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AVAILABILITY AND USE OF EDUCATIONAL TECHNOLOGY MATERIALS IN TEACHING AND LEARNING OF CHEMISTRY IN SECONDARY SCHOOLS IN OWERRI EDUCATION ZONE.

By

EHUJUO, C.A. (PhD)
chidimaxoby@gmail.com

OJIAKU, F.C. (PhD)
dr.fc.ojiaku@gmail.com

Department of Adult and Continuing Education
College of Education
Michael Okpara University of Agriculture, Umudike

OLOKO, R. NJOKU (PhD)
olokornjokustanley@gmail.com

Department of Agricultural and Vocational Education
College of Education
Michael Okpara University of Agriculture, Umudike

Abstract

The study investigated availability and use of educational technology materials in the teaching and learning of Chemistry in Secondary Schools in Owerri education zone. It is no longer news that educational technology materials are put into use in our secondary schools as we are now in computer age, yet some teachers pay non-challant attitude to using some of such materials. Moreover, some of such materials may not be available in most schools for use and when they are available the Chemistry teacher may not have been using them and thus the study is to find out if such materials are available in use in teaching and learning of Chemistry. Three research questions guided the study. Survey design technique was adopted for this study with researcher's made questionnaire for data collection. The targeted population was 171 Chemistry teachers. 50 Chemistry teachers were selected through a simple random sampling. The instrument for data collection was the researchers structured questionnaire. The face and content validity were established by three experts. The instrument was subjected to trail testing to ascertain the reliability. The reliability of the instrument obtained by administering 20 copies to a school which was outside the sampled schools. The stores obtained from the test were analysed using Cronbach Alpha. Reliability index of 0.75 was obtained indicating that the instrument was reliable for the study. Data collected was analysed using mean with standard

deviation and t-test. The findings of the work revealed that the teachers' accepted that the educational technology materials are available to low extent availability and the educational materials are slightly utilized in the urban and rural schools by the teachers. It is therefore recommended that the government should consider schools in rural areas and provide adequate educational technology materials for the enhancement of teaching and learning. The schools in these areas should be visited often by education authority to profer solution to their needs.

Keywords: Educational Technology, Materials, Teaching and Learning Chemistry

Introduction

The new chemistry curriculum for Nigeria's secondary educational system focuses on practical activities with emphasis on locally available materials and technological skills for the teaching of the subject. The implication of this is that our chemistry teachers need to re-examine their classroom methods of teaching with a view to adopting or indeed devising school-based practical activities in which scientific resources are effectively and efficiently utilized to the benefit of the students. It therefore demands that the chemistry teachers must be proficient in the use of modern techniques in teaching as well as acquisition of the relevant knowledge and skills in the use of educational technology materials. The reason is because students had the conception that chemistry is very volatile, that is, you study the concept and they evaporates or easily forgotten. To help students overcome the fear of the volatile nature in chemistry, the science teachers should apply the use of educational technology materials in teaching and learning of chemistry.

Educational technology materials deals with all the materials like video tapes, transparencies slides, overhead projectors, television, radio and so on which when used systematically help to solve educational problems.

An effective application of such materials help to make learning more permanents and it creates impressions that are so vived and powerful that the learner hardily forgets the experience into

which he was exposed. Olugbemi (2015) opined that educational technology materials awakens learner's interest by its ability to arouse their curiosity to know more. The use of educational technology materials makes the learner to be more, alert and attentive, it captures the interest of the learner. The applications of such materials help to improve the retention level of the learners, so for students to be having problem with the learning of Chemistry, one of the possible reasons may be that the Chemistry teacher may not have identified the relevant educational technology materials that would be applied in the teaching and learning of Chemistry for effective learning and retention.

Utubuaku (2005) opines that when educational technology materials (Computer Assisted Instruction CAI, projectors, transparencies etc) are used in teaching and learning of Chemistry, it goes a long way to solving the learners problems especially in educational sector. Abimbade in Ehujuo (2013) stated specifically that educational technology materials are broad range of resources, which can be used to facilitate effective and efficient communication in teaching and learning process.

Further research have been made to examine the use of educational technology materials in teaching and learning of Chemistry. Researchers findings have shown that many schools do not have adequate educational technology materials in teaching Chemistry, where some have, such materials, some of the teachers do not know how to utilize them effectively. This could be lack of adequate exposure and knowledge on those materials and inability of the government to supply schools with such needed materials for effective teaching and learning of Chemistry.

Igboasoiyi (2011) stated the factors that negatively affect Chemistry achievements as: inadequate educational technology (institutional) materials, application of poor teaching method, teacher-related factors like poor teacher preparation, students background and lack of interest or negative attitude towards Chemistry. Moreso Josiah (2012) opined that the use of

CAI packages as an educational aid has been effective in stimulating students interest and providing individualized time at the students own pace and direction.

