

**FACTORS INFLUENCING THE USE OF ICT IN THE TEACHING
OF BIOLOGY IN SECONDARY SCHOOLS IN ONITSHA
NORTH LOCAL GOVERNMENT AREA OF ANAMBRA STATE.**

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Abstract

The proper understanding and utilization of ICT is the ambition of most countries of the world in order to attain sustainable development. This study investigated the influence of ICT use in the delivery of Biology instruction in Anambra State. A purposive sampling technique was used to select one hundred and seven (107) biology teachers from 457 biology teachers' population in public secondary schools of the state. A 12-item questionnaire tagged "Perception of Biology Teachers on Factors Affecting the use of ICT in Teaching of Biology (PBTFAEUITB)" was developed and Used to collect data. Research questions were answered with mean and standard deviations while the null hypothesis was tested with t-test. The result showed that lack of proper training for teachers and unstable power supply, amongst others, affect the use of ICT in the delivery of Biology lessons. Also there was no significant difference in the mean ratings of male and female Biology teachers' on the factors influencing the use of ICT in the delivery of Biology instruction. Effective and proper teacher training was recommended among others.

Introduction

The need for a response to the rapid advancement in science and technology will enable the country to surge forward in keeping pace with the process of modernization as witnessed in the developed and developing countries of the world. Biology is the study of life. Its study involves both practical and theoretical work. The National Policy on Education (2014) has it that biology is one of the core subjects offered in secondary schools, its teaching and learning is one of the crucial aspects of science education. In the school programme, biology commences from senior secondary school. The teaching of every science subject, including Biology, demands that learners are engaged in active process. This implies that methods for its teaching should involve the students in activities that stimulate their interest and help their learning the content areas.

The poor performance of senior secondary school students in biology has

contributed greatly to their inability to pursue biology-related careers (Jongur & Mohammed, 2011). Onwiodukit (2013) notes that, the performance of students in biology at the senior secondary school certificate has often been unsatisfactory. The West African Examination Council (WAEC) observes that students' performance at the senior secondary school certificate shows no progress over the years (STAN, 1992). Abimbola & Danmole (1995) opines that every content in the science discipline is learnable when such is presented in a suitable structure that would facilitate comprehension. Nwagbo(2006), Armed(2008), WAEC(2008) & Egbunonu&Ugbaja(2011) have also reviewed the persistently poor performance of students in biology. Many researchers agree that there is a need for a shift in the structure of its curriculum content and in the ways students are taught (Ogunkunle & Gbamaja, 2006; Kolawole,2007 & Adeyemi, 2008). They argue that

uninspiring teaching methods adopted by science teachers have led to the under-achievement of students in biology.

Numerous studies have shown that teacher classroom interaction have a strong influence on students' learning outcome (Rickards,1999;Scott,2003 & Alausa,2007). Okeke, Osuafor & Okafor (2011) in their studies reveal low extent of learners' participation in biology lessons. Biology teachers do not provide opportunities for independent investigations, questioning, class discussions, conduct of experiments and competitions amongst students. All time was spent on the lessons. Imhanlahimi & Aguele (2006) have found that facilities for learning biology are inadequate and teacher quantity is low. These factors above pose a serious problem for biology being a core subject in secondary schools in Nigeria. For science-inclined students, biology may provide relevant paradigm for their training as scientists or a career involving science. Non-science students have biology as a terminal science subject to study. For all students biology provides a kind of scientific literacy that they need to play a full part in a modern society where science and technology play a key role (Burden & Hall 2007).

The origin of Computers Assisted Instructions(CAI) where students learn from programmed computer package can be traced to the works of Skinner(1954) on experiments with ICT teaching machines which came as a result of a dissatisfaction with traditional methods of learning which were teacher-based and did not exploit the individual student's potentials. Skinner suggested that the experimental analysis of behaviour could be applied in the construction of a teaching machine. The ICT teaching machine would present a

carefully sequenced set of ideas to a student and reinforce his or her responses to direct behavioural capabilities. Skinner's ideas led to the development of programmed learning materials.

