IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON TEACHING OF SCIENCE IN SENIOR SECONDARY SCHOOLS IN ANAMBRA STATE.

Dr. Onyeka, Edith Chinyere; Ekoyo, Destiny Onyebuchi; Okoye, Grace Nwakaego; & Obikezie, Maxwell Chukwunazo
Department of Science Education, Faculty of Education,
Nnamdi Azikiwe University Awka,
P.M.B. 5025 Awka, Anambra State.
ORCID: https://orcid.org/0000-0002-2149-560X
Email:ech.onyeka@unizik.edu.ng; 07059936144

ABSTRACT
This study aimed to ascertain the impact of Information and Communication Technology (ICT) on teaching of science in senior secondary schools in Awka South local government area of Anambra State. Two research questions were raised and answered to achieve the purpose of this study. A descriptive survey research design was used to carry out this study. The population for this study consisted of all the 116 science teachers in 19 public senior secondary schools in Awka South local government of Anambra State The total population sampling method was used for the study which gave a sample size of 116 science teachers. The instrument used for collection of data is a structured questionnaire developed by the researchers. The questionnaire contained thirteen (13) item questions. The instrument was validated by three (3) lecturers from the Department of Science Education, Nnamdi Azikiwe University, Awka. To determine the internal consistency of the instrument, Cronbach alpha method was used and a reliability coefficient of 0.89 was obtained. The researchers with the aid of 5 research assistants went to the sample public senior secondary schools and administered the questionnaire to the respondents on the spot. Data collected were analyzed using mean. Results revealed that ICT has a positive impact on the academic achievement of students in science. The result of the study also revealed that information and communication technology equipment are not readily available or complete in schools. It was recommended among others that government should provide funding and adequate ICT equipment for schools to use in order to aid learning.

Keywords: Information and communication technology, teaching, science, secondary school.

INTRODUCTION
The principal objectives of education have been the development of the whole individual. The only way to achieve this is by giving the child high-quality and standard education. Education is therefore an inevitable tool for surmounting ignorance, disease, and poverty and producing functional individuals who have positive attitudes toward the progress and expansion of society. (Ugwuanyi,2019). It is also one of the tools for the integration of society and for the realization of individual progress, national consciousness, and promotion of unity, economic, political, scientific, cultural, and technological development (Sufiyanu & Julius, 2018). The development of any nation depends largely on the level of its scientific and technological mastery of science.

No nation can develop without giving the study of science top precedence in her schools. Secondary school science prepares citizens for the future world. In the progress of the world today, science plays a major role in technological advancement. According to Abdullah et al (2019), information and communication technology has changed the old-style learning tactics to a modern and interactive environment. ICTs are the keys to the revolution in education. New educational practices depend on new technologies and new technology is changing every single day. As a result of this, the ways teachers and students use their own methods of teaching and learning respectively in or out of classrooms have changed. Several years ago, students were using only their textbooks to review what they studied in classrooms with their teachers. Nowadays, students can study from their homes, and even no need to have a teacher as long as there are many ICT tools to enable them learn. Mohammad, Mohammad et al (2011) opined that information and communication technology have become an inseparable part of human life. Information and communication technology (ICT) has a major role to

play in forming the new worldwide economy to deliver fast changes in society. Within the previous decade, ICT has advanced and changed at such a speed, that developing countries have not been able to catch up with the revolution and have been left behind and thus lag in their communication with the developed countries. Information and communication technology (ICT) is a specific term that refers to technologies designed for collecting, processing, preserving, and delivering information (Elisha, 2016). It has been widely recognized that the rapid development of information and communication technology dramatically affects every aspect of contemporary life by changing the ways people live, work, and study in today's society. These changes have brought innovative and diverse options, but they have also required us to be information and communication technology (ICT) literate. In general, information and communication technology (ICT) literacy requires one to have the ability to use technological tools appropriately in processing, managing, and evaluating information and communicating with others (Zhang & Liu, 2015).

