# INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY APPLICATION ON SCIENCE TEACHER EDUCATION PROGRAMME IN IMO STATE

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## Abstract

*The study investigated the influence of ICT applications on science teacher education progammes. The study was carried out at Alvan Ikoku Federal College of Education Owerri Imo state. The study adopted the descriptive survey research design. A sample of 205 lecturers was drawn for the study through stratified random sampling technique. Three research questions and a hypothesis guided the study. Researchers developed modified likert scale type response option questionnaire with reliability coefficient of 0.81which was used for data collection. The generated data was analyzed using mean and standard deviation to answer research questions while the hypothesis was analyzed using chi square(x2) statistical tool tested at 0.05 level of significance. The result of the study showed that, there is a significant relationship between ICT applications and enhanced science teacher education. Based on the findings, it was recommended that the government should provide ICT facilities such as computers, internet, projectors, smart boards, etc, in all teacher training institutions for effective teaching and learning.*

*Keywords: ICT, science, teacher education*

## Introduction

Teachers are very important component of the Education system as they are vested with the responsibility of transmitting knowledge at all levels of Education. In a nation like Nigeria where there is poor state of education, especially in science. It becomes pertinent to train teachers with the required knowledge and skills to pilot the affairs of teaching. Kumar (2014) noted that it is well known that the quality and extent of learner achievement are determined primarily by teacher competence, sensitivity and teacher motivation.

It is necessary to have teacher education programme that will grantee adequate preparation to handle the business of teaching. Teacher education is the process of training that deals with the art of acquiring professional competencies and growth. It is an essential exercise that enhances the skills of teaching and learning (Osakwe 2013). Kumar (2014) stated that teacher education is a programme that is related to the development of teacher proficiency and competence that would enable and empower the teacher to meet the requirement of the profession and face the challenges therein. It is designed to produce highly motivated, sensitive, conscientious and successful classroom teachers who will handle students effectively and professionally for better

educational achievement, (Ololube, 2005).

According to Aina (2012), the method of teaching has gone beyond traditional method of talk and chalk. Shedd (2004) suggested that anyone preparing to become a teacher must incorporate technology into their classes. However most science education teachers leave training institutions with limited knowledge of ways technology can be effectively used in their professional practice (Okoloba, Abdullahi and Omosidi 2014). Science education has a great role to play in the technological development of any nation so there is need to change the traditional approach of teaching and learning Science Education. In this age of digitization, being able to effectively apply technology should be high on the list of what teachers at all levels of our education should know and be able to do in any instructional transaction (Olokoba et al 2014).

The present pedagogical pattern used in Nigerian classroom does not prepare students for the information age and globalization, that is, it is not equipping students to live effectively in the modern age of science and technology (Abdullahi 2013). Information and communication technologies (ICT) could be very effective in facilitating teaching education programmes.

Olugbenge and Adebayo (2010) defined ICT as collection, retrieval, and use of computers and micro electronic systems. According to Ibe-Bassey (2011), ICT is a critical tool for preparing and educating students with the required skills for the global work place. ICT is a diverse set of technological tools and resources used to communicate, and manage information (Amajuoyi 2012). Ali, Haolader and Muhammand (2013) regarded ICT as an electronic means of capturing, processing storing and communicating information. Pernia (2008) defined ICT as technologies used to communicate in order to create, manage and distribute information, adding that ICTs includes computers, the internet, telephone, television, radio and audio-visual equipment.

There are several benefits of introducing and using ICT as part of the teaching and learning process (Osakwe 2013). The use of ICT in the classroom teaching-learning is very important for it provides opportunities for teachers and students to operate, store, manipulate, and retrieve information, encourage independent and active learning, and self-responsibility for learning. Haddad and Draxier (2005) claim that ICTs do make valuable contributions to educational development and effective learning by expanding access, promoting efficiency, improving the quality of learning, enhancing the quality of teaching and improving management systems. Obunadike (2010) noted that ICTs aid learning by breaking down the barriers between teachers and students, improve the socio-cultural behavioral patterns of students, improves ethical awareness of students to the norms and existing modalities of the immediate community, serves as an agent of change, and helps disseminate ideas, educational materials and instructional resources. ICTs strengthen teaching and learning as it provides powerful resources and services for students, thereby enabling them meet their educational needs, it also allows for networking among students and teachers to facilitate exchange of schools to the world, as learning is expanding beyond the classroom, so real life can be established (Dotimi and Harmilton-Ekeke 2013, Hamilton-Ekeke et al (2015). Amajuoyi (2012) in Abdullahi

