

ASSESSMENT OF TEACHERS UTILIZATION OF E-LEARNING TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT OF PRIMARY SCHOOL MATHEMATICS CURRICULUM

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Abstract

The study investigated utilization of e-learning technologies for sustainable development of primary school education mathematics curriculum implementation. Descriptive survey research design was adopted in carrying out the research. Based on the objectives, two research questions and two hypotheses guided the study. The population of the study comprises all mathematics teachers in the public and private secondary schools in Owerri Municipal Council Area of Imo State. A sample size of forty-five (45) mathematics teachers participated in the study using simple random sampling technique. The instrument used for data collection is researchers made structured questionnaire that was validated by one expert judge from mathematics education and two experts from measurement and evaluation departments. The reliability of the instrument was determined using Cronbach alpha reliability method which yielded a value of 0.88. The data generated was analyzed using mean, standard deviation for the research questions while t-test were used to test hypotheses at 0.05 level of significant. One useful recommendation was that the government of Nigeria should embark on a massive computer literacy training programme nation-wide particularly for teachers at all levels. This should be accomplished through in-service training for teachers, workshops, seminar, and conferences.

Keywords E-Learning technologies, Primary Education Mathematics and sustainable development

Introduction

Globally, electronic learning, popularly referred to as e-learning is increasingly becoming acceptable in the educational sector all over the world, simply as a result of the growing standard in Education. (Evarest and Laura, 2011). Etang and Ntui (2009) opined that electronic learning is basically the use of information and communication technologies (ICTs) to enhance and support teaching – learning and research. E -Learning is a unifying term used to describe the fields of online learning, web-based training and technology delivered instructions (Oye, Salleh, & Laland, 2010). E- learning is the use of information and communication technologies such as computer scanner, printer, internet, e-mail, videophone systems, telephone devices, wireless applications protocols (WAP), radio and microwaves, television and satellites, multimedia computer and multimedia projector, interactive whiteboard among others in instructional delivery method (Nwana, 2002). According to Ologo, Adenmm & Ajosoba (2012) E-learning technologies enhance knowledge and performance. E-learning offer learners control over contents, learning sequence, pace of learning, allowing them to tailor their experiences to meet their personal learning objectives. Nwana (2012) outline the benefit of E-learning as follows:

- i. E – Learning is important for education because it can improve the quality of the learning experience.
- ii. By E – learning can help remove barriers to achievement, providing new and creative ways of motivating and engaging pupils and learners of all abilities, enabling and inspiring everyone to attain their educational potential.
- iii. E-learning offers a made range of tools to enable teachers and learners to be innovative, creative and resourceful in all learning activities.
- iv. E- learning creates on-line commutes of practice the internet can bring learners, teachers, specialists’ communities, experts, practitioners and interest groups together to share ideas and good practice.
- v. E – Learning provides virtual learning world where learners can take part in active and creative learning with others through simulations, role – play remote control of real-world tools and devices, online master classes or collaboration with other education providers.

Okure (2008) opined that because the attractive benefits of information and communication technology in education has made the National policy on education (FGN, 2012) places emphasis on the provision and utilization of information and communication technology in teaching and learning. In advancing knowledge and skills necessary for effective functioning on the modern world. Despite of its importance in the educational sector there are

factors that hinder utilization of e-learning technologies. According to Infindo (2007), In brief, the broad categories of factors believed to be hindering efforts of developing societies in spreading ICT (e-learning) products for instructional delivery method include the following:

1. Infrastructural problems, that is, poor information and telecommunication technologies facilities, inadequate power generation, poor internet access, international tariff and lack of circuit capacity.
2. Institutional problems, for example, awareness problems, lack of familiarity with the use of e-learning technologies and unwillingness to change from the status quo, among others: and
3. Human capital problems, that is, lack of qualified skilled IT professionals, cost of procurement of internet access and lack of financial resources.