Information and communication technology is transforming procedures of instructional processes by contributing components of strength to learning situations involving virtual environments. It is an effective and influential instrument for providing educational opportunities, thus, it is difficult to envision future learning situations that are not bolstered by information and communication technology. Therefore, the effects of integrating information and communication technology into teaching and learning for students' development have gained more attention from education policymakers and researchers (Gumus & Atalmis, 2011). Supporting the above views, Ghavifekr and Rosdy (2015) stated that information and communication technology refers to a whole range of facilities or technologies involved in information processing and electronic communication to be handled with skills and expertise, for effective achievement and realization of its potential in education. Furthermore, Priyank and Nehal (2017) noted that the application of information and communication technology in teaching and learning makes institutions more effective and productive thereby stimulating a variety of tools to enhance and facilitate pedagogical activities.

The researchers found that schools are not completely ready with Information and conversation era facilities. Some schools which have ICT facilities aren't the use of them for studying. Having look at this, the researchers investigated, if the use of information and verbal exchange generation to teach technology in senior secondary schools have effect on students' performance.

Statement of the Problem

Science is a critical discipline in secondary schools. But in spite of the status, most teachers do use the old-style of teaching which is mostly done with less or no teaching aids. Seeing that many students regard science as a mystique, that is something feared without a sound reason. This fear leads to poor performance in science. Hence, teaching and learning depend to a large extent on the teacher's ability to adequately deliver the instruction to the students in a way void of this phobia. However, a lot of variables may hinder the effective dissemination of knowledge and the understanding of scientific content by the students. This is where the implementation and usage of teaching aids like information and communication technology come into play to help the teacher's teaching process and the student's academic development in sciences. As information and communication technology is seen to be essential, is it available or not in schools. If available, is it fully utilized? If in use, can it have impact in teaching science in secondary schools. Thus, this is what triggered the development of this study which is on the impact of information and communication technology in teaching of science in senior secondary schools in Awka South Local Government Area.

Purpose of the Study

The main purpose of this study is to ascertain the impact of information and communication technology in teaching of science in senior secondary schools in Anambra State. Specifically, this study intends to:

1. To examine the availability of information and communication technology for teaching science in senior secondary schools in Awka South Local Government Area.
2. To examine the impact of information and communication technology on the academic performance of senior secondary school science students.

Research Question

These research questions were raised to achieve the purpose of the study:

1. What is the information and communication technology available for teaching science in senior secondary schools in Awka South Local Government Area?

2. What is the impact of information and communication technology on the academic performance of senior secondary school science students?

METHODS

The design was survey research design. The Area of this study is Awka South local government area of Anambra State Nigeria. The population for this study consists of all science teachers in 19 public senior secondary schools in Awka south local government of Anambra State. 38 Mathematics, 21 Chemistry,16 Computer,27 Biology and14 Physics Teachers which gave us 116 science teachers. A sample size of 116 science teachers was used for the study. The total population sampling method was used to select the 116 science teachers in the 19 public senior secondary schools which formed the sample of the study. This is because total population sampling is a type of purposive sampling where the whole population of interest, that is a group whose members all share a given characteristic, is studied. It is most practical when the total population is of manageable size. The instrument used for collection of data was a structured questionnaire developed by the researchers. The questionnaire was intended to elicit the objective opinions of the respondents on the Impact of information and communication technology (ICT) in teaching of science in secondary schools in Awka South Local Government Area. The questionnaire was made up of two main parts, I and II. Part I of the questionnaire elicits personal information of the respondents. Part II was further divided into two sections (A and B) containing item questions in accordance to the specific purpose of the study and research questions developed from the study. The instrument comprises 13 items, arranged under four options of response in each section. Validation of the instrument was done with the assistance of three (3) lecturers. Using Cronbach Alpha method, a reliability of 0.89 was obtained which shows that the instrument is highly reliable. The researchers with the aid of 5 research assistants went to the sample public senior secondary schools and administered the questionnaire to the respondents on the spot. The data collected was analyzed, using the mean to answer the research questions posed for the study. Nominal values were attached to the response options of the questionnaire as follows: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1. Decision rule - any item that has a mean rating ($\bar{x}$) such that;

a) $\bar{x} \geq 2.50$ is regarded as accepted by the respondents.
b) $\bar{x} < 2.50$ is regarded as rejected by the respondents.

