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Teachers' Challenges in Integrating Information and Communication Technology (ICT) in Teaching and Learning of Biology in Secondary Schools.

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Abstract

The study sought to determine teachers' challenges in integrating Information and Communication Technology (ICT) in teaching and learning of Biology in secondary schools. The study adopted descriptive survey research design. Two research questions and one null hypothesis guided the study. The population for the study comprised all Biology teachers in 19 public Secondary Schools in Ika North Local Government Area (L.G.A.) of Delta state. Simple random sampling techniques was used to select 78 Biology teachers for the study. Researchers developed instrument "Teachers ICT Challenges Questionnaire (TICTCQ)" was used for data collection. The instrument was validated by three experts. A reliability coefficient of 0.72 was obtained for the instrument using Cronbach's Alpha. Mean and standard deviation were used to answer the research questions. The findings of the study revealed a number of challenges hindering ICT integration into classroom teaching and learning. Example, insufficient time allocated for the teaching and learning of Biology, lack of computer laboratory and computers for the teacher, low funding of education and over bulky Biology curriculum among others. Based on the findings, recommendation was made and conclusion reached.

Keywords: ICT Integration, Teachers Challenges, Teaching and Learning

Introduction

Over the years, teachers have been charged with the responsibility of teaching students to think, reason, communicate, observe and solving problem for themselves and for the society at large. It appeared or seems that these teachers charged with these humongous responsibilities of educating young minds at various school levels are rarely provided with necessary materials and skills needed to perform these tasks judging from students' academic performance in recent time (Aniaku, 2012). This according to Agharuwhe (2013) this has led teachers to revert to the old practice of lecture method resulting to the decline in students' academic performance in most science courses in Nigeria especially Biology. According to Hellmann, Paus and Jucks (2014) Biology teachers ought to possess or have a good content knowledge of his/her subject area, be grounded with innovative pedagogies invoke in this 21st Century, be a classroom manager and possess an outstanding communication skill. Therefore, the need to strengthen the process of teaching and learning of Biology in secondary schools appears to be well recognized.

Biology is a branch of natural science which deals with the study of living things (plants and animals), including their structures, functioning, evolution, distribution and interrelationships (Ukala, 2018). The importance of Biology as a science subject cannot be relegated to the background as it stands as the basis upon which many professional courses like Medicine, Pharmacy, Nursing, Biochemistry, Genetic studies, Agriculture science etc., are laid. Despite its importance to the developmental aspiration of every society, student performance continues to decline both in internal and external examination (Aniaku, 2012). In line

with the above, Hellmann et al. (2014) and Samuel (2016) outlined some factors leading to the poor performance of students in science subjects (Biology, Chemistry & Physics) with great emphasis on Biology to include; peer group influence, teacher teaching methods, motivation, unavailability of instructional materials and teacher's inability to use innovative teaching strategies. Furthermore, Ajaja (2013) agreed that method adopted for teaching and learning of science in our secondary school is one of the major factors contributing to the low interest and performance of students in Biology and hence call for a search for an alternative instructional strategy that could enhance students' interest and boost academic performance in science subjects and Biology in particular.

Therefore, Anderson and Maninger (2007), Wood and Ashfield (2008) and Samuel (2016) in different studies also agreed that to improve student's academic performance in Biology in secondary school, Information and Communication Technology (ICT) should be introduced into classroom at all cost. The emergence of technology in 21st Century has placed the world into a global village and has transformed teaching and learning processes in developed countries. Violeta, Milena and Bisera (2016) stated that the importance of ICT cannot be over emphasized and suggested that it should be integrated into educational system. In agreement with Violet et al. (2016), Ukala (2018) stated that for meaningful teaching and learning to occur, teachers should blend or get acquainted with the dynamics of the century with regard to technological advancement. All over the world, there is a growing evidence that ICT has a positive effect on teacher effectiveness and students' attainment in Biology (Van & Veen, 2011).

Information and Communication Technologies (ICT) is seen as a set of technological tools and resources used to communicate, create, organize, disseminate, store, retrieve and manage information. These technologies include computers, the Internet, broadcasting technologies (Radio and Television), and telephones. The use of technology involves a hand-on teaching approach that prompt students to learn by interacting with course materials through video, active discussion and outline game and activities (Constantina & Zacharoula 2017). Indeed, the use of ICT in education and training has been a key priority in Nigeria in the last decade, although progress has been uneven (Allan & Lolita, 2018). ICT has had a major impact on the education sector, on organization and on teaching and learning methods. It is being used globally to translate ideas into realizable goals and develop same into concrete achievement. ICT provides knowledge-based system that includes knowledge acquisition, knowledge incubation, knowledge amplification and knowledge dissemination.

The advantages of ICT cannot be over emphasized as it helps establish a friendly atmosphere between teachers' and learners, helps boost learner self-reliance and self-esteem, encourage cooperation among learners, enables learners to overcome their fears and language barrier, keeps participants engaged in activity and assists low-achieving students (Sibanda, Mapenduka, & Furusa, 2016). Bakytgul and Samal (2016) explained that the use of ICT in classroom situation gives students and teachers equal opportunity in the learning process and help improve students' academic achievement. Simin, Thanusha, Logeswary and Annreetha (2015) stressed that ICT in education has the potential to transform teaching and allows students interaction with content, interaction with instructors, and interaction among peers. Simin et al. (2015) concluded that their interaction is devoid of dominance, in thought or viewpoint, by one participant over another.