(2013) summarized the roles of ICT in education to include:

- Promoting students intellectual qualities through higher order thinking, problem solving, improved communication skills and deep understanding of the learning tools and concepts to be taught.
- Promoting a supportive, interactive teaching and learning environment by creating broader learning communication and therefore provide learning tools for students especially those with special needs.
- Using computer generated graphics to illustrate relationships of all kinds especially dynamic processes that cannot be illustrated by individual pictures.
- Ensuring that more effective learning environment is created through the use of a learner centered and activity oriented teaching/learning approach.
- Encouraging deeper undertaking about data collection saves time on measuring and recording analysis.
- Improve the quality of instruction.
- Encourage collaborative learning.
- Enhancing the tools and environment for learning because materials can be presented by using multimedia.

Learning approaches using contemporary ICTs provide many opportunities for constructivist learning through their provision and support for resource-based, student centered settings and by enabling learning to be related to contest and to practice (Berge, 1998; Barron, 1998).

The application of ICT in Science Education are so many, the limit to these applications is a matter of knowledge, the more knowledgeable someone is in ICT the more the person will be able to apply it (Aina 2013).

The current economic and technological development worldwide calls for a review of the teaching approach applied in our Education System especially in Science Education programme. The influence of ICT to education and educational activities has placed a pressure on educators to transform schools through technology and ICTs. The availability of ICT facilities and its utilization is a key factor for the adoption of ICT for educational activities such as teaching and learning (Harmilton-Ekeke and Mbachu 2013). Mallow (2009) in Olokoba et al (2014) in a study on assessment of secondary school teachers' use of ICT, found that teachers lack skills and knowledge in the use of computer and software and the result is lack of confidence in utilizing ICT tools for communication. Lack of effective ICT training remains one of the major obstacles for integration in instruction. There are not enough training opportunities for teachers in the use of ICT in a classroom environment (Aramide 2004).

The study therefore looks at the influence of ICT applications on science teacher education programme in Imo State.

The main purpose of the study was to investigate the influence of ICT applications on science teacher education programme in Imo State. Specifically, the study is to determine the:

1. Availability of ICT facilitates in science teacher education
2. Extent of application of ICT facilities in science teacher education
3. Influence of ICT applications on science teacher education programme.

## Research Questions

The following research questions were drawn to guide the study:

1. What are the ICT facilities available for science teacher education programme?
2. To what extent do lecturers apply ICT facilities in teaching science education courses?
3. In what ways has ICT applications enhanced science teacher education programme?

## Hypothesis

The following hypothesis was formulated for testing in the study:

**Ho1:** There is no significant relationship between ICT applications and enhanced science teacher education programme.

## Method

The descriptive survey research design was adopted in carrying out the study to determine influence of ICT applications on science teacher education programme. The population of the study consisted of all the 639 lecturers in Alvan Ikoku Federal College of Education Owerri Imo State. The stratified random sampling technique was used to select 205 lecturers from seven departments in School of Science and Education. This comprised of 95 male and 120 female lecturers. A four point likert scale type questionnaire designed by the researcher was used for generating data. It was divided into two sections, section A dealt with respondents characteristics while section B dealt with items relevant to the study. The face and content validity of the instrument was established by two experts in Science Education and an expert in Measurement and Evaluation who read through the items and made useful suggestions which were given consideration during restructuring of the instrument. The reliability of the instrument was determined through test-re-test method which gave a reliability coefficient(r) of 0.81 using Pearson's product moment correlation coefficient.

