INVESTIGATING THE AVAILABILITY AND UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY FACILITIES FOR TEACHING BIOLOGY IN SENIOR SECONDARY SCHOOLS WITHIN KADUNA METROPOLIS

Tanko Festus

A.G Jibrin

M. M Baba

&

Ibrahim Mohammed

Department of Science Education Abubakar Tafawa Balewa University, Bauchi, Nigeria
Corresponding author: tankofestus7@gmail.com

Abstract

The study investigated the availability and utilization of Information Communication Technology (ICT) facilities for teaching biology in Senior Secondary Schools within Kaduna Metropolis. A descriptive survey design was adopted for the study. The population of the study consisted of all sixty - three (63) senior secondary schools offering biology and one hundred and Fifty - five (155) biology teachers teaching in such schools. The entire population was used in the study; therefore, no sampling techniques and the instruments for data collection were the ICT Facilities for Teaching Availability Checklist (ICTFTAC). Four Likert scale questionnaires on the Availability and Utilization of ICT in the Teaching of Biology Questionnaire (AUICTTBQ) were adapted and modified by the researcher. The two sets of instruments were face validated by two (2) experts, one from the Science Education Department of Abubakar Tafawa Balewa University (ATBU), Bauchi, and the other from the Foundations Department (Measurement and Evaluation unit) of the same institution. They were checked for reliability and internal consistency. The reliability of the instruments was determined using Cronbach Alfa analysis and a reliability Coefficient of 0.916 for utilization of ICT facilities. Data were collected using ICTFTAC and AUICTTBQ with the help of two research assistants. Descriptive statistics was used to analyzed the data obtained using frequency, mean, and standard deviation to answer research questions through the use of Statistical Package of Social Sciences (SPSS) version 22. The results showed the extent of availability of ICT facilities in the study signifies a low extent of availability ($\bar{x}$ =2.168). The findings showed that the extent of utilization of ICT facilities in the study area indicates a perception of a large extent ($\bar{x}$ =2.642) of utilization among educators in teaching biology within senior secondary schools. The study recommends that relevant authorities should prioritize upgrading existing ICT facilities and increase the rate of supply in secondary schools. Also, Schools should regularly evaluate the utilization of ICT facilities, seeking feedback from teachers and students to identify areas for improvement.

Keywords: Availability, Utilization, Information, and Communication Technology.

Introduction

The future of every nation, including Nigeria lies in the quality of education given to its citizens. For every developing nation to attain sustainable growth, a well-planned and innovative technology such as the use of Information and Communication Technology (ICT) facilities remains the only essential tool for her national development. (Tafi, 2016). Education is the bedrock of civilization and development of any nation, without it no nation can move from where it is to the next level, Nigeria has made various efforts towards the realization of education (Tafi, 2016).

Teaching, most especially science-related courses such as biology sometimes requires the presentation of the utilization of concrete ICT facilities that could approve the senses of seeing and hearing. These ICT facilities brought a lot more that can be used in teaching biology as a science subject, taught in senior secondary schools (Umar), 2021). The knowledge of biology is not only paramount and useful to the teacher and learners, but to everyone who seeks to go with the changing trends of society through the utilization of ICT facilities (Ezeh, et al 2020). Knowledge is power and education is indeed fundamental to the development of a dynamic labour force capable of accessing and integrating knowledge into social and economic activities and participating in today's global economy. With the evolution of ICT facilities, education, and training are changing and these changes may not be attained without the use of ICT facilities especially in the teaching of biology (Olatokun), 2015).

Information and Communication Technology (ICT) plays a major role in individual and professional lives. As a result of this technological revolution, there are increasing demands for schools to integrate this technology to enhance the teaching-learning process. The advent of ICT has opened new opportunities for changing classroom practices; facilitates the sharing of resources; provides an interactive learning environment; supports collaboration among learners and promotes efficiency in learning as compared to traditional methods (Fu, Livingstone, Loveday & Nkweke, 2018; Talebian, Mohammadi & Rezvanfar, 2019). The use of ICT has made teaching easier, more concrete, real, and more result-oriented (Etiubon & Akpan, 2020). In addition, ICT has strengthened and increased the learners‘ retention of concepts and improved performance (Abidoye & Omotunde, 2020; Rabiu, Muhammed, Umaru & Ahmed, 2019; Anthony, 2018). Studies have shown that using ICT in education enhances learning and provides satisfying outcomes to both teachers and students (Yusuf, 2019; Adebayo & Nafisat, 2018).