In fact, UNPAN (2005) cited in Archibon and Ugwulashi (2012) highlighted poverty, low level of literacy, inadequate infrastructure, high cost of ICT services, lack of investments, poor institutional structures, absence of international cooperation and lack of security (in that order) as the major barriers to achieving an information society in developing countries. According to Gabadeen, Alabi & Akunubo (2005) Opined that the primary school mathematics curriculum in Nigeria has been expanded with the inclusion of science and ICT. Use of appropriate modes of interactive technologies would ensure more effective and innovative lesson delivery towards internationalism and application of knowledge for technological development. However, mathematics Education will enable our students imbibe the values, norms, knowledge, actions and activities for sustainable development. Despite these factors' researchers like Akuchie 2008, Evarest & Ntui 2009 and Gold 2001 opined that there is urgent need to integrate information and communication technology into the primary education mathematics curriculum in Nigeria.

Primary Education is education acquired after primary education and the broad aims of primary education according to National policy on Education (FRN, 2012) are (i) Preparation for useful living within the society and (ii) Preparation for higher education. In the primary school education, mathematics has been a core compulsory subject which it's indispensable in all face of life. The general objective for mathematics education among other includes.

- i. To generate interest in mathematics and to promote a solid foundation for everyday living.
- ii. To develop computational skills.
- iii. To foster the desire and inability to be accurate to a degree relevant to the problem at hand.

- iv. To develop precise, logical and abstract thinking.
- v. To develop the ability to engage problems and solve with related mathematical knowledge.
- vi. To provide necessary mathematical background for further education.
- vii. To stimulate and encourage creativity (Obodo, 1997).

However, mathematics Education will enable our children imbibe the values, norms, knowledge, actions and activities for sustainable development. The concept of sustainable development has been an age long discourse in all education. According to Ayodebe (2007), sustainable development can be broadly defined as the ability of the economy to support the needs of the people of a country over times, taking into consideration the economic, social and ecological constraints of the country. The development of information technologies makes the increasingly wider application of multimedia in education possible.

Bassey (2007) cited in Eteng and Ntui (2009) investigated the Nigerian secondary student's access to e-learning technology in South-South Nigeria. Results of the survey indicate that the number of students in Nigeria secondary schools who have access to e-learning technology was negligible. According to Akuchie, (2008), most e-learning facilities are not available in the schools and where they exist, they are either not functional or inadequate and students do not employ ICT facilities for teaching and learning. Kamba (2009), writing on the problem of implementing e-learning technologies in Nigerian primary, argued that investment and commitment to develop an e – learning application is very poor and below expectations in the institutions.

Evarest and Laura (2011), in their study on learning electronically in Nigerian secondary schools, revealed that the e-learning facilities were inadequate and students, access to these facilities is very negligible. They also revealed some inhibitors to the use of e-learning facilities which include power outages, obsolete e-learning facilities, lack of skilled manpower and poor infrastructure and recommended that government should show more political-will be increasing the financial resources available to the universities especially in the area of e-learning facilities which is capital intensive, among others.

Sam (2011), argued that e-learning is a logical and strategies approach to achieve the technological transformation of Nigeria, adding that the deployment of ICT is critical in the implementation of education road map, which is designed to revamp the education sector. According to Sam (2011), e-learning is expected to redefine education, for example, the classroom will no longer be demarcated by brick walls rather “students can communicate with

their teachers from their bedroom or wherever they are, especially during strikes. In another study conducted by Agboze, Ugwoke and Onu (2012) in the secondary schools in South – South and South-Eastern geopolitical zones of Nigeria on the utilization of e-learning technology resources in instructional delivery, it was found that e-learning technology resources were not extensively utilized in teaching due to many constraints which include shortage of qualified staff with e-learning application, lack of e-learning facilities and infrastructure in the schools. Nwana, (2012), writes on the challenges in the application of e-learning in secondary schools in Onitsha North Local Government Area. Anambra State, Nigeria, revealed that acute shortage of e-learning materials such as on-line/internet-connected computers, e-mail facilities, multimedia television, multimedia computer and digital library were major constraints. It was also revealed that the few available ones such as off-line/ordinary computers, scanners, printers and ready-made courseware are not utilized because the teachers lack the knowledge and skills of computer application. The only material identified as available and in use is the telephone. It was recommended, among other things, that government should embark on massive computer training programmes for teachers, and that teachers should be trained and retrained through in-service training, seminars, workshops and conferences for the acquisition of the knowledge and skills needed for e-learning application in primary schools in Nigeria.

