Avaliability and Usage of Ict Resources for Chemistry Curriculum Delivery in Schools

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---**ABSTRACT**---
The study investigated the availability and extent of use of information communication and technology resources for chemistry teaching in secondary schools of Anambra State. The design of the study was survey. The population of the study was all the chemistry teachers in 260 governments owned secondary schools in the state. The instrument used for the study was questionnaire with two sections on availability of ICT resources tagged (AICTR) and of ICT resources tagged (UICTR) and oral interview. The validation of the instrument was done by four experts- two computer educators, a chemistry educator and an expert in measurement and evaluation in higher institution. The reliability of the instrument was determined by administering the questionnaire to twenty chemistry teachers in Nnewi education zone. The alpha indices obtained were 0.85 for AICTR and 0.81 for UICTR. Oral interview was used to buttress the findings of the study. The findings of the study revealed that the ICT resources needed for chemistry curriculum delivery are not available, except generators and desktops available in rural and urban schools. On the extent of utilization of ICT resources, for chemistry curriculum delivery the study revealed that teachers do not use them in teaching. Necessary conclusion was drawn and recommendations made. Amongst others are that all state holders in education should join hands in furnishing schools with more ICT resources needed for curriculum delivery and ensuring that chemistry teachers use these resources.

I.   INTRODUCTION.

The federal government of Nigeria has called for advancement to socioeconomic development in various ways. One of which is the introduction of information, communication and technology (ICT) at all levels of education. In order to actualize this, a lot of curriculum reforms were put in place. According to Obioma (2006) there is plan to digitalize the science, technology and mathematics (STM) Curricula which implies the following:

i. Automating digital templates for teaching and learning or where expertise is not locally available. Domesticating existing digital templates from elsewhere to ensure that they are compliant with extant.
ii. Establish relevant digital infrastructure to drive the application of the automated curricula (Obioma 2006).

ICT resources such as internet, video conference, digital camera are useful for exchange and sharing of information through electronic media. The internet is an inter national net work of computers which enable individuals to have access to publication and transfer.

Chemistry as one of the STM subjects is a physical science which is found to be abstract in nature. The need for the implication of chemistry content through the use of ICT need not be overemphasized.

With the above intention, chemistry is one of the STM subjects is a physical science which is found to be abstract in nature and need to be simplified through the use of ICT need not be over emphasized. The Objective of the new chemistry curriculum as stated by Nigeria Educational Research Development Council (NERDC 2007: iv) in Achimugu (2013) include among others:-

i.   Develop interest in the subject chemistry
ii. Acquire basic theoretical and practical knowledge and skills.
iii. Develop reasonable level of competence in ICT application that will engender entrepreneurial skills.
iv. Apply skills to meet society needs due to unemployment and wealth creation.

Considering the above objectives competences and application of ICT is apt in secondary school education.

ICT has been viewed in many ways by several authors. Nzewi (2009) in Ezenduka and Achufusi (2013) describe ICT as a term used to describe technologies which receive, records, process, transmit and retrieve information. ICT occurs in several devices capable of converting images, sound and motion into digital forms. The role of ICT in teaching and learning is inevitable in this age of science and technology development. In developing countries like Nigeria, the use of ICT such as computers, internet, interactive video disk instruction, computer assisted instruction (CAI) computer based instruction (CBI), computer based learning (CBL), e-learning and so on for curriculum delivery have been Found to be effective in science, technology, engineering and mathematics (STEM) curriculum delivery (Okoli & Osuafor 2008).

Computer is useful in enhancing STM education using a variety of programmes internet is a platform where network of networks linking computers to computers and contains all sort of information including variety of education resources which is useful to both teachers and learners Education Trust fund (ETF, 2006) Oloruntegbe and Odutuyi (2003) opined that the use of additional media serve as supplement or/and complement the actual classroom and laboratory chemistry activities and information for books.

The overall benefit is that the learning of chemical concepts will be enhanced, retention and transfer of knowledge could be assured.

Unfortunately despite all the efforts by the government interventions to encourage and provide relevant skills, the competences for the utilization of ICT in STM subjects, chemistry inclusive, researchers still report low level of computer literacy amongst the following; science educators (Achufusi Ezenduka 2008), preservice science teachers (Njelita 2012); poor knowledge and negative attitude of chemistry teachers to ICT (Igboegwu, Egolum & Nnoli; 2011), non-availability, poor accessibility and low extent of use of new technology for STM curriculum delivery (Okoli & Osuafor 2008).

There is no research work known to the researchers on availability and utilization of ICT resources for chemistry curriculum delivery in secondary schools of Anambra State. The problem of this study is therefore to identify the extent to which ICT resources are availability and also the extent of use of ICT resources by chemistry teachers in the secondary schools considering the much clamored need for use of ICT for effective curriculum delivery in secondary schools.