Teachers have more choices about learning styles and pathways if ICT serves as a tool for learning. Learning with ICT goes in line with the ideas and beliefs of constructivist theories which entail that knowledge is actively constructed by learners rather than transmitted by the teacher; learners are active knowledge constructors‘, not passive information receivers (Oakley, 2004). Learning through ICT combines the belief of two distinctive types of constructivism; cognitive constructivism and social constructivism (Oakley, 2004). The former believes that learners construct their knowledge individually based on their prior experience and new information, whereas the latter argues that learning is fostered through interactive processes of sharing, negotiation, collaboration, and discussion. Identifying a clear link between the use of ICT and the extent of learning requires more than technical know-how of the gadgets and mastery of the subject, but more of learning theories,

learning objectives, and the learning needs of individuals. The main goals of ICT integration into education, particularly in secondary education, are to improve the quality and value of secondary education and expand access to education (Kingsley & Otabor, 2019). Learning through the use of ICT allows students to choose when and where to progress in their learning, choose content, be free to use the appropriate media, and study anywhere anytime (Koller, 2018).

The fact that ICT plays a vital role in modern teaching and learning cannot be overemphasized (Nwankwoala, 2020; Yushau & Nannim, 2018). Now, looking at the role of education in national building and the rapid increase in population being witnessed in secondary schools these days, the utilization of ICT in teaching becomes imperative considering the benefits. Therefore, ICT teaching facilities have to be readily available in secondary schools for ICT integration and effective delivery of lessons.

Studies have shown that the availability of ICT facilities is no longer the major concern of teachers in developed countries, but rather, how best to integrate these facilities into teaching and learning (Tella, Orim, Ibrahim & Memudu, 2020; Cosgrove et al., 2018). However, research findings concerning the availability and utilization of ICT facilities especially in the Nigerian secondary schools appeared inconclusive (Ifeakor & Okoli, 2019). Some studies found facilities to be available (Olelewe & Okwor; 2020; Obahiagbon & Osahon, 2019). While others found them either adequate or not adequate (Muhammad & Yagana, 2018). Where some of these ICT facilities are available, they appear to be underutilized (Tella et al., 2020; Amusa & Atinmo, 2019).

However, Availability and utilization of ICT facilities are the major challenges facing most secondary schools in Kaduna metropolis in particular. With a ratio of one computer to 150 students, against the ratio of 1:15 in the developed countries (Kaduna State Ministry of Education, 2021). It is against this background that this study seeks to investigate the availability and utilization of ICT facilities for teaching Biology in senior secondary schools within Kaduna metropolis.

Objectives of the Study

Specifically, the objectives of this study were to:

1. identify the Information Communication Technology facilities available for teaching biology in Senior Secondary Schools within Kaduna Metropolis.
2. find out the extent of utilization of Information Communications Technology facilities by biology teachers in Senior Secondary Schools within Kaduna Metropolis.

Research Questions

In other to carry out research, the following research questions were formulated in line with the objectives of the study:

1. What are the available Information Communication Technology Facilities for teaching in Senior Secondary Schools within Kaduna Metropolis?
2. To what extent are Information Communication Technology facilities utilized in the teaching of Biology in Senior Secondary Schools within Kaduna Metropolis?

Method

This study was designed to suit a descriptive survey. This design allows to analyze and to describe facts and helps in developing an in-depth understanding of the research problems. It also determines the behaviour of people in a natural setting. The descriptive

survey design was adopted because the information gathered from the group was made in their natural and normal school environment and analyzed without any form of treatment. The population of this study consists of all the sixty - three (63) senior secondary schools offering biology and one hundred and Fifty - five (155) biology teachers teaching in such schools within Kaduna Metropolis. Teachers consist of 91 males and 64 females with ages ranging from 25 to 45 years, having a working experience of 1-15 years and above (Ministry of Education Kaduna State, 2022).