Information and Communication Technology (ICT) is an umbrella term that includes any communication device or application (Kola, 2013). It comprises radio, television, computers, satellite systems network, cellular phone, hardware and software with the various services and applications associated with them. The inclusion of video conferencing and distance learning. ICT is a range of technology for gathering, storing, retrieving, processing, analyzing and transmitting information (Virkus, 2008). Information Technology is the use of man-made tools for the collection, generation, communicating, recording, re-management and exploitation of information; it includes application and commodity by which information is transferred, recorded, etched, stored, manipulated or disseminated (Anyakora, 1991). ICT are important to sustainable development in developing countries. ICT 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 (Agommuoh, 2015). Information and Communication Technology (ICT) Education is an instrument, a device or strategy in our education system aimed to achieving effective classroom instruction delivery. For ICT education to be achieved for classroom instruction delivery in Nigeria, our educational system must be tailored towards the actualization of self- realization, better human relationship, individual and

natural efficiency, effective citizenship, scientific and technological progress,(NPE 2008).

The driving factor behind government and organisational policy relating to ICT integration includes the need to equip students with the skills to participate and thrive in an information society, and the need to create highly skilled and flexible workforces (Baskin & Williams,2006). The transformation of pedagogy and the enhancement of the quality of learning experiences are other factors driving ICT integration in classrooms. Wong, Goh,Hanafi& Osman (2010) revealed that, in this information age, Nigeria, also as a developing country, has a clear vision that information and communication Technology can transform conventional education systems and bring advantages and benefits to the country especially to the younger generation. Technologies have extended the ability of teachers to manage and disseminate knowledge providing new opportunities for students to enhance various aspects of new knowledge (Hong & Songan 2011). In view of the above, Nigerian schools have integrated computer studies into the students learning activities in order to equip them with the knowledge and skills needed to excel in this technological era. Haruna (2003) reveals the need for attention to be directed towards science teacher education repositioning, especially in this era of ICT skill acquisition repositioning. Branford, Brown & Cocking (1991) as cited in Volman (2005), state a common belief that the use of ICT in education contributes to a more constructivist learning and an increase in activity and greater responsibility of students. Mikre (2011) thus explain that ICT has

revolutionalized the way students learn today and are now transforming education systems. The role of the teacher is limited to supporting, advising, and coaching students rather than merely transmitting knowledge. In agreement to the above Volman (2005) maintains that the gradual progress in using computers changes from learning about computers to learning computers and finally to learning with computers.

Series of studies have been carried out in relation to ICT as to the teaching and learning of biology. Cox M., Webb M., Abbot C., Blakeley B., Beauchamp T., Rhodes V.(2003) point out that teachers use ICT in discussing their subjects, and thus the students understand it better. The most powerful effect is achieved when the students alone, or in groups, apply software focused on a particular task. Osborne & Henessy (2001) report that the presenting of information using ICT has a positive effect on the students interest in biology. Salinger (2004), in his studies, asserts that ICT makes the quality of education better as the multimedia content helps with illustration and explanation of demanding concepts using the methods inaccessible through the sources of traditional methods of learning. Soyibo & Hudson (2000) also reveal in their studies, that the students' attitudes are statistically significant towards biology in the experimental group (taught using personal computer, digital projector etc. rather than in comparison with the control group where the methods of lecture and discussion were applied. Yu (1998) using teaching supported by a personal computer has found out that the improvement of students' performance and attitudes to natural sciences are better. Thus, Gilmore (1995) asserts that

ICT do not meet the task to be an attachment or supplement to teachers' preparation, but they offer the infinite access to information which is accessible without any effort due to internet. Akudolu & Olibie (2007) are of the view that knowledge of ICT is familiarity with ICT facilities, that is, the ability of teachers to understand and use computers in the course of teaching in a class. ICT literacy, they define as the knowledge and ability to use computers and related technology efficiently, with a range of skills covering levels from elementary use of to programming and advanced problem solving. The application of ICT in biology education entails holistic and wholesome integration of modern telecommunication into the education system. It provides common levels for all professionals to rub minds, share information and contribute towards an effective and productive teaching and learning environment. It gives room for independent and individual study with orientation by making instruction more powerful, more scientific and subject centred (Modebelu & Anebi, 2013). Biology teachers play a very important role in using ICT and moulding up tomorrow's citizens (Ugwu & Nzewi, 2015).