PURPOSE OF STUDY
To determine:
i.   The extent of availability of ICT resources for chemistry curriculum delivery.
ii.   The extent of Utilization of ICT resources for chemistry curriculum delivery

RESEARCH QUESTIONS: The following research questions were used to guide the study.

1. To what extent are the ICT resources available for chemistry curriculum delivery?
2. To what extent are ICT resources for chemistry curriculum delivery utilized.

RESEARCH HYPOTHESES: This study is guided by the following null-hypotheses tested at 0.05 level of significance.

Ho₁: There is no significance difference between the mean ratings of chemistry teachers in urban and rural schools on extent of availability of ICT resources.

Ho₂: There is no significant difference between the mean ratings of chemistry teachers in urban and rural school on extent of utilization of ICT resources.

METHOD:
This study adopted a survey research design. The area of the study is government owned secondary schools in Anambra State. The population of the study comprised of all the chemistry teachers in two hundred and sixty (260) government owned urban and rural secondary schools in the state.

The sample of study was selected by stratifying the secondary schools into Urban and rural from the following education zones-Awka, Aguata, Onitsha, Ogidi and Otuocha. By simple random sampling without replacement one hundred and fifteen (115) chemistry teachers were selected; eighty (80) chemistry teachers in the urban secondary schools and thirty five (35) chemistry teachers from the rural secondary schools. The instrument used for the study were researchers structured questionnaire and oral interview. The questionnaire consisted of three sections.

Section A sought information on the personal data of the respondents. Section B had eleven (11) items tagged availability of ICT resources. (AICTR) and section C has twelve (12) items tagged utilization of ICT Resources tagged (UICTR). The instrument AICTR has 4 point rating scale of highly available -4, moderately available -3, slightly available -2 and not available -1. The UICTR has 4- point rating scale of always used-4, moderately used -3, slightly used -2 and not used -1.

The oral interview was used for clarification and buttress findings. The validation of the instrument was done by three-experts – two computer educators, one chemistry educator and a lecturer in measurement and evaluation to indicate whether the listed ICT resources are used in curriculum delivery. The reliability of the instrument was determined by administering the questionnaire to twenty chemistry teachers in Nnewi education zone using cronbach alpha technique and the value obtained were 0.85 for AICTR and 0.81 for UICTR. There values were considered adequately for this study.

The questionnaire was administered to chemistry teachers found in selected secondary schools and it was collected on the spot with the help of three research assistants. The data obtained were analysed using means and standard deviations for the research questions. A mean of 2.50 and above indicate that ICT resources are available (A) and utilized (U) for chemistry curriculum delivery while a mean of less than 2.50 indicated that ICT resources are not available (NA) and they are not utilized (NU) for chemistry curriculum delivery.

RESULTS:

Research Question 1
Research Question 1: To what extent are the ICT resources available for chemistry curriculum delivery?

TABLE 1: Mean ratings and standard deviation on availability of ICT resources.

	ICT RESOURCES	Mean Urban	SD	Decision	Mean Rural	SD	Decision
1	Basic computer softwares such as word processing, spread sheet, power point	2.56	1.12	A	2.45	1.01	NA
2	Multimedia Projectors	1.00	0.89	NA	1.00	0.90	NA
3	Internet Facilities	1.18	0.91	NA	1.00	0.88	NA
4	Diskette	1.20	0.92	NA	1.00	0.86	NA
5	Ready-made programme for chemistry instruction.	1.00	0.88	NA	1.00	0.89	NA
6	CD-ROMS	1.07	0.89	NA	1.00	0.90	NA
7	Electronic bulletin board	1.00	0.88	NA	1.00	0.70	NA
8	Computers-desktop	2.50	1.13	A	2.48	1.11	NA
9	Computer laptop size	1.00	0.89	NA	1.00	0.91	NA
10	Tele conferencing	1.00	0.91	NA	1.00	0.91	NA
11	Stand by generator	2.80	1.20	A	2.66	0.18	A
	Grand Mean	1.48			1.42		

Table 1 showed that there is standing by generators for urban and rural schools. Most of the ICT resources listed above are not available but there are availability of computers in urban schools.

Research Question 2
Research Question 2:- To what are the ICT resources for chemistry curriculum delivery utilized?

Table 2: Mean ratings and standard deviations on utilization of ICT resources for curriculum delivery.