The Checklist was used in determining the available ICT facilities among senior secondary schools within Kaduna metropolis. Four Likert scale questionnaires on the Availability and Utilization of ICT in Teaching Biology Questionnaire (AUICTTBQ) by Suleiman (2016) were adapted and modified by the researcher and aimed to collect data from the schools, and biology teachers. Availability and Utilization of ICT in Teaching of Biology Questionnaire (AUICTTBQ) was used as an instrument for data collection. The checklist ICTFTAC was designed to help in collecting information on the availability of ICT facilities for teaching in public schools within Kaduna Metropolis. Items identified present were ticked [√] **(A)** Available, (**NA)** Not Available.

AUICTTBQ is a closed-ended structured questionnaire that was to determine the extent to which the available ICT facilities are being utilized by the biology teachers. The content validity of the instrument was established by two experts with the rank of Doctorate Degree (PhD), one from the Department of Science Education, ATBU Bauchi, and the other from the Foundations Department (Measurement and Evaluation unit), ATBU Bauchi. This was done to determine the suitability and clarity of the language used in the items to answer what it set out to answer. However, for content validity, the questionnaire was scrutinized to ensure that it included all the items that are essential for accurate assessment. Necessary corrections were made. This was achieved through a judgmental approach which involves exhaustive literature reviews to extract the related items and then a follow-up evaluation by experts to assess the items.

To ascertain the reliability of the instrument, the instrument was pilot tested on 30 senior secondary school biology teachers in Jos metropolis, Plateau state. A pilot study has to do with the pre-testing of a particular research instrument (Baker, 1994). The reason for the pilot testing was to find out how teachers react to the instrument. The data collected was analyzed using Cronbach Alfa reliability Coefficient at 0.05 level of significance. The internal consistency reliability estimate of the utilization of ICT facilities was 0.916. The data was collected using a checklist and close-ended questionnaire and descriptive statistics were used to analyze the data obtained using frequency, mean, and standard deviation to answer research questions using Statistical Package of Social Sciences (SPSS) version 22. Following Adeji (2018), the criteria for accepting any item to the research response was a mean score of 2.50 and above while any item below 2.50 was rejected.

Results and Discussion

Information Communication Technology facilities available for teaching biology in Senior Secondary Schools

This section examined the availability of ICT facilities in Senior Secondary Schools within Kaduna Metropolis

Table 1: Checklist of ICT for Teaching Facilities Availability in Senior Secondary Schools within Kaduna Metropolis

ICT Facilities	Category	Frequency	Percentage
Computers and Laptops	Desktop computers	208	51.5
	Laptop computers	196	48.5
	Total	**404**	**100.0**
Accessories	Mouse	185	39.9
	CD ROM	133	28.7
	Storage devices (e.g., external hard disk)	146	31.5
	Total	**464**	**100.0**
Handheld Devices	Tablets(iPad)/other Mobile devices	195	85.9
	Digital Camera	32	14.1
	Total	**227**	**100.0**
Multimedia	Projector	86	18.4
	Television	57	12.2
	Audio tape	55	11.8
	Internet	108	23.1
	DVD, VCD	161	34.5
	Total	**467**	**100.0**
Presentation tools	Speakers	146	41.1
	Digital podium	26	7.3
	Microphone/External Speakers	183	51.5
	Total	**355**	**100.0**
Interactive tools	Interactive Whiteboards	135	75.0
	Interactive radio	31	17.2
	Electronic/ Smart Board (Triumph Board)	14	7.8
	Total	**180**	100.0
Games	Educational games	95	50.5
	Documentation	93	49.5
	Total	**188**	**100.0**
Devices	Printers	144	37.6
	Scanners	108	28.2
	Photocopiers	131	34.2
	Total	**383**	**100.0**
Communication tools	e-mail (g-mail, Yahoo Mail, etc.)	182	51.7
	School Website	170	48.3
	Total	**352**	**100.0**

The study found that among the computers available for educational purposes, 51.5% were Desktop computers, while 48.5% were Laptop computers. Accompanying these computers were various accessories: 39.9% were Mouse, 28.7% were CD-ROM, and 31.5% were Storage devices like external hard disks. These findings indicate a diverse distribution of computer types

and their corresponding accessories, catering to different preferences and needs among educators.

