

EXTENT OF UTILIZATION OF INFORMATION AND COMMUNICATION TECHNOLOGY TOOLS FOR TEACHING AND LEARNING OF BASIC SCIENCES AND VOCATIONAL AGRICULTURAL SCIENCE IN SECONDARY SCHOOLS

J.U. Ndem, PhD¹ and Omiko Akani, PhD²

Department of Technology and Vocational Education and Department of Science Education,
Ebonyi State University, Abakaliki, Nigeria

E-mails: ndemjoseph2012@gmail.com, akaniomiko@gmail.com

Abstract: This study was designed to determine the extent to which information and communication technology tools has been utilized for teaching of basic sciences and vocational agricultural science in secondary schools. The study was carried out in Ebonyi State of Nigeria. The study adopted survey research design. The sample for the study was 476. The instrument for data collection was a structured questionnaire. The questionnaire had four points rating options of very highly utilized, highly utilized, little utilized, and not utilized with their nominal values as 4,3,2 and 1 respectively. The questionnaire had 16 items in all. The instrument was validated by 3 experts in information and communication technology in the Ebonyi State University. The validity of instrument was determined by using Cronbach alpha, which yielded reliability coefficient of 0.94 indicating that the instrument was reliable. The data was collected by administering the instrument to the target respondents with the help of trained 3 research assistants. The collected data were analyzed using mean for the research questions and t-test statistics was used to test the hypotheses formulated. Based on the analysis, the following results emanated; computer and over-head projector was found to be utilized for teaching and learning of basic sciences and vocational agricultural science in secondary schools, but internet was not being utilized for teaching and learning. It was recommended among other things that internet facilities should be installed in every secondary school and the teachers and the students should be trained for the use of internet in the school for the use of the teachers and students.

Introduction

Information and communication technology (ICT) is a globally common innovation that has tremendously influenced development of all human endeavours. Adebayo and Adesope (2007), described ICT as scientific, technological and engineering discipline and the management technologies used in the handling of information, processing and application related to computers. ICT is a relatively recent instrument in the power behind globalization and the underpinning issues.

*Received May 7, 2015 * Published June 2, 2015 * www.ijset.net*

Akpabio (2004), reported that ICT includes technologies and methods for storing, managing and processing information as well as communicating information.

Adesope and Adebayo (2007) stated that information and communication technology is a medium through which students can observe the real-life implication of technology and communication. In the context of this study, ICT is the technologies that provide access to information and communication. ICT has many tools which help in facilitating information in achieving the efficient educational system.

Adesope and Adebayo (2007) explained further that the introduction of ICT usage integration and diffusion has ushered a new age in educational methodologies. Thus, it has radically changed traditional method of information delivery and usage patterns in the domain as well as offering contemporary learning experience for both instructors and students. For developing countries, ICT has potentials for increasing access to and improving the relevance and quality of education. It has represented a potential equalizing strategy for developing countries. ICT has greatly facilitated the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational system. Eynon (2006), reported that students become more aware about how to learn when using ICT tools. ICT has also changed the relationship between teacher and students. The idea of sharing knowledge and the capability of using ICT has helped students in the better communication and access to information. ICT has enhanced students' curiosity and motivation which has forced the teacher to seek more knowledge. The competencies learnt by using ICT prepares students better for further education and in future work. The introduction of ICT has brought about rapid change in technology, social, political and global economics transformation. It is widely acknowledged that ICT tools can be used to improve the quality of teaching and learning of basic sciences such as biology, chemistry, physics, mathematics, additional mathematics as well as vocational agriculture at the secondary school level. The prevalence and rapid development of ICT has transformed human society from the information and technology age to age of knowledge. In fact ICT is becoming natural part of man's daily life. Adekunmisi (2009), stated that the development of ICT has brought in more spectacular phenomenon of knowledge explosion. Information can now be generated, stored, retrieved and transmitted at a great speed through ICT. According to Mudrak (2004), the common ICT tools, they are; computer, video and cassette, projectors, internet, camera, television. These are tools designed, built and installed, to serve a specific function affording

a convenience or service. In this context of this study, the ICT tools are equipment provided for a particular purpose.

Adequate tools have been seen to enhance effective teaching and learning. Drucker (2006) said that effective is the ability to produce a desired result or the success in achieving a given goal. He further explained that to be effective, is to be successful in accomplishing a purpose and produce the intended or expected result. The use of adequate and appropriate tools can lead to effective teaching and learning. He further explained that teaching is the act of imparting knowledge to learners. The authors explained that teaching is an interactive process, primarily involving classroom talk which takes place between teacher and pupil with the activities and guidance or directing of the learning. In modern society, there is need for the use of ICT tools to aid teaching and learning in the educational system. Eynon (2006) stated that learning is the acquisition of cognitive skills or knowledge. It leads to the development of new capacities, skill, value, understanding and preferences.