Many a times, teachers have these educational technology materials within the school premises, but do not use them during teaching and learning. Some that do use them do not do so always as they do not know how to put them into use. Students on the other hand, learn more on practical use of these educational technology materials as they come in contact with them. Diaz and Bontemba (2000) opined that the use of technology materials to enhance the educational process involves more than just learning how to use specific piece of hardware and software. It requires an understanding of pedagogical principles that are specific to the use of teaching in an instructional setting. Thus Onyejemezi (1991) points out that student generally remember

10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say and 90% of what they say and do it.

Furthermore, Kumazx in Ojiaku (2021) opined that educational technology is a field of study that investigates the process of analysing, designing, developing, implementing and evaluating the instructional environment and learning materials in order to improve teaching and learning. Ojiaku (2021) stated that the main objective of educational technology is to improve education as educational technology materials evolves various senses of seeing, smelling, hearing, feeling and tasting.

Purpose of the Study

The main purpose of the study is to investigate the availability and use of educational technology materials in the teaching and learning of Chemistry in secondary schools in Owerri education. Specifically, the study aimed at the following:

To:

1. determine the extent of availability of educational technology materials based on school location.
2. ascertain the extent of utilization of educational materials based on school location.

Research Question

The following research questions guided the study.

1. What is the extent of availability of educational technology materials based on school location?
2. What is the extent of utilization of educational materials based on school location?

Hypotheses

The following hypotheses were tested at 0.05 level of significance to guide the study

Ho_1: there is no significant difference in the mean rating of urban and rural school teachers on extent of availability of educational technology materials.

Ho_2: there is no significant difference in the mean rating of urban and rural school teachers on extent of utilization of educational materials

Methodology

This study adopted descriptive survey design to determine the availability and use of educational technology materials in the teaching and learning of chemistry in secondary schools in Owerri education zone. The population of the study was all the chemistry teachers in the public secondary schools in Owerri Education Zone which comprise of 171 chemistry teachers. 50 chemistry teachers were selected through simple random sampling technique. The instrument used for the study was the researchers structured questionnaire. Face and content validity were established by three experts. The instrument was subjected to trail testing to ascertain its reliability. The reliability of the instrument was obtained by administering 20 copies to a school which was outside the sampled schools. The scores obtained from the test analysed using Cronbach alpha. Reliability index of 0.75 was obtained indicating that the instrument was reliable for the study. The instrument were made up of 16 items rated base on very adequate, adequate, not adequate and grossly inadequate with their means with standard deviation with t-test statistics was used to analysed the study.

Results

Research Question 1: What is the extent of availability of educational technology materials based on school location?

Table 1: The mean rating of urban and rural school teachers on extent of availability of educational technology materials

S/NO	Educational Technology Materials	Urban		Rural		$\bar{X}_G$	SD_G	Remark
		$\bar{X}$	SD	$\bar{X}$	SD			
1.	Weighing Balance	2.51	0.62	2.32	0.52	2.41	0.57	LEA
2.	Burrettes	2.61	0.63	2.54	0.51	2.57	0.57	HEA
3.	Pepettes	2.11	0.32	2.17	0.46	2.14	0.39	LEA
4.	Tripod stand	2.43	0.53	2.35	0.43	2.39	0.48	LEA
5.	Periodic Table Chart	2.32	0.31	2.24	0.38	2.28	0.34	LEA
6.	pH meter	2.52	0.62	2.73	0.63	2.62	0.62	HEA
7.	Beakers	2.42	0.42	2.35	0.38	2.38	0.40	LEA
8.	Text tubes	2.11	0.32	2.18	0.37	2.14	0.34	LEA
9.	Text tube holders	2.53	0.43	2.52	0.46	2.52	0.44	HEA
10.	Measuring cylinder	2.34	0.23	2.05	0.24	2.19	0.23	LEA
11.	Flat/round Bottom Flask	2.22	0.41	2.32	0.53	2.27	0.47	LEA

12.	Reagent Bottles	2.33	0.33	2.24	0.43	2.28	0.38	LEA
13.	Bulletin Boards	2.42	0.52	2.32	0.53	2.37	0.52	LEA
14.	Flannel Boards	2.00	0.32	2.11	0.42	2.05	0.37	LEA
15.	Newspaper cut –out	2.18	0.36	2.24	0.45	2.21	0.40	LEA
16	Current Chemistry text book	2.35	0.63	2.46	0.61	2.40	0.62	LEA
	Pooled Mean	**2.33**	**0.43**	**2.32**	**0.45**	**2.32**	**0.44**	**LEA**

Where $\bar{X}$ = Mean, SD= Standard deviation, $\bar{X}_G$=Grand mean, SD_G=Grand standard deviation, HEA= Highly Extent Available, LEA= Low Extent Available

Table 1 showed that the extent of availability of educational technology materials based on school location. The pooled mean responses of the respondents had mean value of 2.33 and 2.32 for Urban and Rural school teachers respectively and standard deviation of 0.43 and 0.45 for urban and rural school teachers respectively. The respondents had grand mean pooled value of 2.32 with standard deviation of 0.44. The grand mean value indicated that the teachers' accepted that the educational technology materials are available to low extent availability.