Regarding handheld devices, 85.9% were Tablets (iPad) or other Mobile devices, while 14.1% were Digital Cameras. In terms of multimedia tools, 34.5% constituted DVD/VCD players, 23.1% were Internet-connected apps, 18.4% were Projectors, 12.2% were Television sets, and 11.8% were Audio tapes. This array of multimedia facilities reflects the educators' exposure to a variety of resources that can enhance biology teaching through dynamic content delivery.

Among the presentation tools available, 51.5% consisted of Microphone/External Speakers, 41.1% had loud Speakers, and 7.3% were equipped with a Digital podium. Interactive tools played a significant role, with 75.0% of them being Whiteboards, 17.2% being Interactive radios, and 7.8% being Electronic/Smart Boards (Triumph Boards). These tools empower educators to create engaging and interactive lessons for biology students.

The study found that educational games constituted 50.5% of available resources, while Documentaries accounted for 49.5%. Additionally, Communication tools were present, with 51.7% using email services (e.g., Gmail, Yahoo Mail), and 48.3% having access to their school's website. These tools facilitate diverse instructional approaches and streamlined communication within the educational context.

The extent of utilization of Information Communications Technology facilities by biology teachers in Senior Secondary Schools

The study assessed the extent of Utilization of various Information Communication Technology (ICT) facilities in teaching biology in Senior Secondary Schools within Kaduna Metropolis. The results from Table 2 reveal the extent to which these facilities are used in the teaching process.

Table 2: Mean Scores and Standard deviation of the Extent of Utilization of the Available ICT Facilities for Teaching Biology in Senior Secondary Schools within Kaduna Metropolis.

S/N	Item Statement	VLE	LaE	LiE	NE	$\underline{X}$	SD	REMARK
1	Desktop/Laptop Computers	104	39	52	13	3.125	.9946	**Large Extent**
2	Handhelds computers /Tablets (iPad)/other mobile devices	91	39	65	13	3.000	1.0024	**Large Extent**
3	Electronic/ Smart Board (Triumph Board)	39	39	26	104	2.063	1.2002	**Little Extent**
4	Projector	91	26	26	65	2.687	1.3127	**Large Extent**
5	Digital podium	78	0	26	104	2.250	1.3953	**Little Extent**
6	Microphone/External Speakers	65	39	52	52	2.563	1.1738	**Large Extent**
7	Digital Camera	78	13	26	91	2.375	1.3669	**Little Extent**
8	Storage devices (e.g., external hard disk)	52	39	91	26	2.563	1.0005	**Large Extent**
9	Mouse	104	39	26	39	3.000	1.1754	**Large Extent**
10	Computers	104	39	39	26	3.063	1.0906	**Large Extent**
11	DVD, VCD	65	39	65	39	2.625	1.1137	**Large Extent**
12	CD-ROM	91	26	52	39	2.813	1.1871	**Large Extent**
13	Photocopying Machine	78	78	39	13	3.063	.9014	**Large Extent**

14	Printers	52	78	52	26	2.688	1.0465	**Large Extent**
15	Speakers	52	78	52	26	2.750	.9706	**Large Extent**
16	Scanners Machine	91	26	65	26	2.875	1.1137	**Large Extent**
17	Interactive whiteboard	78	52	65	13	2.938	.9686	**Large Extent**
18	Television	65	26	52	65	2.437	1.2261	**Little Extent**
19	Educational documentation	39	26	39	104	2.000	1.1754	**Little Extent**
20	Educational games	39	26	39	104	2.000	1.1754	**Little Extent**
21	Audio Tapes	65	13	52	78	2.313	1.2639	**Little Extent**
22	Internet	91	65	13	39	3.000	1.1207	**Large Extent**
23	Interactive radio	52	26	39	91	2.188	1.2388	**Little Extent**
24	e-mail (g-mail, yahoo mail etc.)	91	26	39	52	2.750	1.2530	**Large Extent**
25	School Website	104	26	39	39	2.938	1.2002	**Large Extent**
	Grand mean					**2.642**		**Large Extent**

