schools for teaching Biology in Minna metropolis while, the results varied for item 6 which stated that 'Biology teachers source for Biology materials online' item 9 which stated that 'Teacher have mobile phone communication devices that promotes communication between them and their students' item 11 which stated that 'Teachers use electronic devices such as microscope to facilitate understanding of practical aspect of Biology' item 12 which stated that 'Teachers can operate and set up multimedia projectors for instructional delivery' and item 15 which stated that 'Teachers make available Biology instructions to students in soft copies and the Mean value ranges between 2.48 to 2.28 which is below the criterion value of 2.50. This revealed that the results for items 6, 9, 11, 12 and 15 are not utilized in secondary schools in Minna metropolis for effective teaching of Biology.

The hypothesis in Table 5 which tested there is significance in the mean response of Male and Female Teachers on the utilization of ICT facilities for effective teaching of Biology in secondary schools revealed that male did not differ significantly from their female counterparts when both responded to the level of utilization of the available ICT facilities in teaching Biology. On this basis, hypothesis 2 is not rejected. Therefore, there was no significant difference between male and female teachers on their level of utilization of the available ICT facilities for teaching Biology using t-test which gives P-value 0.684 at $p > 0.05$. The finding disagrees with the findings of Fakeye (2010) who investigated English teacher knowledge and use of ICTs in Ibadan and found out that availability and utilization of ICTs to be very poor. The findings are in agreement with Abubakar and Oguguo (2011) in their comparison, found no significant difference between the performance of boys and girls. This agrees with Uduosoro (2011) who found no significant different between the performance of boys and girls.

The result from Table 4.3 shows the mean response of students on the utilization of ICT facilities in secondary schools in learning Biology. The Grand Mean of the response is 2.51 which is a little above the criterion value of 2.50. This means that students are utilizing the ICT facilities in their schools for learning Biology in Minna metropolis while the result varied for item 2 which stated that 'Biology students can use Audio/Video instruction provided by the school for accessing instructions; item 4 which stated that 'Students have mobile phones which can help them browse the internet for Biology instructions' item 6 which stated that 'Students use school computer for group work and communication with other students' item 10 which stated that 'Students can log onto their school internet services out of school time, anytime, anywhere' item 11 which stated that 'Students have interactive Radio/Television through which information provided by the Teacher can be transmitted' item 14 which stated that 'Students can use electronic devices such as

microscope to facilitate their understanding of Biology practical' with Mean Value ranging from 2.49 to 2.18 which is below the criterion value of 2.50 revealed that ICT facilities for the items 2, 3, 4, 6, 10, 11 and 14 are not utilized by students in secondary schools in Minna metropolis for effective learning of Biology.

The results from Table 6 which measures the differences in gender among student's utilization of ICTs revealed that male students did not differ significantly from their female counterparts when both responded to the level of utilization of the available ICT facilities in learning on this basis, hypothesis 3 is not rejected. Therefore, there was no significant difference between male and female students on their level of utilization of the available ICT facilities for effective learning. The results in with the findings of Andrej Sorgo (2009) as concluded in his study of ICTs in Biology teaching that the situation of use of ICTs differs when computers are to be used in the classroom, schools are generally well equipped with computers for instructions in computer science and informatics but not for teaching Biology. The majority of Biology teachers access to one computer (besides the school library\staff room) in a preparatory room which is normally unavailable to students. Computers situated outside Biology classroom do not guarantee their use in Biology instruction. Thus, there is positive correlation with the use and availability of computers only if they are located in a Biology classroom or laboratory.

The result from Table 4 revealed that teachers did not differ significantly from students when both responded to their level of utilization of the available ICT facilities. On this basis, hypothesis 4 was not rejected. Therefore, there was no significant difference between teachers and students on their level of utilization of the available ICT facilities for teaching and learning.

Conclusion

In conclusion, the study revealed that some but not all ICT facilities are available in secondary schools in Minna metropolis and the availability of these ICTs influenced their usage by the Teachers and Students in effective teaching and learning of Biology in secondary schools in Minna metropolis. This implies that although some of these facilities are available for use but are not sufficient and their usage in the instructional process is not adequate. The indication that not all these facilities are available may be due to inadequate provision of these facilities by the government and the use of these facilities are largely dependent on availability and all other factors such as poor electricity, low technical know-how of both teachers and students. In conclusion, although these facilities are available but are not sufficient and adequately utilized. Thus effective teaching and learning of Biology can be enhanced through ICTs and this is largely dependent on its availability and utilization in schools. It is therefore essential to conclude that the provision and adequate utilization of Information and Communication Technology in effective teaching and learning of Biology will enhance the achievement and understanding of learners in Biology and also complement and stimulate Teacher's efforts in instructional delivery process.

Recommendations

Base on the findings of the study, the following recommendations were made:

1. Students should be properly trained to acquire basic knowledge on the utilization of ICT facilities to promote their learning achievements in most science subjects.
2. Teachers should be encouraged through in-service training within a specific period to continuously update their knowledge on how to effectively use and incorporate ICT in teaching and learning process.
3. The Federal and State Ministries of Education should ensure the provision of electricity in every school for efficient running of these facilities.
4. The government through Ministry of Education should ensure the provision of sufficient and modern ICT facilities in secondary schools across Nigeria for effective teaching and learning.

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