The corresponding hypothesis that addressed the above research question is.

Hypothesis 1

There is no significant difference in the mean rating of urban and rural school teachers on extent of availability of educational technology materials.

Table2: t-test Analysis of mean rating of urban and rural school teachers on extent of availability of educational technology materials

Teachers	N	$\bar{X}$	SD	Df	t-calculated	t-critical	Remark
Urban	28	2.33	0.43				
				48	0.15	2.00	NS
Rural	22	2.32	0.45				

Where N=Number of respondents, $\bar{X}$ = Mean, SD= Standard deviation, df= degree of freedom

Data in table2 reveal that the calculated t- value is 0.15 and the critical t-value is 2.00 at 48 degree of freedom. The t-calculated is less than the t-critical therefore the null hypothesis stated

was accepted. Since the t-calculated value is less than the t-critical value inference drawn is that there was no significant difference in the mean rating of urban and rural school teachers on extent of availability of educational technology materials.

Research Question 2: What is the extent of utilization of educational materials based on school location?

Table 3: The mean rating of urban and rural school teachers on extent of utilization of educational materials based on school location

S/NO	Educational Technology Materials	Urban		Rural		$\bar{X}_G$	SD_G	Remark
		$\bar{X}$	SD	$\bar{X}$	SD			
1.	Weighing Balance	2.21	0.22	2.22	0.42	2.21	0.32	SU
2.	Burrettes	2.32	0.43	2.43	0.45	2.37	0.44	SU
3.	Pepettes	2.24	0.30	2.37	0.42	2.30	0.34	SU
4.	Tripod stand	2.20	0.33	2.15	0.23	2.17	0.28	SU
5.	Periodic Table Chart	2.22	0.35	2.21	0.36	2.22	0.35	SU
6.	pH meter	2.42	0.42	2.31	0.33	2.36	0.37	SU
7.	Beakers	2.52	0.46	2.35	0.38	2.43	0.42	SU
8.	Text tubes	2.31	0.34	2.08	0.32	2.19	0.33	SU
9.	Text tube holders	2.43	0.45	2.22	0.36	2.32	0.40	SU
10.	Measuring cylinder	2.23	0.36	2.15	0.22	2.19	0.29	SU
11.	Flat/round Bottom Flask	2.32	0.32	2.22	0.33	2.27	0.32	SU
12.	Reagent Bottles	2.24	0.34	2.21	0.33	2.22	0.33	SU
13.	Bulletin Boards	2.32	0.32	2.12	0.23	2.27	0.27	SU
14.	Flannel Boards	2.30	0.22	2.20	0.32	2.25	0.27	SU
15.	Newspaper cut –out	2.38	0.42	2.14	0.35	2.29	0.38	SU
16	Current Chemistry text book	2.45	0.53	2.36	0.41	2.40	0.47	SU
	Pooled Mean	**2.31**	**0.32**	**2.23**	**0.34**	**2.27**	**0.33**	**SU**

Where $\bar{X}$ = Mean, SD= Standard deviation, $\bar{X}_G$=Grand mean, SD_G=Grand standard deviation, SU=slightly utilized

Table 3 showed that the extent of utilization of educational technology materials based on school location. The pooled mean responses of the respondents had mean value of 2.31 and 2.23 for Urban and Rural school teachers respectively and standard deviation of 0.32 and 0.33 for urban and rural school teachers respectively. The respondents had grand mean pooled value of 2.27 with standard deviation of 0.33. The grand mean value indicated that the teachers' accepted that the educational technology materials are slightly utilized to a low extent.

The corresponding hypothesis that addressed the above research question is

Hypothesis 2

There is no significant difference in the mean rating of urban and rural school teachers on extent of utilization of educational technology materials.

Table4: t-test Analysis of mean rating of urban and rural school teachers on extent of utilization of educational technology materials

Teachers	N	$\bar{X}$	SD	Df	t-calculated	t-critical	Remark
Urban	28	2.31	0.32				
				48	0.85	2.00	NS
Rural	22	2.23	0.34				

Where N=Number of respondents, $\bar{X}$ = Mean, SD= Standard deviation, df= degree of freedom

Data in table4 reveal that the calculated t- value is 0.85 and the critical t-value is 2.00 at 48 degree of freedom. The t-calculated is less than the t-critical therefore the null hypothesis stated was accepted. Since the t-calculated value is less than the t-critical value inference drawn is that there was no significant difference in the mean rating of urban and rural school teachers on extent of utilization of educational technology materials.

