

Availability and Utilization of Information and Communication Technologies facilities For Teaching Biology in Irepodun Local Government Area, Kwara State, Nigeria

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Abstract

Information and communication technology have greatly impacted classroom teaching and learning processes. However, evidences abound in literature of the inadequate utilisation of ICT devices due to non-availability. Therefore, this study sought to identify the information and communication technologies utilized for teaching biology in Irepodun Local Government Area of Kwara State, Nigeria. The objectives were to determine the extent of utilization of ICT resources available for teaching biology; influence of gender and years of teaching experiences on biology teachers' level of utilization of the available ICT resources. Survey research design was adopted for the study. The sample comprised 51 secondary school biology teachers drawn using simple random sampling technique in Irepodun Local Government Area of Kwara State, Nigeria. Data were gathered using researchers designed questionnaire whose reliability coefficient was found to be 0.79 using Cronbach alpha correlation statistics. Frequency, percentage and mean were used to provide answers to the three research questions while t-test and ANOVA was used to test the null hypotheses. The findings indicated that: Overhead Projector, Internet, Computers, Wireless Microphone, Mobile Devices, and Printer were frequently utilized; while other ICT devices available in some schools were rarely utilized or never utilized. In addition, there was no significant difference in the utilization of the available ICT resources based on teachers' gender and experiences. Hence it was recommended that government should provide more ICT facilities in schools in order to enhance the classroom teaching and learning of biology.

Keywords: ICTs, Availability, Utilisation, Gender, Teaching Experiences

Introduction

Science and technology have remained two inseparable entities that are important for the growth and development of every nation. Science, according to Adeoye (2021) is the logical

and systematic process of applying a planned series of methods to acquiring knowledge about human and the environment. Ramalingam (2013) identified the main divisions of science as pure and applied sciences in which subjects such as biology, chemistry, and physics constituted the pure science while applied science includes subject area such as agriculture, geography, engineering, and other related subjects requiring the application of scientific knowledge.

Technology on the other hand is the application of scientific knowledge for practical purposes, especially in industries and can be placed under the field of knowledge dealing with engineering or applied sciences (Hornby, 2015). Technology has found application in all aspects of life ranging from the procurement of food, clothing and shelter. In fact, one major breakthrough of the 21st century is the utilization of technology for the storage of information and communicating such information to a large group of audience or receiver in a split second. Eze and Egbo (2014) defines Information and Communication Technology as the application of computer, telecommunication and electronic equipment to process, store, retrieve, analyse and disseminate information in digital and other electronic forms. The United Nations Education and Socio-Cultural Organization (UNESCO, 2008) submitted that technologies are used to communicate, create, manage and distribute information.

The advent of ICT to Nigeria was traced by Yusuf (2007) to the late 70's and early 80's but there was no policy then for its inclusion into the nation's education system until the evolution of the National Policy on Computer Education in 1988 (Federal Republic of Nigeria, 1988). Despite the effort of the government at meeting the global demand of integrating ICT into the nation's educational system, evidences abound in literature that teachers lack the requisite pedagogy and knowledge needed to integrate and utilize ICT facilities for classroom instruction (Ajayi & Ekundayo, 2009; Okebukola, 1997).

Nwangwu, Obi, and Ogwu (2014) reported that often times, teachers do not possess the requisite technological skills to guide learners in the use of information and communication technologies. Hence, Ajayi (2008) submitted that government should make provisions for ICT resources and training for teachers on the effective utilization of the available information and communication technologies in institutions of learning because the quality of teachers ultimately determines the quality of knowledge imparted to learners and the overall quality of learners' residual knowledge.

Existing evidences in literature revealed that researchers are divided in their opinions on the utilisation of the available IT/ICT facilities by teachers. Ezekoka (2007) noted that ICT facilities were not available for secondary school teachers' use and curriculum implementation in Imo State of Nigeria and consequently the teachers neither utilized nor encouraged their students to use them. Fashina and Akanji (2016) investigated the utilization of ICTs by teachers and observed that very few teachers possess ICT content knowledge and that some teachers do not feel confident in exploiting ICT to support teaching activities.

