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**EXTENT OF UTILIZATION OF INFORMATION AND COMMUNICATION
TECHNOLOGY IN LEARNING BASIC SCIENCES IN JUNIOR SECONDARY
SCHOOLS IN SOUTH EAST NIGERIA**

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Abstract

The research study investigated the extent of utilization of ICT facilities in learning basic science in junior secondary schools in Southeast Nigeria. The researchers used 75 secondary schools selected through stratified random sampling technique. JSS3 classes were selected from the schools using purposive sampling technique and 1500 students were selected through random sampling. The researchers adopted a descriptive survey design. A 19-item, four-point scale structured questionnaire was developed by the researchers to enable them collect data for the study. Mean and standard deviation were used to answer the research questions while t-test was used to test the hypothesis at 0.05 alpha level of significance. Results of data analysis showed that the extent to which basic science students in both urban and rural junior secondary schools use ICT facilities in learning basic science is low. Based on the findings of the study, the researchers recommended that basic science teachers in junior secondary schools should do more to expose themselves and their students to use of ICT facilities in learning basic science. The government and the school authorities should ensure that basic science teachers are adequately trained on the use of ICT facilities in teaching basic science. The state government should provide ICT facilities to all junior secondary schools in the state and ensure basic teachers use ICT facilities in teaching basic science.

Introduction

According to Adigun (1999), students have to be actively involved in science and technology lessons to acquire skills in their various fields of studies. These science lessons (activities) can take place in the school using many student-centred strategies among which is information and communication technology (ICT) facilities. The emergence of information and communication technology has really revolutionized education and other human endeavours globally.

Information and communication technology involves handling and processing all kinds of information using all kinds of electronic devices, (FGN,1998). According to Akindolu, (2002) and Adebayo,(2002) information and communication centred education involves the use of computers, on-line self-learning packages, CDs, satellites, optical fiber technologies, telepresence systems and different types of hardware and software. Audu, (2005) and Ambimbade,(2006) stated that the utilization of ICT in teaching and learning has brought improvement in rate of knowledge acquisition and dissemination, and the quality of products of education system. The impact of ICT is evident in virtually all aspects of human endeavours, ICT is indispensable and has become part of the contemporary world, (Ololube,2006). It has brought tremendous changes in technological, political, economic, educational and social life of the society.

Federal Republic of Nigeria, (2013) emphasized the role of ICT in enhancing the acquisition of knowledge for effective functioning in today's technologically driven world, The National Policy on Education stressed the need to integrate ICT into education in Nigeria. In integrating ICT into teaching and learning, emphasis is placed on learner-centred environment and paying attention to the acquisition of knowledge, skills and attitudes by the learners. Federal Republic of Nigeria, (2012) stressed that what is utmost importance in any education system is what the learners are able to learn and not what the teachers are required to teach. It implies that learners should be engaged actively in their learning process. Learning plans and programmes in the classroom should focus on making sure that effective learning takes place rather than simply planning to cover the course contents.

According to Yusuf, (2005), teachers need training in different kinds of educational software in teaching and learning. They need to know how to integrate ICTs into classroom teaching and learning activities. Teachers' training in the utilization of ICT in the various classroom science learning experiences is crucial so that they can



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conveniently facilitate learners using these technologies to acquire knowledge, skills and attitudes. Information and communication technology has opened a new dimension in the use of conventional teaching methods and is offering new teaching and learning experiences to both teachers and students. Education is not complete without effective ICT, (Enwereonye, 2004). This requires that ICT should be properly rooted in our school curriculum and that ICT facilities should be available and utilized in the teaching learning experiences. Igboegwu, Egolum and Nnoli, (2011) found that chemistry teachers in secondary schools in Anambra State have very low knowledge of information and communication technology.

Olasupo, (2011), outlined the under listed as the materials needed for successful integration of ICT in the teaching and learning activities: 1. Browsing Environment consisting of ICT centre with a very strong server, use of modem to connect Internet Service Provider,(ISP) Cyber-cafe, (a sub client to any of ISP, 2. Personal Computers, (PC) such as Desk-Top, Lap-Top or Palm-Top, 3.WEB application software such as Microsoft Internet Explorer, Mozilla Firefox, Google Chrome, Opera, YouTube, Wikipedia free encyclopaedia 4. Library Websites, which has abundant information on research papers, publications, databases, images, videos and diagrams. 5 Facilities for classroom lessons in off-line environment such as flash drives, re-writable VCDs and DVDs. Akindolu,(2002 and Adebayo,(2002) stated that ICT-centred education includes the use of computers, on-line self learning packages, interactive CDs, satellites, radio, television, optical fiber, technologies and other ICT hardware and software. Aginam, (2006), in Adomi and Kpangban, (2010) noted that the New Partnership for African Development, (NEPAD) launched the e-school initiative intended to equip all African schools with ICT facilities such as computers, radio and television, phones and fax machines, communication equipment, scanners, digital cameras, copiers among others.

