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ABSTRACT

This study examined the availability, access points and use of Information and Communication Technologies (ICT) by science students in selected private secondary schools in Ibadan, Oyo State, Nigeria. The descriptive survey design was used and four (4) research questions guided the study. Data was collected from one hundred and fifty six (156) science students from six (6) private secondary schools in Ibadan with the use of questionnaire. The data analysis was done with the use of SPSS. Findings revealed the ICT facilities that were made available to include: computers 125 (80.1%), scanning machine 120 (76.9%), interactive white board 118(75.6%), CD-ROMS 117(75.0%), Internet 116(74.4%), mobile phone 114(73.1%), television 102(65.4%), radio 102(65.4%). Most of the respondents frequently used interactive white board for learning 101(64.7%), television 98(62.8%), and mobile phone 98(62.8%). Similarly, the science students had access to television at school, home and cyber café. There was access to interactive white board at school and home. Similarly, most of the respondents had access to Internet and computers at home and cyber café. However, the challenges faced by the science students on use of ICT facilities in Ibadan Township were: fear of using ICT tools, time constrains, complexity of operating ICT tools and lack of electricity to power the tool(s). The study recommends that teachers should train science students on use of ICT; secondary school management/authorities should adequately supply sufficient ICT teaching equipment to schools; science students should have personal laptop and modem.

Keywords: Information and Communication Technology, Availability, Access, Science Students

Introduction

Discussion of secondary school education in Nigeria cannot be made without making reference to the Nigeria historical antecedents in relation to regionalism, cultural background and religion of the people. Secondary school education in Nigeria started from the time Christian missionaries introduced the western educational system in the mid-nineteenth century. The missionaries and the colonial government were impressed that there were suitable students for secondary education in the Southern Nigeria having seen the eagerness in the children that attended the available primary schools then. In Lagos, the first Grammar school was opened by the CMS in 1859. The United Prebyseterian Church at Calabar built in 1895, including a catechist's seminary, teacher training college, grammar school and technical college "all-in-one" which later became Hope Waddell Institute (Adeyinka, 1971).

The Federal Government of Nigeria regards education as an instrument for effecting national development. In other words, Nigerian philosophy on education is based on the development of the individual into a sound and effective citizen and the provision of equal educational opportunities for all citizens of the nation at the primary, secondary and tertiary levels both inside and outside the formal school system (Federal Republic of Nigeria, 2004). The language of instruction in Nigerian institutions is English. Presently, the secondary school system is run by religious, private organizations and the government, with their number running into thousands all over the country (Awwalu, Najeemah and Mohammad, 2012).

The primary objective of secondary school education is to prepare individual student to have strong educational background before proceeding to higher institutions (university, polytechnic, mono-technic and college of education), with the simple focus of subject tracking for the purpose of having and producing experts or specialists in subject areas (Federal Republic of Nigeria, 2004). In the modern education system, there appears that Information and Communication Technology (ICT) has become the most popular and easy means of of instructional planning and delivery in the secondary school education system.

ICT use by secondary school students allows for increased individual and personal learning. In schools where new technologies are used, students have access to tools that adjust to their attention span and provide valuable and immediate feedback for literacy enhancement, which is currently not fully implemented in the Nigerian school system (Emuku and Emuku, 1999 and 2000). This study is designed to find out the ICT facilities available for use by science

students in private secondary schools, and the access points to the ICT facilities. Perhaps, ICT application and use in private secondary schools will improve and give the students a better education.

Statement of the Problem

Using conventional education information resources for learning by Nigerian students seems to be drastically reduced these days. Most students seem to use conventional books to pass examinations after which the books will be closed back till another upcoming examinations not minding to read for personal development. It is possible that ICTs are just the beginning of something that could lead to educational ways of finding and interacting with one another among secondary school students. However, many parents are worried that students are spending too much time on ICT driven tools and applications like games and social media, and not enough time studying. Secondary school teachers are even worried that some students sneak out of their parents' house to places such as cyber café or their friends house, and boy friends' house (for girls) in order to have access to ICT facilities and probably use for leisure purpose. Could it mean that ICT facilities were not available for students' use in their various schools or homes? Or could it mean that the students do not have the knowledge of ICT use for education purpose? This study therefore seeks to investigate issues relating to information and communication technology availability, access points and utilisation for learning science subjects among secondary school students in selected private secondary schools in Ibadan.