Key: VLE =Very Large Extent, LaE = Large Extent, LiE = Little Extent, NE = No Extent

Certain ICT facilities were reported to be utilized to a large extent in teaching biology. Laptop Computers, Desktop Computers, photocopying machines, Handheld Computers/Tablets (iPad), mice, the Internet, and other mobile devices were among the most widely used tools. Additionally, facilities like Interactive whiteboard, School Website, CD-ROM, Speakers, e-mail (g-mail, Yahoo Mail, etc.), Printers, and Scanners Machine were all utilized to a large extent in the teaching of biology. Projectors, DVDs, VCDs, Microphone/External Speakers, and Storage devices (e.g. external hard disk) were also frequently used tools, with mean scores ranging from 3.125 to 2.563.

The study also identified a group of ICT facilities that were utilized to a limited extent in teaching biology. These include Television, Digital cameras, Audio Tapes, Digital podiums, Interactive radio, and Electronic/Smart Board (Triumph Board). While not as extensively used as the high-utilization facilities, these tools still contributed to the teaching of biology, with a mean score ranging from 2.437 to 2.000.

The study also identified a group of ICT facilities that were utilized to a limited extent in teaching biology. These include educational documentation and educational games. These tools were reported to be less frequently used compared to others, indicating potential areas for improvement in incorporating them more effectively into the teaching process.

The findings highlight a diverse range of utilization levels for different ICT facilities in teaching biology. While some tools are heavily used and contribute significantly to the teaching process, others are utilized to a lesser extent. This suggests variations in the awareness, comfort level, and integration of these tools among educators within senior secondary schools.

The grand mean score of 2.642 for the extent of utilization of ICT facilities in the above study indicates a perception of the relatively large extent of utilization among educators in teaching biology within senior secondary schools in Kaduna Metropolis. This score offers insight into how effectively these educators are incorporating ICT tools into their teaching practices.

Discussion of Findings

From Table 1, the research uncovered a diverse array of ICT facilities available for teaching biology in senior secondary schools within Kaduna Metropolis. These facilities encompassed a wide range, including traditional tools such as desktop computers and laptops,

essential accessories like mouse and CD-ROMs, auxiliary equipment like storage devices (external hard disks), handheld devices such as tablets and mobile gadgets, multimedia tools like DVDs and internet-connected resources, presentation aids like projectors and audio tapes, interactive tools like whiteboards and electronic/smart boards, and communication instruments like email and school websites. This finding is by that of Gabadeen et al., (2015) and the findings of Eseroghene and Barisi (2020) which revealed that e-learning technologies were relatively available to teachers and students. This differs from Adelabu, & Adu (2015) who revealed that ICT facilities were less available, and could not be accessible by teachers in secondary schools.

Table 2, shows that the findings demonstrated a prevailing trend of extensive utilization for most of the available ICT facilities in teaching biology. Tools such as laptop and desktop computers, core accessories, multimedia features like interactive whiteboards, digital resources such as CDs and DVDs, and internet-connected tools were reported to be widely used. However, some tools, including televisions, digital cameras, and specific presentation aids, exhibited relatively lower levels of utilization. The results underscore the potential for these technologies to significantly augment the pedagogical experience, offering interactive, multimedia-rich learning environments that engage students and promote effective biology instruction. The findings disagreed with Yadap (2021), Okunade *et. al.,* (2023) on the extent of utilization of ICT and that of Onuekwa and Amaehule (2011).

Conclusion

The findings of the study underscore the potential of Information Communication Technology (ICT) facilities to revolutionize the teaching of biology in senior secondary schools within Kaduna Metropolis. While a broad spectrum of ICT facilities are available, the study reveals that the utilization of these resources is not uniform across different tools. Some facilities were extensively utilized, while others remain largely untapped.