It appears that information and communication technology facilities are not utilized in teaching basic science in junior secondary schools in South East of Nigeria. Students in the state seem not to use these facilities in learning basic science; It is possible that the basic students learn basic science by the traditional chalk-and-talk methods and in some cases, conventional deductive laboratory approach. The researchers presume that basic science students in junior secondary schools in South East of Nigeria do not use ICT facilities in learning basic science.

It is uncertain whether there are empirical data on the extent of utilization of information and communication technology facilities in learning basic science in junior secondary schools in South East Nigeria, It is in the light of the above, that this research is set out to investigate the extent of utilization of information and communication technology (ICT) facilities in learning basic science in junior secondary schools in South East Nigeria

Statement of the Problem

Various science texts contain a wealth of information on the importance of using ICT facilities in facilitating learning and the application of same in virtually all aspects of human endeavours. In spite of this, basic science students in junior secondary schools in the South East of Nigeria seem not to utilize these ICT facilities in learning basic science.

The extent of utilization of ICT facilities in learning basic science in junior secondary schools in South East of Nigeria is uncertain. This research is therefore designed to ascertain the extent of utilization of ICT facilities in learning basic science in junior secondary schools in South East Nigeria.

Purpose of the Study

The main objective of the study is to ascertain the extent of utilization of information and communication technology facilities in learning basic science in Junior secondary schools in South East Nigeria. Specifically, the research seeks to:

1. Ascertain the extent basic science students in junior secondary schools in urban areas in South East Nigeria use information and communication facilities in learning basic science.
2. Assess the extent basic science students in junior secondary schools in rural areas in South East Nigeria use ICT facilities in learning basic science
3. Determine the extent basic science students in junior secondary schools in South East Nigeria use ICT in learning the sciences



Research Questions

To ensure the attainment of the objectives of the study and to guide the researchers in the research work, the following research questions were posed:

1. To what extent do basic science students in the urban areas in junior secondary schools in South East Nigeria use ICT facilities in learning basic science?
2. To what extent do basic science students in rural areas in junior secondary schools in South East Nigeria use ICT facilities in learning basic science?
3. To what extent do basic science students in junior secondary schools in South East Nigeria use ICT facilities in learning basic science?

Scope of the Study

The study was centred on government owned junior secondary schools in rural and urban areas in South East of Nigeria. It covered the extent basic science students in junior secondary schools in the South East of Nigeria use ICT facilities in learning basic science.

Hypotheses

The following null hypotheses were formulated at 0.05 level of significance to guide the study:

HO1 There is no significant difference in the mean responses of basic science students in rural and urban areas on the extent of utilization of ICT facilities in learning basic science in junior secondary schools in South East of Nigeria

Sample and Sampling Techniques

The sample consists of 75 junior secondary schools selected from the rural and urban areas of the five states South East of Nigeria. The junior secondary schools were selected using stratified random sampling technique. Stratified random sampling technique was used to ensure that the survey is spread across the junior secondary schools in the five states of the zone. 15 junior secondary schools (10 from rural schools and 5 from urban schools) were selected from each state of the zone using simple random (balloting) technique. 20 basic science students were selected for the study from each of the schools using simple random sampling technique also. A total of 1500 JSS3 students were selected for the study. Purposive sampling was used to select the class (JSS3 class) with the highest experiences in basic science lesson activities.

Instrument for Data Collection

The instrument for the collection of data for this study is a structured questionnaire developed by the researchers. The instrument is titled ICT Facilities Utilization Assessment Questionnaire (IFUAQ). The questionnaire is organized into two sections. Section A seeks background information of the respondents such as name of school and class of the student. Section B seeks information on utilization of wide range of information and communication technology facilities by basic science students in the state. The instrument is made up of 19 items.

The instrument is a four-point scale developed by the researchers. The response scales for the instrument are as follows: 4= Very High Extent (VHE); 3 = High Extent (HE); 2 = Low Extent (LE) while 1 = Very Low Extent (VLE).

Validation of the Instrument

Two experts each from the Department of Science Education from Ebonyi State University, Abakaliki and Computer Science Department, Ebonyi State Collge of Education, Ikwo face validated the instrument. They made corrections and amendments by restructuring some of the items. They also ensured content validity of the instrument by ensuring that the required information and communication technology facilities are contained in the instrument. The instrument has 19 items.