Statement of the problem

The Millennium Development Goals (MDGs) and the transformation agenda of the Nigerian government place a premium on education as vital tool towards the realization of sustainable development Goals. The position of mathematics education within the three levels of education system is very important and the major challenge facing the school system in Nigeria is how to improve the performance, positive attitude and self-reliance of the students. The domain of education, particularly teaching and learning in Nigeria secondary school system has not been so influenced even when teachers claimed that they are the benefits of using e-learning technologies (Okoro, 2009, Olubebe & Ubogul, 2009). The inability of teachers to utilize e-learning technologies in classroom may hinder critical thinking skills, teamwork, collaboration and effective communication among students. Since e-learning technologies is a factor in promoting sustainable development in the education sector. Therefore, this study was designed to investigate availability and utilization of e-learning for sustainable development of secondary Education mathematics.

Purpose of the study

The main purpose of the study is to assess teacher's utilization of e-learning technologies for sustainable development of primary school mathematics. Specifically, it seeks;

- i. To assess extent of utilization of e-learning technologies for sustainable development of primary school mathematics.
- ii. To assess the constraints to effective utilization of e-learning technologies for sustainable development of primary school mathematics.

Research Questions

1. To what extent are e-learning technologies utilized for sustainable development in primary education mathematics curriculum.
2. What are the constraints to effective utilization of e-learning technologies for sustainable development in primary education mathematics curriculum?

Hypotheses

1. There is no significant difference in mean responses of public and private of teachers on e-learning technologies utilized for sustainable development in primary education mathematics curriculum.
2. There is no significant difference in mean responses of public and private constraints to effective utilization of e-learning technologies for sustainable development in primary education mathematics curriculum?

Methodology

The study employed a descriptive survey research design to determine the utilization of e-learning technologies in secondary education mathematics curriculum implementation. The population comprises all the mathematics teachers in the eleven (11) and twenty –seven private secondary schools in Owerri municipal council Area of Imo State. The sample for the study comprises 45 mathematics teachers selected using simple random sampling technique. The instrument for data collection was a self-developed 30-item questionnaire. It was structured on a five – point scale and has two sections (A – B) which sought information on the two-research question. Section A dealt with the extent of utilization of the e-learning technologies with the response categories as “Very High Extent”, “higher Extent”, “Moderate Extent”, “Low Extent” and “Very Low Extent”, Section B of the questionnaire dealt with the constraints to effective utilization of e-learning technologies in “Agree”,

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“Undecided”, “Disagree” and “Strongly Disagree”.The face and content validation of the instrument were established by three experts, two from Measurement and Evaluation Department and one from Mathematics Education. The reliability of the instrument was determined using the Cronbach’s Alpha method. A reliability coefficient of 0.88 was obtained, an indication that the instrument was reliable for data collection. The data collected were analyzed using mean and standard deviation while the null hypotheses were tested rating scale, the decision rule was based on the mid-point of the scale, 3.0. Therefore, items with mean scores of 3.0 and above were regarded as high extent or agreed while items below 3.0 were regarded as low extent or disagreed.

Results

Research Question one: What are e-learning technologies utilized for sustainable development of primary education mathematics curriculum.

Table 1: Mean ratings and standard deviation of respondents on the extent of utilization of e-learning technologies for sustainable development primary school mathematics curriculum.