Recommendation

1. It was recommended that relevant authorities should prioritize upgrading existing ICT facilities and increase the rate of supply in secondary schools.
2. Authorities should regularly evaluate the utilization of ICT facilities, seeking feedback from teachers and students to identify areas for improvement.

References

Abidoye, J. A., & Omotunde, C. T. (2020). Effects of computer animation package on senior secondary school students‘ academic achievement in geography in Ondo State, Nigeria. *Journal of Teaching and Teacher Education, **3***(2), 2210-1578.

Abubakar, M. S., & Akor, P.U. (2016). Availability and utilization of electronic information database for research by agricultural scientists in Federal University Libraries in North Central Nigeria. *Library Philosophy and Practice (e-journal), **7**(9), 16-26.*

Adebayo, T. E., & Nafisat, A. S. (2018). Information and communication technology (ICT) in teacher education. A tool for sustainable national development in Nigeria. *In Annual International Conference of Education media and Technology Association of Nigeria (E $ TAN) on ICT,* 8(3), 98-108

Adelabu, O. A. & Adu, E. O. (2015). Assessment of accessibility and utilization of information and communication technology (ICT) for effective teaching of biological science in

Enugu.

Amusa, O. I., & Atinmo, M. (2019). Availability, level of use and constraints to use of electronic resources to teachers in public secondary schools. *JLIS. 7*(3), 139-172. Retrieved from https://files.eric.ed.gov/fulltext/ED569231.pdf

Anthony, U. (2018). Information and communication technology and the learning of English phonetics in selected secondary schools in Nigeria: A Case Study. *English Linguistics Research,* **6**(4), 13-28.

Cate, J. W. (2017). Students to computer ratio, socioeconomic status and students achievement. electronic theses and dissertations. Paper 3284. htt://dc.etsu.edu/etd/3284.

Cosgrove, J., Butler, D., Leahy, M., Shiel, G., Kavanagh, L., & Creaven, A. (2018). The ICT census in schools summary report. Educational Research Centre. Retrieved from http://www.erc.ie/documents/itc cencus2013 summary report.pdf.

Davis, F. D. (1986). Perceived usefulness, perceived ease of use, and user acceptance of information technology,‖ *MIS Quarterly,* (13:3), 1989, pp. 319-339

Davis, F.D, Bagozzi, P R, Warshaw P (1986) –User acceptance of computer technology: A comparison of two theoretical models, *Management Science, 35* 982-1003.

Davis, F.D., and Warshaw, P.R. (1986) –Extrinsic and intrinsic motivation to use computers in the workplace,‖ *Management Science, 37* 1 111-1132.

Eseroghene. A., & Barisi, G.P., (2020) Availability and utilization of information and communication technology in teaching and learning of biology in secondary schools. *International Journal of Research and Scientific Innovation* (*14*(3), 239 - 244.

Etiubon, R. U., & Akpan, A. O. (2020). Science teachers' perception of ICT capacity building workshop in Akwa Ibom State Secondary Schools, Nigeria. *African Research Review,* **11**(2), 201-215.

Ezeh, S. C., Awa, H. O., Okoye, J. C., Emecheta, B. C., & Anazodo, R. O. (2020). Determinant factors of Information Communication Technology (ICT) adoption by government-owned universities in Nigeria: A qualitative approach. *Journal of Enterprise Information Management, 26*(4), 427-443. Retrieved from http://www.Emeraldinsight com/doi/abs/10.1108/JEIM-05-2013-0024.

Ifeakor, A. C., & Okoli, J. N. (2019). Appraisal of the availability, adequacy and utilization of new technological resources for science curriculum delivery in secondary schools in Nigeria. *African Research Review*, **4**(2), 231-245.

Ihuoma, A. C., & Solomon, I. (2020). The Availability and utilization of Information and Communication Technology (ICT) facilities for administrative purpose by principals in Imo State, Nigeria. *Journal of Education and Practice,* **7**(5), 178-186.

Instructional delivery in secondary schools in Enugu State, Nigeria. *Journal of Computers in Education*, *4*(2), 171-196. Retrieved from https://link. Springer .com/article /10.1007/ s4 0692-017-0077-6.