Reliability of the Instrument

The 19-item instrument was subjected to trial testing by administering it to 30 respondents who are not part of the sample. Cronbach Alpha statistics was used for the computation of reliability coefficient of the instrument and a coefficient of 0.78 was obtained. This means that the instrument is highly consistent.



Methods of Data Collection

The researchers made use of three research assistants in the administration of the instrument. The research assistants were trained by the researchers to explain to the respondents what to do and the need for them to respond honestly to the items. Each research assistant visited and administered the questionnaire to the respondents to respondents in Anambra, Abia and Imo states respectively while one researcher each visited and administered the questionnaire to respondents in Ebonyi and Enugu states respectfully. The basic science teachers in various schools also assisted in the administration of the instrument.

Method of Data Analysis

The researchers used mean and standard deviation in making the analysis of the responses of the basic science students on each item of the questionnaire and in answering the research questions. The sample mean and the standard deviation of each scaling item was calculated for the basic science students. The values obtained were interpreted in relation to the scale code. A mean value between 3.50-4.00 is regarded as VHE; a mean value between 2.50-3.49 is regarded as HE while a mean value between 1.50-2.49 is regarded as LE. On the other hand, a mean value between 1.00-1.49 is regarded as VLE. T-test was used to test the hypotheses, at 0.05 alpha level of significance

Results

This chapter presents the results of data analysis based on the three research questions and the null hypothesis. Results are presented in tables according to the individual research questions and hypothesis.

Research Question I

To what extent do basic science students in junior secondary schools in the urban areas in South East Nigeria use ICT facilities in learning basic science?

Data collected with respect to the instrument administered to students in government owned junior secondary schools were used to answer this research question. The data were analysed descriptively on individual item basis. Summary of the data analysis is presented in table 1

Table 1: Extent of utilization of ICT facilities in learning basic science in secondary schools in urban areas in South East Nigeria

S/N	Items	\bar{X}	SD	Interpretation
1	Personal computers such as desktops, laptops or palmtops	2.55	0.70	HE
2	Use of modems to connect internet service providers	2.44	0.52	LE
3	ICT Centre with strong server	2.46	0.51	LE
4	Web application software such as explorer, Google chrome, Mozilla Firefox, Opera, YouTube, Wikipedia.	2.45	0.63	LE
5	On-line self-learning packages	2.34	0.61	LE
6	Library websites for research papers, publications, images, videos, diagrams	2.43	0.52	LE
7	Flash drives, re-writable DVDs, VCDs for classroom lesson in an offline environment	2.35	0.48	LE
8	Camera phones and digital cameras	2.48	0.55	LE
9	Digital television and radio	2.47	0.52	LE
10	Scanners	2.42	0.46	LE
11	Fax machines	2.39	0.44	LE
12	Memory cards	2.54	0.57	HE
13	Cam coders	2.38	0.45	LE
14	E-Book readers	2.42	0.58	LE
15	Routers	2.39	0.52	LE
16	Interactive whiteboards	2.95	0.49	HE
17	Data projectors	2.34	0.53	LE
18	MP3 Players	2.57	0.62	HE
19	Printers	2.51	0.56	HE
	Grand Mean	2.46	0.54	LE



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Based on the result of data analysis shown in table 1 basic science students in junior secondary schools in urban areas in South East Nigeria use ICT facilities to a high extent in items 1,12,16,18 and 19 where as they use ICT facilities to a low extent in items 2,3,4,5,6,7,8,9,10,11,13,14,15 and17. The grand mean value of 2.46 and standard deviation of 0.54 also show that the extent of utilization of ICT facilities is low.

Research Question 2

To what extent do basic science students in junior secondary schools in the rural areas in South East Nigeria use ICT facilities in learning basic science?

Data collected with respect to the instrument administered to basic science students in the rural junior secondary schools were used to answer the research question. The data were analysed descriptively on individual item basis. Summary of the data analysis is presented in table 2.