Mark (2014) said that learning is the communication between the teacher and learner. In the context of this study, learning is a process of acquiring knowledge and skills. It is also the act of experience or observation. ICT Tools have made learning of basic sciences and vocational subjects in secondary schools more meaningful and educative to the student. Basic sciences are biology, chemistry, physics, additional mathematics while vocational subjects include; vocational agricultural. Miller (1990) stated that vocational agriculture prepares individuals on skills, knowledge and attitudes required for entry into agricultural occupations. It involves skills in site selection, land preparation, planting, weeding, disease control, harvesting, preservation, storage, marketing and distribution of farm products.

Basic sciences and vocational subjects such as vocational agricultural science are taught at the secondary school level in Nigerian education system. Secondary school level is an institution level after the primary school. At the secondary school level, ICT tools is expected to be used for easy teaching and learning of basic sciences and vocational agricultural science since the introduction of ICT in the educational institution in Nigeria, but experience has shown that it appears that the use of ICT tools has not been adequately used in teaching of basic sciences and vocational agricultural science in the secondary schools. It is on this basis that this research is designed to determine the extent of the use of ICT tools in the teaching of basic sciences and vocational agricultural sciences.

Specifically, the study sought to determine;

1. The extent of the use of computer for the teaching and learning of basic sciences and vocational agricultural science at the secondary schools.
2. The extent of the use of overhead projector in teaching and learning of basic sciences and vocational agricultural science in secondary schools.
3. The extent of the use of internet teaching and learning of basic sciences and vocational agricultural science in the secondary schools.

Hypotheses

The following hypotheses guided the study;

HO1: there will be no significant difference between the mean scores of the teachers and the students on the extent of the use of computers for teaching and learning of basic sciences and vocational agricultural sciences at the secondary schools at 0.05 level of significance.

HO2: there will be no significant difference between the mean scores of the teachers and the students on the use of internet for teaching and learning of basic sciences and vocational agricultural sciences at the secondary schools.

Methodology

The research adopted survey research design. The research was carried out in Ebonyi State of Nigeria. Three research questions guided the study. While two null hypotheses were formulated and tested at 0.05 level of significant. The population of the study was 1,850. This comprised of 530 teachers and students of basic sciences and vocational agricultural science at the secondary school levels. A simple random sampling technique was adopted to select 476 teachers and students which was used for the study. The instrument used for data collection was a structured questionnaire. The instrument had four point response options of very highly utilized (VHU) highly utilized (HU) averagely utilized (AU) not utilized (NU) with nominal values of 4, 3, 2, and 1 respectively. The instrument was validated by 3 experts in science education and agricultural education unit in the Department Of Technology and Vocational Education, Ebonyi State University, Nigeria. The reliability of the instrument was determined by using Cronbach Alpha which yielded 0.85 reliability co-efficient.

The copies of the questionnaire were distributed to the respondents by the researcher with the help of 3 research assistants who were trained by the researchers. Out of the 476 copies of the questionnaires distributed, 470 were retrieved which represent 98.7 percent.

The data collected were analyzed using mean and standard deviation to answer the research questions and t-test statistics was used to test the hypotheses formulated. The result of the study was obtained from the research questions answered and the hypotheses tested.

Results

Research Question 1

What extent has the computer being utilized for teaching of basic science and vocational agriculture in the secondary school levels?

Table 1: Mean ratings and standard deviation of the respondents on the extent of the use of computer for teaching and learning of basic science vocational agricultural science in the secondary school levels.

S/N	Item Statements (use of computer for teaching)	\bar{x}	SD	Interpretation
1	Storage of information	3.66	0.73	Utilized
2	Processing and analysis of data	3.69	0.59	Utilized
3	Evaluation of the students performance	3.50	0.57	Utilized
4	Checking of correct spellings and meaning of words	2.93	0.83	Utilized
5	Plotting of graph and sketching of diagrams	3.15	0.84	Utilized
6	Sourcing of information	3.43	0.97	Utilized

Table 1: indicates that all the items had their mean scores above the cut-off point of 2.50. This is an indication that the computer is being utilized in teaching and learning of basic sciences and vocational agricultural science in secondary schools.

Research Question 2:

What extent is the use of overhead projector for teaching and learning of basic sciences and vocational agricultural science in the secondary school levels?