Objectives of the study

The main objective of this study is to investigate the level of availability, access points and use of Information and Communication Technologies (ICT) by science students in selected private secondary schools in Ibadan, Oyo State, Nigeria. However, the specific objectives are to:

i. find out the level of availability of ICT facilities for learning science subjects by private secondary school students in Ibadan;

ii. ascertain the level of ICT facilities use for learning science subjects by private secondary school students in Ibadan;

iii. find out the access points to ICT facilities use for learning science subjects by the secondary school students; and

iv. find out the challenges faced by science students on use of ICT facilities in Ibadan.

Literature Review

Teaching and learning of science subjects in secondary schools are gradually becoming scientific and more systematic with less emphasis placed on them. The approach to teaching and learning of science subjects such as physics, Chemistry, Further Mathematics, Biology, Agricultural Science and mathematics therefore, must allow for factual and measurable evidence which can be achieved through systematic activities, ICT application and utilisation of instructional materials. Although efforts have been made to ensure that ICTs are available, accessible and used in Nigerian secondary schools, the level of uptake is still low (Goshit, 2006). The ability to use computers effectively has become an essential part of everyone's education. Skills such as bookkeeping, clerical and administrative work, stocktaking, and so forth, now constitute a set of computerised practices that form the core IT skills package: spreadsheets, word processors, and databases (Reffell and Whitworth, 2002).

The demand for computer and ICT literacy is increasing in Nigeria, because employees realize that computers and other ICT facilities can enhance efficiency. On the other hand, employees have also realized that computers can be a threat to their jobs, and the only way to enhance job security is to become computer literate. With the high demand for computer literacy, the teaching and learning these skills is a concern among professionals. This is also true of other ICT components. New instructional techniques that use ICTs provide a different modality of instruments. For the student, ICT use allows for increased individualisation of learning. In schools where new technologies are used, students have access to tools that adjust to their attention span and provide valuable and immediate feedback for literacy enhancement, which is currently not fully implemented in the Nigerian school system (Emuku and Emuku, 1999 and 2000). ICT application and use will prove beneficial in improving Nigeria's educational system and giving students a better education. A technologically-advanced workforce will lead to ICT growth in Nigeria, with the potential to improve military technology and telecommunications, media communications, and skilled ICT professionals who will be well-equipped to solve IT problems in Nigeria and other parts of the world (Goshit, 2006).

There are developments in the Nigerian education sector which indicate some level of ICT application in the secondary schools. The Federal Government of Nigeria, in the *National Policy on Education* (Federal Republic of Nigeria, 2004), recognizes the prominent role of ICTs in the modern world, and has integrated ICTs into education in Nigeria. To actualize this goal,

the document states that government will provide basic infrastructure and training at the primary school. At the junior secondary school, computer education has been made a pre-vocational elective, and is a vocational elective at the senior secondary school. It is also the intention of government to provide necessary infrastructure and training for the integration of ICTs in the secondary school system (Cantoni and Danowski, 2015).

Nowadays ICT cannot be separated with students' daily needs. For example, students can read Nigerian local newspaper using the online newspaper. Another example is that students can get connected with their family, relatives, or colleagues even if we are abroad by using the electronic mail, yahoo messenger, call conference, or video conference (Murray, 2011). Information and Communication Technology can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration. UNESCO takes a holistic and comprehensive approach to promoting ICT in education. Access, inclusion and quality are among the main challenges they can address. The Organization's Intersectral Platform for ICT in education focuses on these issues through the joint work of three of its sectors: Communication and Information, Education and Science (Cantoni and Danowski, 2015).

In modern society ICT is ever-present, with over three billion people having access to the Internet. With approximately 8 out of 10 Internet users owning a smartphone, information and data are increasing by leaps and bounds. This rapid growth, especially in developing countries, has led ICT to become a keystone of everyday life, in which life without some facet of technology renders most of clerical, work and routine tasks dysfunctional (Murray, 2011). The most recent authoritative data, released in 2014, shows "that access to ICT and Internet use continues to grow steadily, at 6.6% globally in 2014 (3.3% in developed countries, 8.7% in the developing world); the number of Internet users in developing countries has doubled in five years (2009-2014), with two thirds of all people online now living in the developing world" (Cantoni and Danowski, 2015).