Kosoko-Oyedeko and Tella (2010) concluded that many teachers are not using ICT because they lack the necessary skills to make use of the available ICT tools. It is worthy of note that the propensity to integrate and utilize ICTs during classroom activities hinge on the

availability of these resources in schools. Kiptalam and Rodriguess (2011) posited that the integration of technology into education is highly dependent on the availability and accessibility of the resources in schools. Sofowora (2011) also noted that the vision of the Federal Government on the utilization of ICT at all levels of education has not been realised because ICT tools are not readily available in schools especially the primary and secondary schools.

Yusuf (2012) also found out that most teachers in Nigerian secondary schools are not versatile in basic computer operations and in the utilisation of genetic software, although the sampled teachers had positive disposition and attitude towards the use of computer. Opara and Okeke (2021) assessed the way universities in Anambra State, Nigeria utilized information and communication technology for service delivery and discovered that public universities effectively utilise computer more than private universities in delivery of services. Menong (2021) also investigated the adoption and utilisation of ICT facilities in a selected higher Institutions and observed that lecturers utilize certain ICT facilities more than others, mainly for presentation of lectures.

In the same vain, Wordu, Oshebor, and Woke (2021) conducted a study on the perceptions of teachers on the utilization of information and communication technology for instructional delivery in government owned secondary schools in Port Harcourt Metropolis. One of the findings indicated that information and communication technologies were available in public senior secondary schools but are inadequate in supply. Again, the result also shows that teachers do not effectively use these tools in schools, because they are inadequate in supply.

In another related study, Fidelis and Onyango (2021) investigated the availability of ICT facilities and teachers' competence in the use of ICT among public secondary schools in Ngara District, Tanzania. The findings revealed that only few teachers could use the internet because a significant number of the sampled teachers had no competence in computer hardware and programming. The present study is in consonance with existing literature as it probed into the extent of utilization of available ICTs by biology teachers in Irepodun Local Government Area of Kwara State, Nigeria.

The need to investigate gender and teachers' level of utilization of ICT resources have been raised in several literatures because researchers are unresolved in their conclusions on gender in relation to several other attributes of teachers. For instance, while Fashina and Akanji (2016) observed a significant difference in the level of deployment of ICT for teaching by male and female teachers, Ayeni (2016); Ameen, Adeniji, and Abdullahi (2019) reported no relationship between ICT usage relative to teachers' and students' gender respectively.

Teaching experience has also been identified as an important factor that influences teachers' utilization of ICTs (Mahumud & Ismail 2010). For instance, Abu-Obaideh, Ab-Rahim, Rainlah, and Asimiran (2016) concluded from findings of their study that teaching experience does not influence teachers' use of ICT while the studies of Buabeng-Andoh (2012);

Obillos and Rosa (2016) revealed that teaching experiences influence the effective application of ICT for classroom instructional processes.

The main focus of the present study is to survey the information and communication technologies utilised for teaching biology in secondary schools in Irepodun Local Government Area of Kwara State. Although, similar studies had been conducted, however, they are at variance with the present study. For instance, the study of Agbulu and Ademu (2010) assessed agricultural science teachers' knowledge and utilization of information and communication technology in Nigerian secondary school and not biology. In addition, Akingbade (2013) investigated students' perception and not that of teachers on the availability and utilization of ICT in Ekiti State, Nigeria.