	ICT RESOURCES	Mean Urban	Decision SD		Means Rural	Decision SD	
1	Basic computer softwares such as word Processing, spread sheet, power point in lesson presentation	1.04	0.87	NU	1.02	0.90 NU	
2	Multimedia projectors in varying instruction and Presentation.	1.00	0.86	NU	1.00	0.88 NU	
3	Internet Facilities for planning of chemistry instruction.	2.40	1.10	NU	2.35	1.11 NU	
4	Diskettes contain lessons prepared for power point presentation.	1.00	0.88	NU	1.00	0.86 NU	
5	Ready-made programme for chemistry instruction	1.11	0.88	NU	1.00	0.88 NU	
6	CD-ROMS for drilling of students on practical activities	1.00	0.89	NU	1.00	0.87 NU	
7	Electronic bulletin board for highlighting key points	1.00	0.90 NU		1.00	0.89 NU	
8	Computers-desktop for students independent Learning.	1.30	0.93	NU	1.23	0.91 NU	
9	Computer laptop size for teachers use during Instruction.	1.00	0.89	NU	1.00	0.87 NU	
10	Tele conferencing for teachers interaction with student during instruction.	1.00	0.90	NU	1.00	0.88 NU	
11	Use of standby generator during instruction.	1.11	0.81 NU		1.10	0.90 NU	
12	Use of computers in processing students result	2.90	1.30	U	2.70	1.25	U
	Grand Mean	1.32	0.93		1.10	0.934	

Table 2 showed that the ICT resources mentioned are not used in the planning and delivery of chemistry instruction. Although teachers responded that there is computers in the processing of students results.

TEST OF HYPOTHESES

HO$_1$: There is no significant difference between the mean ratings of chemistry teachers in urban and rural schools in availability of ICT resources.

Table 3: Z-test for difference between mean of Urban and Rural Chemistry teachers on availability of ICT resources.

Source of Variation	No of teachers	Mean	SD	Z-cal	Z-critical
Urban teacher	80	1.48	0.97	0.19	1.96
Rural teachers	35	1.42	1.94		

Table 3 showed that the Z-cal of 0.19 is less than Z-critical of 1.96 so the null hypothesis is upheld that there is no significant difference in the mean ratings of chemistry teachers in urban and rural secondary schools in terms of available of ICT resources for chemistry curriculum delivery.

Ho$_2$: There is no significant difference between the mean rating of chemistry teachers in urban and rural schools on usage of ICT resources.

Table 4: Z- test of different between two means of urban and rural chemistry teachers on utilization of ICT resources in curriculum delivery.

Source of Variation	No of teachers	Mean	SD	Z-cal	Z- critical
Urban teachers	80	0.64	0.18		
Rural teachers	35	0.32	0.32	0.94	1.96

Table 4 showed that the Z-calculated of 0.94 is less than the Z-critical of 1.96. Hence the null-hypothesis is upheld that there is no significant difference between the mean ratings of chemistry teachers in the urban and those in the rural secondary schools in terms of utilization of ICT resources for chemistry curriculum delivery.

DISCUSSIONS:

The findings of this study revealed that there is non–availability of ICT resources for chemistry teaching although the teachers report that there is availability of desktops in the schools from the mean of 2.50 for urban schools.. This is in line with the findings of Nnorom and Osuafor (2012), Njelita (2012), Okoli and Osuafor (2008), Alike and Ofojebe (2012).

On the utilization of the ICT resources for chemistry curriculum delivery they indicated slight use of internet facilities in their planning of instruction, the mean of 2.40 for urban schools and 2.35 for rural schools. The findings are in line with finding of Olagunju (2003), Njelita (2012), Nnorom, Osuafor and Okeke (2012), Okoli and Osuafor (2008). Again, most higher institutions and secondary schools have not started using ICT resources for curriculum delivery in various subjects. The researchers are aware that secondary schools in the state are supplied with some desktops. From an interview conducted to buttress the findings of this study, chemistry teachers stated that some of the desktops are not functional in some schools they have not been installed but packed in nearby houses for security reasons. Again schools are supplied with large generators which have not been installed but kept in nearby houses; some installed have been burgled by stealing of vital parts. The functional ones are powered for offices and principal's quarter. Schools with internet services are insignificant. There is slight use of internet facilities in the planning of instruction which were done in business centers. The implication of this study is that as schools do not have the necessary ICT facilities and equipment for curriculum delivery the government proposal on the use of ICT for curriculum delivery will not be actualized. It implies that chemistry teachers will still indulge in the use of didactic approach of teaching. This will not enhance science process skills acquisition and manipulation of ICT equipment by learners which is expected to inculcate in them independent study habits.

CONCLUSION:

The Federal government has proposed the use of ICT in secondary school curriculum delivery and the state government has tried to supply computers to schools but the number supplied is still small. Again these computers supplied are not utilized for they are not installed in the school premises due to insecurity. The necessary accessories are non-existent in these computers.

RECOMMENDATIONS:

Based on the findings of this study the following recommendations were made:
1. The government, Parent Teachers Association and all stakeholders in education should join hands in furnishing schools with more ICT resources needed for curriculum delivery.
2. The use of ICT resources in curriculum delivery should be emphasized and made compulsory in colleges of education and universities in order to prepare teachers for future teaching.
3. There should be adequate provision of lap tops to chemistry teachers which they can use to prepare their lessons at home while they repay install mentally.
4. There should be refresher course for chemistry teachers on the use of ICT resources for curriculum delivery.

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