The use of ICT in secondary school education add value in teaching and learning, by enhancing the effectiveness of learning, or by adding a dimension to learning that was not previously available (Wima and Lawler, 2007). Okwudishu (2005) discovered that the unavailability of some ICT components in schools hampers students' use of ICTs. Lack of

adequate search skills and of access points in the schools were reported as factors inhibiting the use of the Internet by secondary school students (Kaku, 2005). The absence of ICT equipment in most Nigerian secondary schools leads students to resort to cybercafés for Internet access. Most cybercafé clients in Nigeria are students (Adomi, Okiy and Ruteyan, 2003). No matter where students access and use ICT facilities, they all preferred to perform excellently in learning sciences in secondary schools.

One of the main challenges faced by science students as far as using ICT for learning science subjects is concerned is teachers' failure to help the students develop the capacities necessary to take full advantage of the opportunities offered by ICTs. Other challenges include inadequate funding, lack of basic infrastructure, lack of qualified personnel and lack of policy formulation and implementation machinery. In secondary schools, there is lack of qualified personnel to manage available systems, develop and use information communication technology facilities for the teaching-learning process. However, in schools where these personnel exist, they lack skills in designing and delivering subject contents in electronic formats (Osakwe, 2012). According to Gbadamosi (2006), "inadequate funding is a major challenge because it has negatively affected many areas of education in Nigeria". Ibadin (2001) maintained that there is acute shortage of well-trained ICT handlers. There is need to provide adequate manpower, train and retrain personnel on ICT programme management. This will help to ensure that these personnel become conversant with ICT techniques and strategies.

Methodology

Descriptive survey design was adopted for this study. Data for the study was collected from science students in six (6) selected private secondary schools in Ibadan. The selected schools include: Kings International College, Moniya; Posit College, Arulogun Road; Yinbol College, Orogun; Milestone College, Arulogu Road; Adejare College, Abiola Area, Moniya, and Besley College, Moniya. The study adopted the use of equal allocation of thirty (30) science students to each school on the basis of 10 students per class from SSS 1 to SSS 3. This made a total of one hundred and eighty (180) sample size. Structured questionnaire were personally administered by the researchers to collect data from the respondents.

A total number of one hundred and fifty six (156) copies of the questionnaire were retrieved from the respondents sequel to completion giving 86.7% response rate. The data collected was analysed with the use SPSS as a sophisticated technique. Descriptive statistics such

as frequency and percentage distribution in tables was used to answer the research questions, findings were presented clearly with no ambiguity and conclusions thoroughly justified.

Results and discussion

Research question 1: What are the ICT facilities available for learning science subjects by private secondary school students in Ibadan?

Table 1 presents information on availability of ICT facilities for learning science subjects by private secondary school students.

Table 1: Availability of ICT facilities for learning science subjects

S/N	ICT facilities available	Frequency	Percentage (%)
1	CD-ROMS	117	75.0
2	Overhead Projector	46	29.5
3	Digital Camera	34	21.8
4	Computer	125	80.1
5	Interactive White Board	118	75.6
6	Internet	116	74.4
7	Telephone	54	34.6
8	Fax Machine	35	22.4
9	Scanning Machine	120	76.9
10	Radio	102	65.4
11	Mobile Phone	114	73.1
12	Television	102	65.4
13	Filmstrip	40	25.6
	N = 156		

Results show that the following ICT facilities were available with response rate: 125 (80.1%) computers, 120 (76.9%) scanning machine, 118(75.6%) interactive white board. The least responses generated indicated that the following ICT facilities were not available with response rate: 34(21.8%) digital camera, 35(22.4%) fax machine and 40(25.6%) filmstrip. Therefore, the ICT facilities that were made available for learning science subjects by private secondary school students in Ibadan Township were: computers, scanning machine, interactive white board, CD-ROMS, Internet, mobile phone, television, radio (Table 1).

Research question 2: What are the ICT facilities used for learning science subjects by private secondary school students in Ibadan?

Table 2 presents the response rate on ICT facilities used for learning science subjects.