Table 2: mean ratings and standard deviation of the respondents on the extent of the use of overhead projectors for teaching and learning of basic sciences and vocational agricultural science in secondary school levels?

S/N	Item Statements (use of overhead projector for teaching)	\bar{x}	SD	Interpretation
1	To project images for clear of the students	3.02	0.87	Utilized
2	Magnification of micro-specimens for easy observation	3.00	0.92	Utilized
3	Easy identification of parts of objects	3.05	0.78	Utilized
4	Reduction of teachers stress in teaching	2.83	0.71	Utilized
5	Simplification of complex concept for the students	3.40	0.82	Utilized

Table 2: revealed that all the items had their mean scores above the cut-off point of 2.50. This implies that over-head projector is being utilized in the teaching and learning of basic sciences and vocational agricultural science in secondary schools.

Research Question 3:

What is the extent of the use of internet for teaching and learning of basic sciences and vocational agricultural science in secondary school levels?

Table 3: mean rating and standard deviations of the respondents on the extent of the use of internet for teaching and learning of basic sciences and vocational agricultural science in secondary schools?

S/N	Item Statements (use of internet for teaching)	\bar{x}	SD	Interpretation
1	Browsing for information	2.40	0.76	Not Utilized
2	Communicating information to students	2.31	0.88	Not Utilized
3	Delivery of lesson without personal contact with the student	2.42	0.74	Not Utilized
4	Exchange of ideas with teachers and students	1.50	0.98	Not Utilized
5	Sending of messages and of new knowledge to students	2.30	0.96	Not Utilized

Table 3: revealed that all the items had their mean scores below the cut-off point of 2.50. This implies that internet is not being utilized in the teaching and learning of basic sciences and vocational agricultural science in secondary schools.

Hypotheses

HO1: There will be no significant difference between the mean ratings of the teachers and students on the extent of the use of computer for teaching and learning of basic sciences and vocational agricultural science in secondary schools?

Table 4: t-test analysis of the responses of the respondents on the extent of use of internet for teaching and learning of basic sciences and vocational agricultural science in secondary schools

S/N	Item Statements (use of computer for teaching)	\bar{x}_1	\bar{x}_2	S^2_1	S^2_2	t-cal.	t-tab	interpretation
1	Storage of information	3.02	3.06	0.64	0.97	-0.40	1.96	*
2	Processing and	3.30	3.26	0.83	0.74	0.40	1.96	*

3	analysis of data Evaluation of the students performance	3.34	3.01	0.33	0.86	3.30	1.96	**
4	Checking of correct spellings and meaning of words	3.08	3.28	0.80	0.71	-2.00	1.96	*
5	Plotting of graph and sketching of diagrams	3.02	3.13	0.22	0.93	-1.10	1.96	*
6	Sourcing of information	3.25	3.05	0.66	0.99	0.70	1.96	*

HO2: There will be no significant difference between the mean ratings of the teachers and students on the extent of the use of internet for teaching and learning of basic sciences and vocational agricultural science in secondary schools

* = No significant difference

** = significant difference

Table 4: revealed that all the items had their t-calculated less than the t-table except item no 3, therefore, the null hypothesis was accepted but rejected in item no 3.

Table 6: t-test analysis of the respondents of the responses on the extents of use of internet for teaching of basic sciences and vocational agricultural science in secondary school levels

S/N	Items Statements	\bar{x}_1	\bar{x}_2	S^2_1	S^2_2	t-cal	t-tab	Interpretation
1	Browsing of information	2.40	2.41	0.80	1.11	0.78	1.96	*
2	Communicating information to students	2.31	2.30	0.81	0.70	1.27	1.96	*
3	Delivery of lesson without personal contact with the student	2.42	2.43	0.96	0.67	0.98	1.96	*
4	Exchange of ideas with teacher and students	1.50	1.48	0.98	0.69	1.03	1.96	*
5	Sending messages and new knowledge	2.30	2.31	-	0.47	-	1.96	*

Table 5: indicated that all the items had their t-cal less than the t-tab. Therefore, the null hypothesis was accepted.

Finding of the Study

Based on the analysis of the data collected, the following findings emanated;

1. Computer is utilized in the teaching and learning of basic sciences and vocational agricultural science in secondary schools.

2. Over-head projectors are being utilized for teaching and learning of basic sciences and vocational agricultural science in secondary schools.
3. Internet is not utilized for teaching and learning of basic sciences and vocational agricultural science in secondary schools.
4. The opinions of the teachers and the students did not differ on the use of computer and internet for teaching of basic sciences and vocational agricultural science in secondary schools.