Results:

Table 1: Mean of responses on the information and communication technology available for teaching science in senior secondary schools in Awka South Local Government Area.

S/N	Availability of information and communication technology for teaching science in senior secondary schools	N	$\bar{x}$	REMARK
9.	Our school is fully equipped with information and communication technology facilities.	116	2.24	Rejected
10.	Information and communication technology equipment are not complete in my school.	116	2.80	Accepted
11.	Information and communication technology facilities are in the school but they are not used for learning.	116	2.84	Accepted
12.	There is no information and communication technology equipment in my school for learning science.	116	2.44	Rejected
13.	The school does not see information and communication technology as a necessity for learning science.	116	2.20	Rejected
	TOTAL		**2.50**	

The data presented in Table 1 shows the responses on the extent information and communication technology are available for teaching science in secondary schools as shown in items 9, 12, and 13 which are all below 2.5 which is the rejection point, except for items 10 and 11.

Table 2: Mean of responses on the impact of information and communication technology on the academic performance of senior secondary school students in science

S/N	Impact of information and communication technology on the academic performance of senior secondary school students in science	N	$\bar{x}$	REMARK
1.	Information and communication technology make students learn faster.	116	3.44	Accepted
2.	Information and communication technology aids the easy assimilation of learning material content by the student.	116	3.24	Accepted
3.	Information and communication technology makes it easier for students to carry out investigations in an area of their interest.	116	3.28	Accepted
4.	Information and communication technology helps students learn without the assistance of a teacher.	116	3.08	Accepted
5.	Information and communication technology makes learning easy.	116	3.76	Accepted
6.	Use of information and communication technology is student-centered approach.	116	3.00	Accepted
7.	Information and communication technology helps teachers plan for lessons faster.	116	3.32	Accepted
8.	Information and communication technology improves teachers' pedagogical skills.	116	3.32	Accepted
	TOTAL		**3.31**	

The data presented in Table 2 shows the responses on the impact of information and communication technology on the academic performance of secondary school students in science as shown in items 1-8 which are all above 2.5 which is the acceptance point.

Summary of Findings

The study revealed that information and communication technology equipment is not readily available in schools. It also, revealed the use of information and communication technology in teaching has a positive impact on the academic performance of students in science.

Discussion of Findings

The result of the study also revealed that information and communication technology equipment is not readily available or complete in schools. This finding is in line with Tiamiyu & Gbolagade (2016) who conducted a study on Business Educator's Perceptions of the Extent of Information and communication technology Utilization in Teaching Business Education in Tertiary Institutions in Anambra State. The findings show that there is very low utilization of information and communication technology by lecturers in the classrooms because of its unavailability. This result is also consistent with the work of Ishtiaq et al (2017), Abdullah et al (2019), & Mohammad et al (2022).

However, the result of the study revealed that information and communication technology has a positive impact on the academic performance of students in science as it makes students learn faster, aids the easy assimilation of learning material content by the student, makes it easier for students to carry out investigation in an area of their interest, helps students learn without the assistance of a teacher, makes learning easy, help teachers plan for lessons faster, improves teachers pedagogical skill. Therefore, the use of information and communication technology is student-centered. This finding is in line with Ishtiaq et al (2017) who asserted that information and communication technology positively affects students' academic achievement and retention and information and communication technology was found more compelling, effective, and valuable in teaching when contrasted with conventional techniques of teaching. It is also in agreement with the work of Abdullah et al (2019) and Bada et al (2019), in their work Impact of Information and Communication Technology (ICT) on different settings of learning process in developing countries, which revealed that ICT has a positive and significant impact on learning process in high school. Likewise, the result of this study was also consistent with the work of, Mohammad et al (2022) in their work, the Impact of Information and Communication Technology (ICT) on educational improvement of third-grade high school students in Khash-Iran found that using information and communication technology effective in increasing educational motivation, improving questioning skill, improving research spirit and raising school marks. It is generally effective in third-grade high school students' educational improvement to a great extent.