Jabaka, S., & Danbaba, N. (2019). Barriers to ICT utilization in basic education in Nigeria. *In*

proceedings of South African International Conference on Education, **3**(9), 71-77

Kingsley, O., & Otabor J. O. (2019). Information and Communication Technology (ICT) key tools for enhancing teaching and learning in public secondary schools in Nigeria: *American Journal of Educational Research,* **2**(12), 1257-1259.

Muhammad, A. M., Yagana, S. W., & Hajja, K. A. (2018). Availability, adequacy and utilization of ICT facilities for English language teaching and learning in senior secondary schools in Maiduguri Metropolis. *Education and Science Journal*, (5), 107-117.

Nkweke, O. C., Loveday, O., & Agi- Otto, O. (2018). ICT Incorporation: A requirement for upgrading the teaching and learning of social studies in Rivers State. *Mediterranean Journal of Social Sciences*, **4**(12), 15-28.

Nwana, S. E., Ofoegbu, T. O., & Egbe, C. I. (2018). Availability, functionality and utilization of ICT resources in teaching computer education in secondary schools in Anambra State, Nigeria. *Mediterranean Journal of Social Sciences*, **8**(5), 111-116.

Nwankwoala, H. N. L. (2020). An investigation of teachers‘ and students‘ use of ICTs in public secondary schools as a panacea for national development. *IISTE Research on Humanities and Social Sciences,* **5**(20). 167-176. www.iiste.org

Nwiyi, G. U. (2019). Availability, Adequacy and accessibility of Information and Communication Technology (ICT) facilities in the management of secondary schools in Port Harcourt Local Government Area, Rivers State.

Nworgu, G.G. (2006). *Educational research. basic issues and methodology*. University Trust Publishers.

Nyaga, G. O., & Olatunji, B. O. (2018). Inadequate ICT facility in Nigerian secondary schools: Case study in Ado Odo Ota Local Government, Ogun State, Nigeria. *Master's These, Eastern Mediterranean University (EMU)– Dogu Akdeniz Universitesi (DAU)).*

Obahiabon, K., & Osahon, O. J. (2019). Information and Communication Technology (ICT) key tools for enhancing teaching and learning in Nigeria: A study of two tertiary Institutions in Benin Metropolis. *American Journal of Educational Research,* **2**(12), 1257-1259.

Oghenetega, L. U., Okeke, I. E., & Umeji, E. C. (2019). Availability and uses of ICT facilities among students in faculty of social science, Madonna University, Okija. *International Research: Journal of Library and Information Science*, **4**(3).

Okunade A.I., Daramola M.A., and Jegede R.O. (2023) Assessment of availability and utilization of information technology in the teaching of biology in Ekiti State Secondary Schools, Nigeria, *British Journal of Education, 11* (2), 29-39.

Olatokun, W. M., (2015). Availability, accessibility and use of ICTs by Nigeria woman academics. *Malaysian Journal of library and Information Science.12(2), 13 - 33.*

Olelewe, C. J., & Okwor, A. N. (2020). Lecturers‘ perception of interactive whiteboard for

Onwukanjo, S. A., & Men, J. M. (2020). Information resources availability and accessibility on user satisfaction: Case study of Federal University of Technology, Minna Library. *Journal of Applied Information Science and Technology*, **10**(1), 118-132.

Rabiu, H., Muhammed, A. I., Umaru, Y., & Ahmed, H. T. (2019). Impact of mobile phone usage on academic performance among secondary school students in Taraba State, Nigeria. *European Scientific Journal*, **12**(1), 53-68.

Tafi, A., (2016). Relationship between academic self–concept, worldview and misconceptions in photosynthesis and senior secondary students achievement in biology in Enugu Urban. Global leader in 3D content creation.

Umar, L. A (2021). Information and Communication Technology in World-view and misconceptions in biology on senior secondary s.tudents *African journal of Molecular Biology. 7(2) 20-23.*

Yadap, R. P. (2021). Perspectives of science teachers on the use of ICT facilities in secondary schools biology teaching. *Triyuga Academic Journal, 2 (3), 29-38.*