Table 2 Extent of utilization of ICT facilities in learning basic science in junior secondary schools in rural areas in South East Nigeria

S/N	Items	X	SD	Interpretation
1	Personal computers such as desktops, laptops or palmtops	2.57	0.40	HE
2	Use of modems to connect internet service providers	2.37	0.46	LE
3	ICT Centre with strong server	2.39	0.41	LE
4	Web application software such as explorer, Google chrome, Mozilla Firefox, Opera, YouTube, Wikipedia.	2.35	0.43	LE
5	On-line self-learning packages	2.36	0.38	LE
6	Library websites for research papers, publications, images, videos, diagrams	2.41	0.42	LE
7	Flash drives, re-writable DVDs, VCDs for classroom lesson in an offline environment	2.37	0.53	LE
8	Camera phones and digital cameras	2.38	0.45	LE
9	Digital television and radio	2.42	0.50	LE
10	Scanners	2.35	0.42	LE
11	Fax machines	2.34	0.46	LE
12	Memory cards	2.51	0.51	HE
13	Cam coders	2.35	0.44	LE
14	E-Book readers	2.41	0.49	LE
15	Routers	2.33	0.42	LE
16	Interactive whiteboards	2.56	0.46	HE
17	Data projectors	2.32	0.51	LE
18	MP3 Players	2.51	0.55	HE
19	Printers	2.42	0.52	LE
	Grand Mean	2.41	0.54	LE

Based on the results presented in table 2 above, basic science students in juniorsecondary schools in in rural areas in South East Nigeria use ICT facilities to a high extent in items 1, 12,16 and 18 while they use ICT facilities to a low extent in items 2,3,4,5, 6,7, 8, 9,10,11,13, 14,15,17 and 19. The grand mean value of 2.41 and standard deviation of 0.54 show that the extent of utilization of ICT facilities by basic science students in junior secondary schools in rural areas in South East Nigeria is low

Research Question 3

To what extent do basic science students in junior secondary schools in South East Nigeria use ICT facilities in learning basic science?

Data collected with respect to the instrument administered to basic science students in South East were used to answer the research question. The data were analysed descriptively on individual item basis. Summary of the data analysis is presented in table 3.

**Table 3** Extent of utilization of ICT facilities in learning basic science in junior secondary schools in South East Nigeria

S/N	Items	X	SD	Interpretation
1	Personal computers such as desktops, laptops or palmtops	2.53	0.55	HE
2	Use of modems to connect internet service providers	2.40	0.48	LE
3	ICT Centre with strong server	2.42	0.46	LE
4	Web application software such as explorer, Google chrome, Mozilla Firefox, Opera, YouTube, Wikipedia.	2.40	0.53	LE
5	On-line self-learning packages	2.35	0.49	LE
6	Library websites for research papers, publications, images, videos, diagrams	2.42	0.46	LE
7	Flash drives, re-writable DVDs, VCDs for classroom lesson in an offline environment	2.36	0.55	LE
8	Camera phones and digital cameras	2.43	0.49	LE
9	Digital television and radio	2.44	0.41	LE
10	Scanners	2.38	0.44	LE
11	Fax machines	2.36	0.45	LE
12	Memory cards	2.52	0.54	HE
13	Cam coders	2.36	0.44	LE
14	E-Book readers	2.41	0.53	LE
15	Routers	2.36	0.47	LE
16	Interactive whiteboards	2.75	0.47	HE
17	Data projectors	2.33	0.52	LE
18	MP3 Players	2.54	0.58	HE
19	Printers	2.45	0.54	LE
	Grand Mean	2.43	0.54	LE

Based on the results presented in table 3 above, basic science students in junior secondary schools in South East Nigeria use ICT to a high extent in items 1, 12, 16 and 18 while they use ICT facilities to a low extent in items 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17 and 19. The grand mean value of 2.43 and standard deviation of 0.54 show that the extent of utilization of ICT facilities in learning sciences in secondary schools in South East Nigeria is low

HO: There is no significant difference in the mean responses of basic science students in urban and rural secondary schools in South East Nigeria on the extent of utilization of ICT facilities in learning basic science.

Table 4: T-test results based on the extent of utilization of ICT facilities in learning basic sciences.

SN	Variable	No.	\bar{X}	SD	DF	T. Cal	T. Crit	Decision
1	Urban Schools	900	2.55	0.70	898	0.57	1.96	Accept
	Rural Schools	600	2.51	0.40				
2	Urban Schools	900	2.44	0.52	898	0.63	1.96	Accept
	Rural Schools	600	2.37	0.46				
3	Urban Schools	900	2.46	0.51	898	2.06	1.96	Reject
	Rural Schools	600	2.39	0.41				
4	Urban Schools	900	2.45	0.63	898	2.47	1.96	Reject
	Rural Schools	600	2.35	0.43				
5	Urban Schools	900	2.34	0.61	898	0.51	1.96	Accept
	Rural Schools	600	2.36	0.38				
6	Urban Schools	900	2.43	0.52	898	0.58	1.96	Accept
	Rural Schools	600	2.41	0.42				
7	Urban Schools	900	2.35	0.48	898	0.57	1.96	Accept
	Rural Schools	600	2.37	0.53				
8	Urban Schools	900	2.48	0.53	898	2.80	1.96	Reject
	Rural Schools	600	2.38	0.45				
9	Urban Schools	900	2.47	0.52	898	1.37	1.96	Accept
	Rural Schools	600	2.42	0.50				