Discussion of the Findings

The findings are discussed as follows;

One of the results of the study is that computer is used for teaching and learning of basic sciences and vocational agricultural science. This result is in line with Nordhheim and Connors (1997) who reported that computer is used for teaching and learning in schools. The authors stressed that computer is used in drawing diagrams and calculating figures while teaching. On the other hand, students use computer to do their assignment, learn many things in sciences, and vocational agricultural science. Students pick the pictures of plants, animals and other animate and inanimate objects in learning sciences and vocational agriculture. The finding is in agreement with Jackson (1997) who reported that computer can be used by the teacher to calculate averages, record grades and keeps records of class attendance.

The finding that over-head projectors are used in teaching of basic sciences and vocational agricultural science is in agreement with Anglin (1995) who reported that the use of over-head projectors in teaching helps to magnify objects, pictures and diagram which makes the students see clearly.

The work revealed that internet is not being used in teaching of basic sciences and vocational agricultural science. This finding is in line with Ferran and Carlos (2008) who stated that internet utilization in many developing countries has not been satisfactorily explored despite the numerous advantages accruing from the use of internet. The authors further explained that the use of internet are yet to be fully patronized by the third world countries.

Conclusion

Education is a dynamic process which can be achieved through innovations. The introduction of the use of information and communication technology for teaching and learning in schools has been a great innovation; but in Nigeria, the use of ICT in the school system in teaching and learning has not been fully actualized. This work examined the extent of utilization of information and communication technology tools for teaching and learning basic sciences

and vocational agricultural science in secondary schools. The study revealed that computer and over-head projectors are used in teaching and learning of basic sciences and vocational agriculture in secondary schools but the use of internet for teaching and learning in secondary schools has not been actualized especially in the area of the study and this is a challenge to the school proprietors and managers.

Recommendations

Based on the findings; the following recommendations are put forward.

1. School managements should ensure that internet facilities are installed in every secondary school especially in the study area and students and teachers should be trained to make use of it.
2. The use of internet in secondary schools should be made compulsory
3. Every classroom in the school should have television set and over-head project to improve more on the use of such facilities in teaching and learning basic sciences and vocational agricultural science.

References

- [1] Adebayo, E. L. and Adesope, O. M. (2007). Awareness, Access and Usage of Information and Communication Technologies in Secondary Education. *International journal of education and development using information*.
- [2] Adekunmis, (2009) Information and Communication Technologies (ICTS) Application in the Teaching and Learning of Agricultural Science Based Courses. A Case Study of Lectures in the College of Agricultural Science Olabisi Onabnjo University Nigeria *Unpublished Research Work*.
- [3] Akpabio, E. (2004): Nigerian Home Video Films as a Catalyst for National Development. *Journal of Sustainable Development, (1) 5-10*.
- [4] Anglin, G. L. (1995) Instructional Technologies: Present and Future Englewood, *Libraries Unlimited, Inc*.
- [5] Branson, Jr. F. F. and Davis, S. M. (1998) How Closed Circuit Television Works For Extension. *Journal of Extension (on-line) 23(1) 33-36*.
- [6] Drucker, P. F. (2006). *The Effective Executive: The Definite Guide to Get the Right Things Done*. New York: Collins.
- [7] Eynon, R. (2006). The Use of ICTs for Teaching and Learning in Agricultural Science. Some innovations perspectives *Journal of current agriculture education 3(2) 22-35*.

- [8] Ferran, I. A. and Carlos, W.C. (2008) Video Conferencing In The Field: A *Heuristic Processing Model Management Science* 54 (9) 33-42.
- [9] Jackson, D.F. and Martin I.M. (1997). Internet Resources for Middle School Science: Golden Opportunity. *Journal of science education and technology* 6(1) 49-57.
- [10] Mark, A. (2014). Make it Stick: *The Science of Successful Learning*: Cambridge MA: Belknap Press.
- [11] Miller, C. and Kokrlik, J. W. (1990). Micro Computer in Vocational Agriculture Programs in United States. *Journal of the American association of Teacher Educators in Agriculture*, 28(1), 34-39.
- [12] Mudrak, T. (2004), "Assessing the Innovative Ability of FM Teams: A Review", *Facilities*, 22(11-12) 290-5.
- [13] Nordheim, G.J. and Connors, J.J. (1997) Perceptions and Attitudes of Northwest Agricultural Programs. *Proceedings of the 24th Annual National Agricultural Education Research Meeting*. 5 (3-4) 55-59.