Table 2: ICT facilities used for learning science subjects

S/N	ICT facilities used	Frequently used		Sometimes used		Never used	
		Freq.	%	Freq.	%	Freq.	%
1	CD ROM	29	18.6	92	59.0	35	22.4
2	Overhead Projector	17	10.9	30	19.2	109	69.9
3	Digital Camera	11	7.1	35	22.4	110	70.5
4	Computer	27	17.3	97	62.2	32	20.5
5	Interactive White Board	101	64.7	28	17.9	27	17.3
6	Internet	23	14.7	107	68.6	26	16.7
7	Telephone	29	18.6	26	16.7	101	64.7
8	Fax Machine	31	19.9	19	12.2	106	67.9
9	Scanning Machine	29	18.6	26	16.7	101	64.7
10	Radio	21	13.5	107	68.6	28	17.9
11	Mobile Phone	98	62.8	33	21.2	25	16.0
12	Television	98	62.8	31	19.9	27	17.3
13	Filmstrip	25	16.0	20	12.8	111	71.2
	N = 156						

Table 2 shows that most of the respondents 101(64.7%) indicated that they frequently used interactive white board. Similarly, 98(62.8%) indicated that they frequently used television. In addition, 98(62.8%) affirmed that they frequently used mobile phone. However, 111(71.2%) indicated that they never used filmstrip. In the same way, 106(67.9%) indicated that they never used Fax machine, while 110(70.5%) also indicated that they never used digital camera. Therefore, observation of the results in Table 2 shows that respondents frequently used interactive white board, television, and mobile phone.

Research question 3: What are the access points to ICT facilities use for learning science subjects by private secondary school students in Ibadan?

Table 3 shows the response rate on access points to ICT facilities use for learning science subjects by the private secondary school students.

Table 3: Access points to ICT facilities use for learning Physics

S/N	ICT Tools	School		Home		Cyber Café	
		Freq.	%	Freq.	%	Freq.	%
1	CD ROM	35	22.4	43	27.6	110	70.5
2	Overhead Projector	59	37.8	47	30.1	17	10.9
3	Digital Camera	40	25.6	54	34.6	47	30.1
4	Computer	50	32.1	103	66.0	101	64.7
5	Interactive White Board	110	70.5	98	62.8	21	13.5
6	Internet	59	37.8	100	64.1	107	68.6
7	Telephone	52	33.3	48	30.8	37	23.7
8	Fax Machine	40	25.6	56	35.9	59	37.8
9	Scanning Machine	51	32.7	45	28.8	114	73.1
10	Radio	53	34.0	97	62.2	58	37.2
11	Mobile Phone	55	35.3	96	61.5	49	31.4
12	Television	110	70.5	114	73.1	108	69.2
13	Filmstrip	57	36.5	48	30.8	40	25.6
	N = 156						

Most of the respondents indicated that they have access to: television 110(70.5%) at school, 114(73.1%) at home and 108(69.2%) at cyber café; interactive white board 110(70.5%) at school and 98(62.8%) at home; Internet 100(64.1%) at home and 107(68.6%) at cyber café; Computer 103(66.0%) at home and 101(64.7%) at cyber café; 96(61.5%) at home. However, respondents only had access to radio 97(62.2%) at home, mobile phone 96(61.5%) at home, scanning machine 114(73.1%) at cyber café and CD-ROMS 110(70.5%) at cyber café. Based on the results in Table 3, respondents had access to television at school, home and cyber café. Interactive white board was accessed at school and home while, Internet and Computers were accessed at home and cyber café.

Research question 4: What are the challenges faced by science students in private secondary schools on use of ICT facilities in Ibadan?

Information on challenges faced by science students in private secondary schools on use of ICT facilities in Ibadan is presented in Table 4.

Table 4: Challenges faced by science students on use of ICT facilities

S/N	Challenges	Frequency	Percentage (%)
1	Complexity of operating ICT tools	99	63.5
2	Non-availability of ICT facilities	50	32.1
3	Inaccessibility of ICT tools	47	30.1
4	Fear of using ICT tools	105	67.3
5	Time constraint	103	66.0
6	Lack of electricity to power the tool(s)	96	61.5
7	Lack of knowledge to operate ICT tools	49	31.4
	N = 156		

One hundred and five (105 or 67.3%) respondents indicated fear of using ICT tools, 103(66.0%) indicated lack of confidence in ICT tools, and 103(66.0%) indicated time constrain. The least challenge as indicated by the respondents was inaccessibility of ICT tools with 47(30.1%) least response. This is followed by 49(31.4%) lack of knowledge to operate ICT tools and 50(32.1%) non-availability of ICT facilities. Therefore, the peculiar challenges faced by science students on use of ICT facilities in Ibadan Township as revealed in Table 4 were: fear of using ICT tools, time constrains complexity of operating ICT tools and lack of electricity to power the tool.