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10	Urban Schools	900	2.42	0.46	898	2.22	1.96	Reject
	Rural Schools	600	2.35	0.42				
11	Urban Schools	900	2.39	0.44	898	1.58	1.96	Accept
	Rural Schools	600	2.34	0.46				
12	Urban Schools	900	2.54	0.57	898	0.76	1.96	Accept
	Rural Schools	600	2.51	0.52				
13	Urban Schools	900	2.38	0.45	898	0.96	1.96	Accept
	Rural Schools	600	2.35	0.44				
14	Urban Schools	900	2.42	0.58	898	0.25	1.96	Accept
	Rural Schools	600	2.41	0.49				
15	Urban Schools	900	2.39	0.52	898	1.73	1.96	Accept
	Rural Schools	600	2.33	0.42				
16	Urban Schools	900	2.95	0.49	898	11.48	1.96	Reject
	Rural Schools	600	2.56	0.46				
17	Rural Schools	900	2.34	0.53	898	0.54	1.96	Accept
	Rural Schools	600	2.32	0.51				
18	Urban Schools	900	2.57	0.62	898	1.42	1.96	Accept
	Rural Schools	600	2.51	0.55				
19	Urban Schools	900	2.51	0.56	898	2.32	1.96	Reject
	Rural Schools	600	2.42	0.52				
						1.83	1.96	Accept

T. Value

The result of the data analysis in table 4 above showed that the results of items 1,4,5,6,7,9,11,12,13,14,15,17 and 18 were accepted because their t- calculated were less than t- critical of 1.96. The results of items 3,4,8,10,16 and 19 were rejected because their t-calculated were greater than t-critical. The grand t- value of 1.83 is less than 1.96. This shows that H_0 is accepted, implying that there is no significant difference in the mean responses of basic science students in the urban and rural junior secondary schools in South East Nigeria on the extent of utilization of ICT facilities in learning basic sciences.

Discussion

The researchers discussed the findings of the study based on the three research questions and the hypothesis that guided the study. Results were discussed according to the three variables of the study as follows.

Extent to which basic science students in junior secondary schools in South East Nigeria use ICT facilities in learning basic science:

Results of data analysis as shown in table 1 indicate that the extent to which basic science students in junior secondary schools in urban areas in South East Nigeria is low. This means that basic science students in junior secondary schools in urban areas in South East Nigeria do not quite use ICT facilities in learning basic science. Extent to which basic science students in junior secondary schools in rural areas in South East Nigeria use ICT in learning basic science.

Results of data analysis on table 2 indicated that the extent to which basic science students in junior secondary schools in rural areas in South East Nigeria use ICT to learn science is low. This means that basic science students in junior secondary schools in rural areas in South East Nigeria do not quite use ICT facilities in learning basic science.

The research also explored the extent to which the mean responses of basic science students in urban and rural junior secondary schools differ with respect to the extent of utilization of ICT facilities in learning basic science. The result in table 4 indicated that the grand t-value of 1.83 is greater than critical value of 1.96. H_0 is therefore accepted. This implies that there is no significant difference in the mean responses of basic science students in urban and rural junior secondary schools with respect to the extent of utilization of ICT facilities in learning basic science. The means that basic science students in both urban and rural junior secondary schools are not quite exposed to the use of information and communication technology facilities in learning basic sciences in junior secondary schools in South East Nigeria.



Conclusion

Based on the results obtained on the utilization of ICT facilities in learning basic science in junior secondary schools in South East Nigeria, the following conclusions were drawn by the researchers:

In South East Nigeria, junior secondary school basic science students in both urban and rural areas use ICT facilities to a low extent. Generally, the extent of utilization of ICT facilities in learning basic science in junior secondary schools in South East Nigeria is low.

Recommendations

Based on the findings of the study the researchers recommend as follows:

1. Basic science teachers in junior secondary schools in South East Nigeria should do more to expose themselves and their students to use of ICT facilities in learning basic science.
2. The governments and school authorities of junior secondary schools in South East Nigeria should ensure that basic science teachers are adequately trained on the use of ICT facilities in teaching basic science.
3. The governments of South East Nigeria should provide ICT facilities and energy source to all junior secondary schools in the zone.
4. The governments should ensure that there is greater supervision of basic science teachers to ensure that they use ICT facilities in teaching their students basic science.

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