ICT integration into classroom is making use of ICT during instruction to aid the teaching-learning process. Integrating ICT into teaching and learning is a complex process and one that may encounter a number of difficulties. These difficulties are termed challenges. Simin, et al, (2015) defined challenges as any

condition that makes it difficult to make progress or to achieve a stated objective within the stipulated time. Studies suggested that teachers at all level of education faces challenges integrating ICT as a tool in teaching and learning process especially in primary and secondary schools. Shelanee & Ruales (2011) highlighted some of the challenges facing ICT integration to include; lack of good curriculum, lack of qualified teachers, poorly equip computer lab and inability of teachers to use innovative teaching methods and strategies and low funding among others. To tackle these challenges, education systems must be upgraded to equip the young learners with ICT competencies with which they can handle new technology driven ways of accessing, creating and sharing knowledge. Failure to do this according to Abimbola (2013) has given rise to the assumption that the persistent poor performance in Biology at school certificate level over the years, especially in Delta state could probably be traced to these challenges.

Sunday, Martinez, and Seli, (2014) affirmed that the reasons why conventional lecture method became the order of the day among teachers instead of innovative pedagogical which involve the application of technology was due to lack of preparation. Researchers recommend the use of ICT for in training teachers as well as in service teachers because, not only that it facilitate teaching but it also improves student's achievement in internal and external examinations (Pritchard (2009), Agharuwhe (2013), Constantina & Zacharoula (2017), Oyelekan, Igbokwe, & Olorundare, 2017). Studies have shown low or no usage of these innovative teaching methods and strategies among secondary school science teachers in Delta state (Ukala, 2018). Therefore, this may account for the low achievement in Biology among secondary school students in Delta state (Agharuwhe, 2013). This study is therefore to investigate the challenges hindering the integration of ICT into classroom teaching and learning in secondary schools in Delta state.

Purpose of Study

The main purpose of the study was to find out the challenges hindering the integration of ICT into the teaching and learning of science. Specifically, the study determined the:

1. challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state.
2. possible solutions to the challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state.

Research Questions

The following research questions guided the study;

1. What are the challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state?
2. What are the possible solutions to the challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state?

Methodology

The study utilized descriptive survey design. A descriptive research design is a useful tool for scientific investigation which aims to describe the current status of events or phenomena. All the 78 Biology teachers' in 19 public secondary schools in Ika North LGA of Delta State were used for the study. A 22 items researchers developed instrument termed "Teachers ICT Challenges Questionnaire (TICTCQ)" was used for data collection. The instrument was validated by three experts, two from the Department of Science Education,

University of Nigeria, Nsukka and one computer science teacher. Their corrections were effected to standardize the instrument. It was then administered to ten Biology teachers from three secondary schools in Ika South L.G.A outside the study area and the reliability of the instrument was determined using Cronbach's Alpha technique and a reliability coefficient of 0.72 was obtained. The choice of Ika South L.G.A. was anchored on the fact that both areas share similar characteristics. 78 copies of instruments were administered out of which seven (7) copies were not attended to by the respondent. Therefore, only 71 copies of the questionnaire were valid after collection. The data collected were analyzed using mean and standard deviation. Based on the modified 4-point Likert-rating scale adopted for the study, 2.50 mean score was used as a benchmark for the study. Therefore, all students with mean scored 2.5 and above indicated accept while mean score below 2.5 indicated reject.

Results

The findings or result of the study based on research questions are presented in tables below:

Research Question 1: What are the challenges hindering the integration of ICT into the teaching and learning of sciences in secondary schools in Delta state?

Table1: Result of Mean and Standard Deviation Analysis Score of Respondents on the Challenges Hindering the Integration of ICT into the Teaching and Learning of Sciences in Secondary Schools in Delta State

S/N	ITEM	$\bar{x}$	SD	DECISION
1	Insufficient time allocated for the teaching and learning of Biology	2.61	1.08	**Accept**
2	Lack of computers and other ICT teaching tools	3.27	.80	**Accept**
3	Lack of computer literacy skills by Biology teachers	2.07	1.19	**Reject**
4	Low funding of educational system	3.64	.56	**Accept**
5	Lack of computer lab in secondary schools	3.28	.91	**Accept**
6	Biology teacher's non-wiliness to teach with any ICT tools	2.16	1.02	**Reject**
7	No instructional materials to enable ICT in schools	3.45	.78	**Accept**
8	Lack of power supply (electricity) in my school	2.61	.98	**Accept**
9	Teachers low incentives to afford a computer	3.57	.57	**Accept**
10	Over bulky Biology curriculum	2.92	.82	**Accept**
11	Dilapidated school structures	2.76	1.01	**Accept**
12	Students not willing to learn with computer	2.32	1.06	**Reject**
13	Biology teachers' laziness with classroom activities	2.22	1.05	**Reject**
	Total	**2.84**	**.23**	**Accept**