In administering the instruments, they were administered on the respondents by the researcher on face-face bases and they were allowed to return them after two days. This was to allow them understand the items and respond appropriately. All the instruments administered were properly filled out and recovered.

The generated data were analyzed using mean, standard deviation and chi-square $(x2)$ statistical tools. In answering the research questions, instrument scale mean of $2.50((4+3+2+1)/4)$ was used. Any response item with mean of 2.50 and above was accepted while those with less than 2.50 were rejected. The chi-square $(x2)$ was used to test the hypothesis at 0.05 level of significance.

## Result

**Research Question One:** What are the ICT facilities available for science teacher education programme?

**Table 1: Available ICT facilities for science education teacher**

| S/N | Item | Mean | SD | Decision |
|-----|------|------|-----|----------|
| 1 | PA systems are available for use. | 2.93 | 1.10 | Accept |
| 2. | Interactive white boards are available for teaching and learning. | 2.81 | 1.12 | Accept |
| 3. | Internet facilities are available for science teachers to use. | 2.61 | 1.04 | Accept |
| 4. | There is e-library for usage. | 2.64 | 0.98 | Accept |
| 5. | Computers are available for science teachers usage | 3.10 | 1.14 | Accept |
| 6. | Overhead projectors are available for use. | 2.73 | 1.01 | Accept |
| 7. | CD Roms are available for storage of information. | 3.02 | 1.08 | Accept |
| 8. | Flash drives are available for students' usage. | 3.12 | 1.15 | Accept |
| 9. | E-mail facilities are available. | 2.80 | 0.98 | Accept |
| 10. | I-phones are available. | 2.52 | 0.84 | Accept |
| 11. | Video-players. | 2.58 | 0.95 | Accept |
| 12. | WIFI. | 2.32 | 0.73 | Rejected |
| | **Grand Mean $\bar{x}$ = 2.70** | | | |

Table 1 shows that all the items except item 12 had mean scale above 2.50. Based on the result they were accepted while item 12 with lower mean was not accepted. This implies that all the items except wifi facility are available for teaching and learning in science education programme.

**Research Question 2:** To what extent do lecturers apply ICT facilities in teaching science education programme?

**Table 2: Lecturers Responses on application of ICT facilities**

| S/N | Item | Mean | SD | Decision |
|-----|------|------|-----|----------|
| 1. | PA systems are used in teaching and learning process. | 3.12 | 1.11 | Accept |
| 2. | Interactive white boards are used in teaching and learning in science classes. | 2.71 | 1.00 | Accept |
| 3. | Internet facilities are used for information gathering. | 2.60 | 0.87 | Accept |
| 4. | E-library is accessible for science teachers. | 2.73 | 0.82 | Accept |
| 5. | Computers with internet facilities are used by teachers for teaching and learning. | 2.80 | 0.76 | Accept |
| 6. | Overhead projectors are used during teaching and learning sciences. | 2.54 | 0.81 | Accept |
| 7. | CD Roms are used for storage services. | 3.20 | 1.02 | Accept |
| 8. | Flash drives are used for information storage and retrieval. | 3.14 | 1.10 | Accept |

| S/N | Item | Mean | SD | Decision |
|-----|------|------|-----|----------|
| 9. | E-mail facilities are used by science teachers. | 2.86 | 1.03 | Accept |
| 10. | I-phones are applied during teaching and learning process. | 2.72 | 0.96 | Accept |
| 11. | Video-players are used in teaching. | 2.81 | 0.94 | Accept |
| 12. | Wi-Fi facilities are provided for science teachers' usage. | 2.20 | 0.73 | Not Accepted |
| | **Grand Mean $\bar{x}$ = 2.75** | | | |

Table 2, shows that items 12 is not accepted as it had mean bellow the mean scale of 2.50, while other items were accepted as they had mean above the mean scale. This implies that WIFI connections are not available for lecturers to apply during teaching and learning of science education.