S/ N	Items	Mathematicsteachers(pu blic schools)			Mathematics teachers (private schools)		
		Mean	SD	Decision	Mea n	SD	Decisi on
1	E – lecturers	2.46	0.56	LE	2.28	0.4 4	LE
2	E – workshop	2.39	0.49	LE	2.27	0.5 8	LE
3	E – drills	2.24	0.44	LE	2.15	0.6 8	LE
4	E – examination	2.18	0.85	LE	2.11	0.8 8	LE
5	E – books	2.48	0.93	LE	2.38	0.8 2	LE
6	E – library	2.19	0.48	LE	2.22	0.5 2	LE
7	E – mail and Fax	3.26	0.66	ME	3.38	0.6 1	ME
8	E – sound books	1.98	0.58	LE	1.66	0.8 3	LE

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9	E – trackers	2.00	0.73	LE	1.89	0.87	LE
10	Personal Computer, laptops	3.00	0.64	ME	2.91	0.73	ME
11	E – presentation (power point)	2.42	1.03	LE	2.16	0.83	LE
12	E – database	1.99	1.11	LE	1.78	0.77	LE
13	Cable satellite broadcast	1.66	0.84	LE	1.28	0.8	LE
14	Video/Teleconferencing	2.18	0.86	LE	2.10	0.47	LE
15	Internet and Web browsing	3.12	0.48	ME	3.06	0.94	ME
	Overall Mean	2.37	0.71		2.24	0.72	

The findings in Table 1 showed the mean ratings and standard deviation of the responses. All the items, except items 7, 10 and 15, had average mean rating from the two groups of respondents ranging from 1.28 to 2.48 which implied low extent of utilization. The mean ratings of items 7, 10 and 15 ranged from 2.91 to 3.38 which were not up to high extent but implied that those items were moderately utilized. Therefore, results indicated that the two groups of respondents were of the opinion that none of the e-learning technologies listed was utilized to a high extent in primary school mathematics.

Research Question Two: What are the constraints to effective utilization of e-learning technologies for sustainable development in primary school mathematics curriculum?

Table 2: constraints to effective utilization of e-learning technologies

S/N	Items	Mathematics teachers(public schools)			Mathematics teachers (private schools)		
		Mean	SD	Decision	Mean	SD	Decision
16	Inadequate facilities and infrastructure for e-learning	4.33	0.96	Agree	4.46	0.53	Agree

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	application						
17	Shortage of qualified staff with capacity in e-learning application.	3.78	0.89	Agree	3.39	0.76	Agree
18	Inadequate funding of programmes and e-learning related activities	3.65	0.85	Agree	4.16	0.48	Agree
19	Poor administration and supervision of e-learning related programme and instructions	4.27	0.77	Agree	3.80	0.87	Agree
20	High cost of acquisition of e-learning facilities	4.18	0.85	Agree	4.29	0.68	Agree
21	Poor perception and conservative attitude of business educator on the use of e-learning for instructional delivery	4.31	0.97	Agree	4.13	0.59	Agree
22	Lack of adequate incentives and motivation of staff	4.21	0.45	Agree	4.24	0.94	Agree
23	Incessant power failure, inadequate technical support from government and institutions	3.98	0.64	Agree	4.24	0.95	Agree
24	Inadequate time allocated to e-learning related instructions	4.06	0.58	Agree	4.11	0.85	Agree
25	Lack of training and retraining programmes for lecturers on e-	4.24	0.98	Agree	4.51	0.71	Agree

	learning						
26	Disruption and network failure	3.67	0.88	Agree	4.31	0.82	Agree
27	Poor management and maintenance of available resources for e-learning	4.28	0.57	Agree	3.98	0.72	Agree
28	Narrow band with limited area covered by internet connectivity	4.51	0.94	Agree	4.55	0.76	Agree
29	Curriculum inadequacies due to haphazard integration of e-learning applications into the curriculum	4.01	0.72	Agree	4.32	0.68	Agree
30	Lack of strong government policies of e-learning instructional delivery	4.36	0.73	Agree	4.21	0.71	Agree
	Overall Mean	4.12	0.79		4.19	0.74	

Table 2 showed the mean ratings and standard deviations of responses by teachers on constraints to effective utilization of e-learning technologies in primary school mathematics. The table revealed that average mean ratings on each of the items as well as the overall mean ratings for all the items ranged from 3.39 to 4.55 well above 3.00 which is the real limit on the scale. This implied that all the respondents agreed that each of the items listed is constraint to effective utilization of e-learning technologies in primary school mathematics.