Furthermore, Okafor (2020) surveyed the extent of availability and usage of Information and Communication Technologies in secondary schools in Anambra State. Aderogba, Onojah and Olumorin (2021) carried out a correlational study on secondary school teachers' access to and utilization of internet facilities for instruction in Ilorin, Nigeria unlike the present study which specifically focus on identifying those ICT that are utilized for teaching and learning of biology whilst considering gender and years of experience as moderating variables. The motivation for the present study is borne out of the paradigm shift in pedagogy which necessitated the full integration of ICT into teaching and learning. Thus, the researchers seek to assess the availability and utilisation of ICTs by Biology teachers in Irepodun Local Government Area of Kwara State, Nigeria.

Objectives of the Study

The main purpose of this study was to determine information and communication technologies available and utilized for teaching biology in Irepodun Local Government Area, Kwara State, Nigeria. Specifically, the study investigated the:

1. extent of utilization of ICT resources available for teaching biology in Irepodun Local Government Area of Kwara State, Nigeria.
2. difference in the level of utilization of available ICT resources by male and female biology teachers.
3. influence years of teaching experiences of biology teachers on their level of utilization of the available ICT resources.

Research Questions

In this study, answers were provided to the following questions:

1. What is the extent of utilization of ICT resources available for teaching biology in Irepodun Local Government Area of Kwara State, Nigeria?
2. What is the difference in level of utilization of available ICT resources by male and female biology teachers?
3. What is the influence of years of teaching experiences on biology teacher's utilization of the available ICT resources?

Research Hypotheses

The following hypotheses were formulated and tested in this study at 0.05 level of significance.

- H₀₁: There is no significant difference in the extent of utilization of available ICT resources by male and female biology teachers.
- H₀₂: There is no significant difference in the teaching experiences of biology teachers and its influence on the level of utilization of the available ICT resources.

Methodology

The research design adopted for this study is the survey research design. The target population for the study consisted of all the secondary school biology teachers in Irepodun Local Government Area of Kwara State, Nigeria. However, 51 biology teachers drawn from 27 government owned senior schools in Irepodun Local Government Area of Kwara State participated in the study. The schools were selected using simple random sampling technique so as to eliminate bias in school selection and to ensure coverage of major parts of the local government area. Biology teachers on the other hand were purposively selected for the study.

The instrument used for data collection was a researchers-designed questionnaire entitled, "Information and Communication Technologies utilized for teaching biology." The instrument had two sections. Section A seeks information on the demographic data of the respondents like sex, qualification, gender and years of teaching experiences while Section B was designed to elicit information on the ICTs utilized for teaching biology. The section B was structured along a modified Likert's Scale options of Frequently Utilized (3 points), Rarely Utilized (2 points) and Never Utilized (1 point).

As a means of ensuring that the research instrument measures what it intended to measure, the instrument was given to three science education experts for face, content and construct validity to ensure that the instrument measures what it supposed to measure. The reliability of the instrument was determined using test-re-test method by administering the instrument to a small sample of the target population twice with an interval of three weeks. The reliability of the instrument was calculated using Cronbach alpha correlation and a reliability index of 0.79 was obtained, which shows that the correlation was high, meaning that the instrument is reliable.

The researchers personally visited the schools that were selected for study to solicit the permission and assistance of relevant school authorities (due to ethical issues) before administering the instrument. The biology teachers were encouraged to be objective in their responses and the researchers waited to collect the questionnaires on the spot after completion by each respondent. The data collected from the administered questionnaire were analyzed using descriptive and inferential statistics. Research questions were analyzed using descriptive statistical tools of mean and standard deviation while the two null hypotheses formulated were tested using *t*-test and ANOVA respectively. All analyses were carried out using the Statistical Package for Social Science (SPSS) 21.0 window version.

Results

Research Question 1: What is the extent of utilization of ICT resources available for teaching biology in Irepodun Local Government Area of Kwara State, Nigeria?