Discussion of findings

Findings of this study showed that ICT facilities that were made available for learning science subjects by private secondary school students in Ibadan Township were: computers, scanning machine, interactive white board, CD-ROMS, Internet, mobile phone, television, and radio. This supports Ofodu (2007) who submits that the following ICT facilities are always available for teaching and learning activities of students: radio, television, computers, overhead projecttors, optical fibres, fax machines, CD-Rom, Internet, electronic notice board, slides, digital multimedia, video/VCD machine, among others.

Findings also showed that respondents frequently used interactive white board, television, and mobile phone. This is in line with Omosewo (2009) who posits that science subjects are measurements demanding subjects. Therefore, students use ICT facilities like computers, video, Internet, CD-Rom, projectors and electronic notice board which help science students in making accurate and reliable measurement and as well become knowledgeable in science and technology.

In addition, findings revealed that respondents had access to television at school, home and cyber café. Interactive white board was accessed at school and home while, Internet and Computers were accessed at home and cyber café. This is similar to the submission of Grossman and Helpman (2005) who maintained that laptops are now becoming the preferred method of computing, ICT continues to insinuate and alter itself in the ever-changing globe where students have access to them in their schools, home or business environments. No that wonder World Bank (2006) submits that Cyber Cafes and 'Call boxes' are generating a lot of income for owners of such businesses and are employing a good number of youths and equally engaging secondary school students in Internet browsing. Adomi, Okiy and Ruteyan (2003) maintained that most cybercafé clients in Nigeria are students. The absence of ICT equipment in most Nigerian secondary schools leads students to resort to cybercafés for Internet access.

Finally, findings revealed that peculiar challenges faced by science students on use of ICT facilities in Ibadan Township were: fear of using ICT tools, time constrains, complexity of operating ICT tools and lack of electricity to power the tool(s). This is similar to Kaku (2005) who submits that lack of adequate search skills and of access points in the schools were reported as factors inhibiting the use of the Internet by teachers and students in secondary schools. Hence,

Okwudishu (2005) discovered that the unavailability of some ICT components in schools hampers teachers and students' use of ICTs.

Conclusion

Nigeria education system has realised the importance of ICT facilities in attainment of educational curriculum goals and enhances national educational development. Although, most secondary schools have started to integrate ICT utilisation into their education activities, hence, this study concludes that most private secondary schools in Ibadan only made ICT facilities available for their student without fully utilising such for education purposes. Perhaps, the ICT facilities were being used by subject teachers without allowing the students to have full access and make good use of the ICT facilities for their education purposes at school. If ICT is fully integrated into science learning by the students, there will be improvement in the students' academic performance in science subjects and the future of national science and technology development is guaranteed.

It is therefore worthy to note that the main problem confronting the proper use of ICT facilities by the students was fear of using ICT tools which could be due to lack of confidence in ICT tools. Teachers therefore need to be willing to learn and to strengthen the students' understanding and their ICT literacy skills in line with the 21st century ICT competency demands. Until this is done, the use of ICT facilities for Physics learning to enhance students' academic performance may not be fully appreciated.

Recommendations

The following recommendations were made having considered the findings of this study:

1. Information and Communication Technology (ICT) integration in science education will not have the desired effect without student-centred classroom practices. Therefore, Science subject teachers should incorporate practical session with the use of ICT into their science classes.

2. Science teachers should try and improve the ICT literacy competence of the students in order to better appreciate the integration of ICT into science education.

3. Government, non-governmental organisations, and proprietors should adequately supply sufficient ICT teaching equipment to schools; equipment like computer, projectors, educational software and ensure all schools are internet compliant. The equipment should be well monitored by teachers and other school authorities to ensure they are not

vandalised or stolen; this could be done by charging the school management with this responsibility.

4. Educational authorities should always organise computer conference for science and technology teachers who will in turn train the students on ICT use to boost the students' confidence in ICTs. Attendance of these training, workshop, seminar and conference should be made compulsory for all teachers both in public and private schools; there should be a bench-mark for these training, any science teacher short of this should be relieved of the job.

5. All science students should have personal laptop and modem to provide them a limited internet server so that they can access internet anywhere and at any time and thus minimise their stress of going to cyber café for Internet browsing.

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