Hypotheses

Hypothesis One: There is no significant difference in mean responses of public and private of teachers on e-learning technologies utilized for sustainable development of primary school’s mathematics curriculum.

Table 3: T-test analysis on e-learning technologies utilized for sustainable development of primary school’s mathematics curriculum.

Schools	N	X	SD	DF	Level of significant	t-cal	t-tab	Decision
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Public primary schools	21	2.37	0.71	43	0.05	0.58	2.01	Accepted
Private primary schools	24	4.19	0.74					

Table 3 showed that the calculated t-value at 43 degree of freedom and at 0.05 level of significance is 0.59 which is less than the critical table value of 2.10. It implied that both mathematics teachers in public and private primary schools are of the opinion that e-learning technologies are not extensively utilized in primary school mathematics curriculum implementation. This implies that there is no significant difference in the mean ratings of the two groups of respondents.

Hypothesis Two: There is no significant difference in the mean responses of mathematics teachers in the public and private schools on the constraints to effective utilization of e-learning technologies in primary school mathematics curriculum implementation.

Table 4: T-test analysis on constraints to effective utilization of e-learning technologies in secondary school mathematics curriculum implementation.

Schools	N	X	SD	DF	Level of significant	t-cal	t-tab	Decision
Public primary schools	21	4.12	0.79	43	0.05	0.38	2.01	Accepted
Private primary schools	24	4.19	0.74					

Table 4 indicated that the calculated t-value at 43 degree of freedom, at 0.05 level of significance is 0.38 which is less than the t-table value of 2.01. Since the calculated t-value is less than the t-critical table value, the null hypothesis two shows that there is no significant difference in the mean ratings of the respondent’s public and private school’s teachers on the constraints to effective utilization of e-learning technologies in primary school mathematics.

Discussion

The result of this study shows that there are many e-learning technologies and application that are available for utilization in primary school mathematics. However, the result indicated that all the e-learning technologies and application studied were low utilized in primary school mathematics curriculum implementation only few of them being moderately utilized. The result is in line with Nwagb and Ugwuanyi (2011) cited in Agboeze et al (2012)

which stated that the pace of development and utilization of e-learning technologies for educational purposes including teaching and learning of business education is still very low in Nigeria.

The study also identified some constraints to effective utilization of e-learning technologies in primary school mathematics curriculum implementation. These constraints include poor conservative attitude of teachers on the use of e-learning technologies for instructional delivery, shortage of qualified staff with capacity in e-learning application, lack of training and retraining of staff and students in e-learning technologies and applications and inadequate time allocated to e-learning-related instructions, training and practice. Others are inadequate facilities and infrastructure for e-learning instruction and applications together with poor management and maintenance of available resources for e-learning training and practice. This result is supported by Gold (2001) who, in his study, stated that some of the constraints to effective utilization of e-learning technologies in instructional delivery are the quality and creativity of the teachers.

Conclusion

This study examined the utilization of e-learning technologies in primary school mathematics curriculum implementation. The study also revealed that most of the e-learning technologies were utilized to a low extent with very few being moderately utilized to a high extent or very high extent in primary school mathematics curriculum implementation because of constraints to effective utilization of the e-learning technologies and Constraints identified are incentives and motivation of teachers as well as inadequate facilities, equipment and infrastructure for e-learning purposes.

Recommendation

The following recommendation was made based on the findings;

- The government of Nigeria should embark on a massive computer literacy training programme nation-wide particularly for teachers at all levels. This should be accomplished through in-service training for teachers, workshops, seminar, and conferences.
- Videophone, teleconferencing and multimedia system, for examples, multimedia computers and multimedia projectors should be provided in adequate number by the government of Nigeria for effective e-learning technology use at all levels of education.
- Teachers in Nigeria should be motivated and encouraged to develop and use multimedia courseware and software relevant to teaching and

learning. The government should motivate teachers through provision of adequate funds for courseware development.

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