Discussion of the findings

The discussion of the finding is presented as follows

The result revealed that weighting balance, burrettes, pepettes, tripod stand, periodic table chart, pH meter, Beakers, measuring cylinder, flat/round bottom flask, reagent bottles among other chemistry educational technology materials were available to a low extent. The corresponding hypothesis affirmed that there was no significant difference in the mean rating of urban and rural school teachers on extent of availability of educational technology materials in Owerri

Education zone. This is in agreement with the finding of Olugbemi (2015) who pointed out that educational technology materials awakens learners interest by its ability to arouse their curiosity to know more but the materials are not always available for use.

The finding further revealed that weighting balance, burrettes, pepettes, tripod stand, periodic table chart, pH meter, Beakers, measuring cylinder, flat/round bottom flask, reagent bottles among other chemistry educational technology materials were not adequately utilized, the materials are slightly utilized. The corresponding hypothesis affirmed that there was no significant difference in the mean rating of urban and rural school teachers on extent of utilization of educational technology materials in Owerri Education zone. This is in line with the view of Moreso (2012) who opined that the slightly available educational materials in schools are not adequately utilize for learning.

Conclusion and Recommendation

Nigeria educational system need more development in the provision of educational technology materials (including laboratory apparatus) to the schools in rural areas. Children from such areas have equal right to utilize educational technology materials with their counterparts in urban areas. Moreso, since the examination they take (West African School Certificate Examination and Joint and Admission and Matriculation, (JAMB) are the same, they should have equal access to such materials. Otherwise, their academic performance will be negatively affected and thus affect their future hope. According to Cohen noted by Nwarieji *et al* (2016) “the purpose of rural development is to improve the standard of living of the rural population”. So developing country government (Nigeria) should be aware that they have major responsibility for rural development of schools by providing educational technology materials adequate for teaching and learning.

However, since the use of the available educational technology materials are not adequately used by the teachers, the government should make effort and organize training, and workshop for these teachers to be trained on how to use such material. The government should also try as much as possible to provide enough educational technology materials and send them to the rural areas with more teachers to facilitate and enhance the teaching and learning of Chemistry.

References

Diaz, D.P. & Bonteribal, K.F. (2000). Padagogy-based Technology Training. In Pitotman & D. Lemke (eds), Teaching and Learning in a Network World Pp. 50-54. Amsterdam. Nelheelands: 105 Press.

Ehujuo, C.A. (2013). Effects of two Computer Assisted Instructional Method on Secondary School Students Achievement in Chemistry Imo State Owerri (Unpublished Dissertation).

Eya, N.M. (2011). Chemistry curriculum reforms in the 21st century: The need for Human Resource Development: 52nd Annual Conference 2011, Science Teachers Association of Nigeria.

Igboasoiyi, C.A. (2011). Video Compact Disc-lessons as Supplementary Instructional Material in Teaching and Learning of Senior Secondary School Chemistry, Imo State Owerri. (Unpublished Dissertation).

Joscah, M.M. (2012). Location Versus Academic Achievement in Physics. Does Computer Assisted Instruction (CAI) has any Effect. *In Journal of Education and Social Research. 2. (8)*

Njoku, S.O. (1996). An Investigation into the use of Educational Technology in the Teaching of Geography in Isiala Ngwa L.G.A. Abia State (Unpublished PG Project).

Nwarieji, F.E., Amadi, U.P.N., Aniagoro, A. & Martin, O.V. (2016). Innovative Perspective in Application of Information and Communication Technology (ICT) in Rural Agricultural Promotion System in Imo State. *In Innovational Journal of Educational Studies (INJEDs).* ISSN Maiden Educational Vol. 1 No. 3 Sept. (2016).

Ojiaku, F.C. (2021). Effect of Advance Organizer with Video Package and Lecture Method on Student Achievement in Basic Science in Oshodi Local Government Area of Lagos State. *Journal of Nigeria Association for Educational Media and Technology.* Vol. 26,No. 1, 20220.

Olugbemi (2015). Educational Technology for Tertiary Institutions Yinkus & Sons Ent. Abuja.

Onyejemezu, D.A. (1991). Resource Development in Education: Strategies for Schools. In Mkpa (ed) Educational Technology and 6-3-3-4 education System.

Utubuaku, R.U. (2005). Computer Assisted instruction: Traditional Chalkboard Method and Senior Secondary Schools Student Achievement in Graphs. In Obueh local Government Area of C.R.S. Nigeria (Published Thesis) University of Calabar.