Table 1 : Level of Utilization of Available ICTs

S/N	ICT Facilities	N	Frequently Utilized	Rarely Utilized	Never Utilized
			Frequency (%)	Frequency (%)	Frequency (%)
1	MP 3 Player	51	11(21.6)	21(41.2)	19(37.2)
2	Radio	51	9(17.6)	33(64.7)	9(17.6)
3	Audio Tape	51	2(3.92)	7(13.7)	42(82.4)
4	Video Player	51	8(15.7)	13(25.5)	30(58.8)
5	DVD Player	51	17(33.3)	12(23.5)	22(43.1)
6	Television	51	12(23.5)	11(21.6)	28(54.9)
7	Overhead Projector	51	19(37.3)	15(29.4)	17(33.3)
8	Opaque Projector	51	3(5.88)	10(19.6)	38(74.5)
9	Filmstrip Projector	51	2(3.92)	6(11.8)	43(84.3)
10	Internet	51	47(92.2)	4(7.84)	0(0)
11	Digital Cameras	51	8(15.7)	5(9.80)	38(74.5)
12	Class blogs and website	51	5(9.80)	13(25.5)	33(64.7)
13	Computers	51	41(80.4)	8(15.7)	2(3.92)
14	Wireless Microphone	51	23(45.1)	17(33.3)	11(21.6)
15	Mobile Devices	51	49(96.1)	1(1.96)	1(1.96)
16	Interactive whiteboard	51	4(7.84)	22(43.1)	25(49.0)
17	Multimedia Projector	51	6(11.8)	10(19.6)	35(68.6)
18	Online Classes	51	11(21.6)	9(17.6)	31(60.8)
19	Flipped Classroom	51	3(5.88)	8(15.7)	40(78.4)
20	Email	51	9(17.6)	24(47.1)	18(35.3)
21	World Wide Web	51	17(33.3)	11(21.6)	23(45.1)
22	Printer	51	27(52.9)	15(29.4)	9(17.6)

Table 1 indicted that biology teachers in Irepodun Local Government Area of Kwara State consented that Overhead Projector, Internet, Computers, Wireless Microphone, Mobile Devices, and Printer were frequently utilized; MP 3 Player, Radio, and Email were rarely utilized; while Audio Tape, Video Player, DVD Player, Television, Opaque Projector,

Filmstrip Projector, Digital Cameras, Class blogs and website, Interactive whiteboard, Multimedia Projector, Online Classes, Flipped Classroom, and World Wide Web were never utilized.

Research Question 2: What is the difference in level of utilization of available ICT resources by male and female biology teachers?

Research Question 2 had a corresponding null hypothesis 1 which was used to provide answer to it

Null Hypothesis 1: There is no significant difference in the extent of utilization of the available ICT resources base on biology teachers' gender.

Table 2: t-test Result of the difference in the extent of utilization of the available ICT resources among male and female biology teachers

Variable	Levels	N	M	SD	t	df	Sig.
Gender	Male	21	28.90	4.13	.24	49	.81
	Female	30	28.60	4.79			

The independent sample t-test in Table 2 indicated that when $t(49) = .24$, $p = .81$. Hence, hypothesis 1 was not rejected since $p > .05$. This implies that there is no significant difference in the extent of utilization of the available ICT resources base on biology teachers' gender. The mean obtained for male ($M = 28.90$, $SD = 4.13$) and female ($M = 28.60$, $SD = 4.79$) teachers also followed the same pattern. This suggest that male and female teachers exhibited comparable dispositions towards the use of available ICTs.

Research Question 3: What is the influence years of teaching experiences on biology teachers utilization of the available ICT resources?

Research Question 3 had a corresponding null hypothesis 2 which was used to provide answer to it

Null Hypothesis 2: There is no significant difference in the teaching experiences of biology teachers and its influence on the level of utilization of the available ICT resources.

Table 3: Summary of Analysis of Variance on the difference in the teaching experiences of biology teachers and its influence on the level of utilization of the available ICT resources

Source	Sum of Squares	df	Mean Square	F	Sig.	Decision
Between Groups	14.195	2	7.098	.34	.71	Not Rejected
Within Groups	993.962	48	20.708			
Total	1008.157	50				

A one-way ANOVA was performed to compare the effect of three levels of teachers experiences on the utilization of available ICTs. Table 3 showed that there was no significant difference at the $p > .05$ level in teachers experiences: $F(2, 48) = .34$, $p = .71$.