Despite the positive role of ICT in teaching and learning, empirical evidence still shows that there is a poor utilisation of available ICT facilities (Kola, 2013 and Okoye, 2014). Lack of confidence, negative attitude, resistance to change, insufficiency in school timetable and poor technical support are some listed impediments to successful utilization of ICT (Nwagbo & Ugwuanyi, 2012). Also, in studies on influence of gender on science teachers' ICT classroom practices, Nwagbo &

Ugwuanyi (2015) reveal that male teachers use ICT classroom practices more than female teachers. Sieverding & Koch (2009) have investigated gender differences in computer self-efficacy and found out that women have lower computer self-efficacy than men. Onwuachu (2011) also reports that there is no significant difference between the mean ratings of male and female teachers on their ability to utilize the available material resources including ICT facilities in teaching.

Biology teachers, therefore, need to integrate ICT in the teaching and learning process to support instruction and serve as a tool for learners to meet their information and learning needs. This paper, therefore, seeks to ascertain the factors affecting the effective use of ICT in the delivery of biology instruction, in Anambra State.

Purpose of the Study

The purpose of the study was to investigate the factors affecting the effective use of ICT in the teaching of Biology in senior secondary schools in Onitsha North L.G.A. of Anambra State.

The study specifically sought to:

- (1) investigate into the perception of Biology teachers on the factors affecting the effective use of ICT in the teaching of Biology;
- (2) ascertain the role of gender as regards teachers' opinion on factors affecting the effective use of ICT in the teaching of Biology.

Research Question

- 1) To what extent do Biology teachers perceive these as factors affecting the effective use of ICT in the teaching of Biology?

Hypothesis

Ho: There is no significant difference between the mean ratings of male and female biology teachers on the factors affecting effective use of ICT in the teaching of Biology.

Method

The study was conducted in Anambra State. It has boundaries with Enugu, Abia, Imo, Delta from different geographical regions. Anambra state has six (6) education zones namely: Aguata, Awka, Nnewi, Ogidi, Onitsha and Otuocha. (Data from Post Primary School Commission (PPSC) Awka as at January 2016). The population comprised all Biology teachers numbering four hundred and fifty seven (457) in two hundred and fifty-seven (257) public secondary schools in the state. One hundred and seven (107) teachers formed the sample taken from four hundred and fifty-seven (457) biology teachers in the state using purposive random sampling.

Instrument for Data Collection

A specifically designed questionnaire titled "Perception of Biology Teachers on the Factors that Affect the Effective Use of ICT in the Teaching of Biology (PBTFAEUITB)" was used. The questionnaire was made of statements in which teachers are to indicate accordingly on the 4-point rating scale of Very High Extent (VHE) =4, High Extent (HE) =3, Low Extent (LE) =2 and Very Low Extent (VLE) =1. The instrument consists of ten (10) items.

Validation and Reliability of the Instrument

Experts in both measurement and evaluation and Biology education

validated the instrument on its face and content. Corrections from them were effected accordingly by the researcher. The Cronbach alpha was applied in testing the reliability. Copies of the questionnaire were administered to teachers outside the state under study. Alpha coefficient value of 0.89 was considered high and reliable for the study.

Method of Data Collection

One hundred and seven (107) copies of the questionnaire were distributed to the sampled teachers for completion by the help of trained assistants. The completed questionnaires were retrieved immediately to avoid any loss and used for analysis.

Method of Data Analysis

The research questions were answered using mean and standard deviations by preparing a tally sheet of the frequency distribution of responses and weighted on the 4-point rating scale, while the null hypothesis was tested using the t-test at 0.05 level of significance. The criterion mean value was 2.50 being the mid-point of the scale. Strongly agree and Agree were merged as Agree while Disagree and Strongly Disagree were merged as Disagree. Items of values above 2.50 were regarded as Agree and those below 2.50 were regarded to be Disagree. Very High Extent (VHE) and High Extent (HE) were merged while Low Extent (LE) and Very Low Extent (VLE) were merged. Mean scores of 2.5 (mid-point) and above were accepted as High Extent (HE) of ICT to biology delivery and learning while mean scores below 2.5 were of Low Extent (LE) of ICT to biology delivery and learning.

Results
Research Question

To what extent do Biology teachers perceive these as factors affecting the use

of ICT in the teaching of Biology in Anambra State?

Table 1: Mean ratings and standard deviation on the perceptions of Biology teachers on the extent to which these factors affect the use of ICT in the teaching of Biology in secondary schools.