Results in table 1 above shows that items 1, 2, 4, 5, 7, 8, 9, 10 and 11 were accepted by the respondents that they are challenges hindering ICT integration into classroom teaching and learning of Biology in Delta State. This was anchored on the 2.5 and above mean benchmark for the study. While the respondents rejected items 3, 6, 12 and 13 that they are not the major challenges hindering ICT integration into classroom teaching and learning of Biology in Delta State. This was also because they had mean value of less than 2.5 benchmark for

the study. The grand mean analysis of the 13 items is 2.84 with a standard deviation of .23. Based on the grand mean value of 2.7 which is higher than 2.5 mean benchmark for the study, the researcher therefore concluded that respondents accepted that item 1 to 13 are all challenges hindering ICT integration into classroom teaching and learning in Delta State.

Research Question 2: What are the possible solutions to the challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state?

Table 2: Result of Mean and Standard Deviation Analysis Score of Respondents on the Possible Solutions to the Challenges Hindering the Integration of ICT into the Teaching and Learning of Sciences in Secondary Schools in Delta State

S/N	ITEMS	$\bar{x}$	SD	DECISION
14	Enough time should be allocated for the teaching and learning of Biology in secondary schools	3.38	.81	**Accept**
15	Computer should be provided in public secondary schools in the state	2.75	1.12	**Accept**
16	Biology teachers should equip themselves with computer literacy skills	2.69	1.24	**Accept**
17	Government should increase the funding of educational system	3.52	.75	**Accept**
18	Provision of computers and computer lab in secondary schools	2.83	1.06	**Accept**
19	School managements should organize seminars, workshop and conferences to train her teachers on the use of ICT tools in classroom for effective teaching and learning of Biology	2.65	1.14	**Accept**
20	Improve power supply (electricity) in public secondary schools	2.49	1.26	**Reject**
21	Increase in teacher's incentives so as to afford a computer	3.35	.89	**Accept**
22	Build or rehabilitate dilapidated school structures	2.68	1.18	**Accept**
	Total	**2.78**	**.25**	**Accept**

Results in Table 2 shows that items 14, 15, 16, 17, 18, 19, 21 and 22 were accepted by the respondents as the possible solution to the challenges hindering ICT integration into classroom teaching and learning of Biology in Delta state. This was because they had mean scores of 2.5 and above. The respondents however rejected item 20 indicating that power supply is not a major challenge hindering ICT integration in schools. This was also because they had mean scores less than 2.5 benchmark for the study. The grand mean analysis of the 9 items is 2.78 with a standard deviation of .25. Based on the grand mean value of 2.78 which is higher than 2.5 mean benchmark for the study, the researcher therefore concluded that respondents accept that item 14 to 22 are all solution to the challenges hindering ICT integration into classroom teaching and learning of Biology in Delta State.

Discussion:

Table 1 shows that most of the respondents accepted that there are challenges hindering ICT integration into teaching and learning of Biology in Delta State. Some of the major challenges according to the findings of the study are; low funding of educational system, teachers low incentives to afford a computer, no innovative instructional materials to enable ICT in schools, lack of computer lab in secondary schools in

the state, lack of computer in public secondary schools in the state, over bulky Biology curriculum, Dilapidated school structures, Lack of power supply (electricity) in schools and not enough time allocated for the teaching and learning of Biology. The findings of the study agreed with Sunday, Martinez, & Seli, (2014), Gbadamosi, (2013), Shelanee and Ruales, (2011) and Adikwu (2008) who discovered in their studies other challenges limiting the integration of ICT in the learning of Biology such as teacher poor incentives, lack of innovative instructional strategies among teachers and teacher's phobia for ICT gadgets.

Table 2 shows that most of the respondents accepted that the solution to the challenges hindering ICT integration into teaching and learning of Biology in Delta State include; that Biology teachers should equip themselves with computer literacy skills through seminars, workshops and conferences. They also accepted that; more time should be allocated for the teaching of Biology, government should increase teacher's incentives, provide computer lab in public secondary school and most importantly government should increase educational funding. The findings of the study agreed with the findings Shelanee & Ruales (2011) who also carried out a study on ICT integration in teacher education.

Conclusion

The study investigated the challenges hindering the integration of ICT into the teaching and learning of Biology in secondary schools in Delta state. Therefore, based on the findings of the study, the researchers concluded that there are quite a number of challenges hindering the integration of information and communication technology into the teaching and learning of science in secondary school in Delta state. The most challenge according to Biology teacher was low funding of educational system in the state.

Recommendations

1. Government should pay more attention to education and increase the funding of educational system in Delta state.
2. Enough time should be allocated for the teaching and learning of Biology in secondary schools.
3. Computer laboratory should be provided and properly equip with modern facilities to facilitate ICT integration in schools.
4. School management should endeavor to organize seminars, workshop and conference at least once or twice a year to help teachers gain knowledge and skills needed for effective and successful integration of ICT into Biology Education.
5. Government should provide incentives to increase teacher's motivation and interest in using ICT for teaching and learning as well as to enable them acquire ICT facilities such as computers and projectors

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