Conclusion

The study revealed that the use of information and communication technology in teaching has a positive impact on the academic performance of students in science. But information and communication technology equipment is not readily available in schools.

Recommendation

Based on the findings of the study, the following recommendations were made:

1. Government should provide adequate information and communication technology equipment for schools to use in order to aid learning.
2. It was recommended that the Nigerian government should give priority attention to information and communication technology utilization in classrooms by assisting the state government in funding information and communication technology distribution in schools to ensure complete and proper availability.

REFERENCES

Abdullah M. A., Imam S., & Munirul A. (2019) Impact of Information and Communication Technology (ICT) on Different Settings of Learning Process in Developing Countries. *Journal of Science and Technology 9(2) 19-28*

Bada, T., Adewole, A. & Olalekun, O. (2019). Uses of Computer and its relevance to teaching and learning in Nigeria Educational System. *Educational Research and Review*, 4(10), 443-447.

Elisha, M. J. (2016). The application of Information and Communication Technology (ICT) in Nigerian academic libraries prospects and problems. *Information Manager*, 6(1), 35-39.

Ghavifekr, S. & Rosdy, W. A. W. (2015). Technology and Learning with Technology: Effectiveness of ICT integration in Schools. *International Journal of Research in Education and Science (IJRES),* 1(2), 175-191.

Gumus, S. & Atalmis, E. H. (2011). Exploring the relationship between purpose of computer usage and reading skills of Turkish students: evidence from PISA 2006. *The Turkish Online Journal of Educational Technology*, 10, 129-140.

Ishtiaq, H. K., Qaiser, S., Naseer, M. & Farhan, S. (2017). Effects of Information and Communication Technology (ICT) on Students' Academic Achievement and Retention in Chemistry at Secondary Level. *Journal of Education and Educational Development*, *4(1), 73-93*

Mohammad R. G., Alemeh K. & Nour-Mohammad Y. (2011) The Impact of Information and Communication Technology (ICT) on Educational Improvement. *International Education Studies 4(2) 116 – 124.*

Mohammad, R. G., Baluchestan, I., Alemeh K. & Nour-Mohammad Y. (2022) The Impact of Information and Communication Technology (ICT) on Educational Improvement of third grade high school students in Khash-Iran *https://www.researchgate.net/publication/308137664_The_Impact_of_Information_and_Communication_Technology_ICT_on_Educational_Improvement*

Priyank, P. & Nehal, P. (2017). ICT Pedagogy for effective Learning, Education and Quality Evaluation. *International Journal of Computer & Mathematical Sciences,* 6(5), 101-107.

Sufiyanu, H. J. & Julius, K. B. (2018). The Relationship between Teachers' Variables and Students' Achievement and Interest in Mathematics in Kebbi State. *International Journal of Education and Evaluation, 4(3), 29-44.*

Tiamiyu, Y. B. & Gbolagade, W. O. (2016). Influence of Computer Assisted Instruction (CAI) Package on Upper Basic School Students' Performance in Keyboarding Concept in Business studies. *Computing, Information Systems, Development Informatics & Allied research Journal, 7(4), 225-232.*

Ugwuanyi, F. C. (2019). Information and communication technology literacy among academic librarians in Enugu State. *International Journal of Information and Communication Technology, 6 (1), 123-132.*

Zhang, D. & Liu, L. (2015). How Does ICT Use Influence Students' Achievements in Math and Science Over Time? Evidence from PISA 2000 to 2012. *Eurasia Journal of Mathematics, Science & Technology Education, 12(9), 2431-2449.*