Item No	Items on factors affecting use of ICT	x	SD	Decision
1.	ICT facilities are not adequate in my school	2.84	1.67	HE
2.	Inadequate fund for internet connection and services	3.55	1.41	HE
3.	Poor or irregular power supply	3.03	1.72	HE
4.	Inadequate remuneration/incentives for Biology teachers	3.10	1.70	HE
5.	Insufficient time allocation for ICT lessons	2.90	1.69	HE
6.	Poor ICT skills by Biology teachers	3.00	1.65	HE
7.	Scarcity of spare parts for ICT maintenance and repairs	2.51	1.51	HE
8.	Insufficient number of technical experts for ICT repairs and maintenance	2.62	1.62	HE
9.	Insufficient computer for students' use in schools	2.71	1.70	HE
10.	Poor teachers' attitude to ICT innovations	2.40	1.63	LE
	Grand mean	2.87		

In table 1, only item 10 had a mean score below 2.5. Items 1,2, 3, 4, 5, 6,7,8 and 9 had mean scores above 2.5. The standard deviation ranged from 1.41 - 1.72 indicating homogeneity of the mean scores. The mean of means is 2.87. By this analysis, the teachers indicated that ICT facilities were not adequate in their schools; their availability was not commensurate to the number of students to use them and thus affect the efficiency. Poor funding/ high price had also led to non-purchase of facilities and gadgets and spare-parts for the repairs, resulting in the packing-up of some computers

with minor faults, reducing the quantity available. ICT facilities, being electrical appliances, are affected by poor/irregular power supply. Poor internet connection and lack of skills by Biology teachers affect the use of ICT in instruction delivery.

Null Hypotheses

There is no significance difference between the mean ratings of male and female teachers' perception on the extent to which factors affect the use of ICT in the delivery of Biology instruction.

Table 2: t-test of the mean ratings of male and female teachers' perceptions on the extent to which these factors affect the use of ICT in the teaching of Biology in secondary schools (P<0.05).

Gender	N	X	SD	df	t-cal	t-crit	Decision
Male	46	2.99	1.22	105	0.32	1.96	Accepted
Female	61	2.87	1.26				

In Table 2, the t-calculated value was 0.32, while the t-critical value was 1.96 at 0.05 level of significance, with 105 degrees of freedom. Thus, the t-cal was less than the t-critical hence the non-rejection of the hypothesis. Therefore the null hypothesis was accepted.

Discussion

The research question sought to find out how the use of ICT influences the teaching of Biology. The result showed that, with ICT, teaching of biology is more effective as students easily perform projects given to them in the course of the lesson. ICT provides instructional materials for the teaching of biology. It also also enhances the teachers' readiness to execute his/her classroom lessons. Students also perform highly in examinations on topics taught with ICT. Thus, as Ugwu and Nzewi (2015) noted, Biology teachers use ICT to mould up tomorrow's citizens who will fit into the technological era and, thus, improve the nation's technology for enhanced economy. This is also in line with Cox et al (2008) who pointed out that the use of ICT by Biology teachers in discussing their lesson promotes better understanding by the students.

With the above militating factors against the use of ICT, this research aligns with Kola (2013) and Okoye (2014) on poor utilization of available ICT facilities in schools. The study, therefore, conformed to that of Nwagbo & Ugwuanyi (2012) on the impediments to successful utilization of ICT by teachers including, poor electricity supply, lack of skilled manpower, inadequate and insufficient computer systems.

The findings on hypothesis testing revealed that there is no significant

difference in the mean rating of male and female Biology teachers on factors affecting the use of ICT in delivery of biology instruction; thus they both have similar views on impediments to effective use of ICT in the schools.

Conclusions

It has been revealed that teachers do not use ICT in the teaching of Biology by as a result of many factors viz: non-availability of qualified ICT technicians, irregular power supply, insufficient funds for the purchase of ICT facilities, poor supervision of classroom instructions of biology teachers, poor ICT skill acquisition by the Biology teachers, scarcity of ICT spare parts for repairs and maintenance, availability of few computers for students in the schools and poor motivational incentives for Biology teachers.

Recommendations

1. Biology, an arm of STAN should include ICT skill acquisition in its annual workshops
2. Biology teachers should register with STAN and equally attend her conferences and the panel workshops to be abreast of new trends in the systems.
3. Government should help to sponsor teachers to ICT training workshops and conferences.
4. ICT technical staff/personnel should be recruited by government and posted to secondary schools to ensure repairs and maintenance of available ICT facilities.
5. ICT buildings should be erected in schools and available ICT facilities should be properly guided against vandalism.

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