**Research Question 3:** In what ways has ICT enhanced science teacher education programme?

**Table 3: Lecturers' responses on ICT facilities and enhanced science education**

| S/N | Item | Mean | SD | Decision |
|-----|------|------|-----|----------|
| 1. | ICT facilities make sharing of scientific knowledge easier. | 3.18 | 1.02 | Accept |
| 2. | ICT facilities enhance learning of concept in science education. | 3.10 | 1.00 | Accept |
| 3. | Use of ICT facilities enhance higher order skills in science education. | 2.18 | 1.10 | Accept |
| 4. | ICT facilities enhance individual learning. | 3.00 | 0.98 | Accept |
| 5. | It enhances problem solving abilities among students. | 2.84 | 1.08 | Accept |
| 6. | It increases learners' motivation and engagement. | 2.68 | 0.89 | Accept |
| 7. | ICT facilities enhance student teachers pedagogical skills. | 2.82 | 1.2 | Accept |
| 8. | ICT facilities enhance research in science education. | 2.93 | 1.06 | Accept |
| 9. | They provide access to enhanced learner-centered approach of teaching. | 2.95 | 0.97 | Accept |
| 10. | ICT facilities provide access to better and relevant information for teaching. | 3.02 | 1.10 | Accept |
| 11. | ICT facilities enhance students' achievement in science education. | 3.04 | 1.11 | Accept |
| 12. | They enable students to have access to study materials. | 2.98 | 6.91 | Accept |

| 13. | They enhance student-teacher and co-learner relationship. | 2.96 | 1.00 | Accept |
| 14. | ICT facilities promote interactive learning. | 2.93 | 0.98 | Accept |
| | **Grand mean ($\bar{x}$) = 2.95** | | | |

Table 3 shows that all the items had mean scale greater than 2.50 and were all accepted with a grand mean of 2.95. Based on the result, it shows that ICT enhances science teacher education to a great extent.

Ho1: There is no significant relationship between ICT applications and enhanced science teacher education.

The calculated chi-square (x2) value 77.20 is greater than the table value 54.57 at degree of freedom 39 and 0.05 level of significance. Also p-value (0.000) is less than 0.05 (p<0.05). Based on the result, the null hypothesis is rejected and the alternative accepted at 0.05 level of significance. This implies that, there is a significant relationship between ICT applications and enhanced science teacher education programme.

**Discussion of Findings**
The study revealed that there are ICT facilities available for teaching and learning of science education programme in institutions of higher learning. These facilities include Public Address System (PAS) interactive while boards, internet facilities, e-library computers, overhead projectors, CD Rom, Flash drives, e-mail, video-players and i-phones. However it was revealed that Wifi connection was not available for use in the institutions. This result is in disagreement with the findings of Olokoba, et al.(2014) which showed that all ICT facilities are not available in schools.

The study also revealed that lecturers apply these ICT facilities in teaching and learning in science education programme though wifi connectivity has not been totally established for the lecturers application. The grand mean of respondents was also greater than the instrument scale mean. The findings of the study was not in collaboration with those of Olokoba, et al(2014) and Hamilton-Ekeke et al(2015) which variously revealed inadequacy in the use of ICT facilities in schools.

The study revealed that application of ICT facilities enhanced teaching and learning in science education. All the items were accepted as they had mean greater than the mean scale. Also the grand mean of lecturers' responses showed high mean (2.95) greater than the instrument scale mean (2.50). The result of the analysis showed that there is a significant relationship between application of ICT facilities and enhancement of science teachers' education programme. This result is consistent with that of Ali et al (2013) Haddad et al (2005) and Obudike(2010) as earlier reviewed.

**Conclusion**
The study was carried out to determine the influence of ICT applications on science teacher education programme. The result of the study showed that, application of ICT facilities enhanced science teachers' education programme.

**Recommendations**
Based on the result of the study, the following recommendations were made:
1. The government and non-governmental organizations should provide ICT facilities in teacher training institutions to enable its application in teaching and learning process.

2. Workshops and seminars should be organized to train and retrain lecturers on the application of ICT facilities in teaching and learning.

3. The government and school administrators should ensure that there is constant electricity to enable usage of available ICT facilities in institutions of higher learning.

4. There should be good maintenance culture as to preserve available ICT facilities in higher institutions of learning.

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