Discussion of Findings

The present study surveyed the information and communication technologies utilized for teaching biology in Irepodun Local Government Area, of Kwara State, Nigeria. Findings revealed that Overhead Projector, Internet, Computers, Wireless Microphone, Mobile Devices, and Printer were frequently utilized; MP 3 Player, Radio, and Email were rarely utilized; while Audio Tape, Video Player, DVD Player, Television, Opaque Projector, Filmstrip Projector, Digital Cameras, Class blogs and website, Interactive whiteboard, Multimedia Projector, Online Classes, Flipped Classroom, and World Wide Web were never utilized. The plausible reasons adduced for this finding is that most of the ICTs frequently utilised by teachers required less technical know-how to operate them and can be easily maintained.

The pedagogical implication of the finding is that the use of ICTs has not been well incorporated into the classroom teaching and learning processes. This finding corroborates the finding of Abubakar (2016) who posited that ICT facilities are in short supply in most public schools. It also tallies with the submissions of (Wordu, Oshebor, & Woke, 2021; Fidelis & Onyango, 2021) that the available of ICT resources in secondary schools is not adequate and thus affect the utilisation of ICTs for teaching and learning.

The second finding reveals that there was no significant difference in the extent of utilization of the available ICT resources by male and female biology teachers' in Irepodun Local Government Area of Kwara State, Nigeria. This finding implies that the utilisation of ICT devices is not gender sensitive as such both male and female teachers can use ICTs for classroom instruction. The finding may be attributed to the fact that most ICT devices are accompanied with directions or guidelines of operation which in turn makes it easy for both male and female teachers to operate. The result of the above finding is in conformity with the findings of Ayeni (2016); Ameen, Adeniji, and Abdullahi (2019) who observed no significant difference in male and female teachers' use of ICT. However, it is not in consonance with the studies of Onwuagboke, Singh, and Onwuagboke (2014), Fashina and Akanji (2016) who posited that gender predict the utilization of ICT by teachers.

Further findings showed that there was no significant difference in the teaching experiences of biology teachers and its influence on the level of utilization of the available ICT resources. By implication, this finding indicates that teachers' utilization of ICT followed the same pattern and this may be because evidence of ICT training is a prerequisite for all teachers. Thus, most of the teachers showed interest in the utilisation of ICTs. This finding agrees with Abu-Obaideh, Ab-Rahim, Rainlah, and Asimiran (2016) who in their separate studies observed that the difference between highly experienced and less experienced teachers in their use of

ICT was not significant. It however disagrees with the findings of Buabeng-Andoh (2012); Obillos and Rosa (2016) who observed that teachers with more experience used ICT in the classroom more frequently than the less experienced teachers.

Conclusion

The conclusions drawn from the study are that most ICT facilities were not available in schools because the present study indicated that Overhead Projector, Internet, Computers, Wireless Microphone, Mobile Devices, and Printer are the ICTs frequently utilized by biology teachers. Teachers displayed a high level of interest in the utilisation of ICTs for classroom teaching and learning irrespective of their gender and years of experiences.

Recommendations

The following recommendations were advanced based on the findings:

1. The Federal, State and Local Government in conjunction with other education stakeholders need to urgently provide more ICT facilities in schools so as to compliment and facilitate classroom teaching and learning processes.
2. Training, workshops, refresher courses and technical support should constantly be provided for male and female teachers by the ministry of education so as to continue to boost their level of utilization of the available ICTs.
3. Proficiency certificate in ICT should continue to be a requirement for teachers' recruitment not matter the years of experiences they may have in teaching and learning this will ensure that all teachers have requisite knowledge of ICT before taking up the teaching profession.

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