BASIC SCIENCE TEACHERS' AWARENESS AND USAGE OF SYNCHRONOUS AND ASYNCHRONOUS E-LEARNINGFACILITIES IN ENUGU STATE

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Abstract
This studyinvestigated the extent of basic science teachers' awareness and usage of synchronous and asynchronous e-learning facilities inEnugu State. The study adopted a descriptive survey research design.Five research questions and two hypotheses guided the study. The population for the study was allseventeen basic science teachers in the sixteen public secondary schools in Udenu Local Government Area. A questionnaire titled: Questionnaire on Awareness and Usage of Synchronous and Asynchronous E-learning Facilities (QAUSAEF) was used to obtain responses from the teachers. The internal consistency of the instrument was determined using the Cronbach Alpha technique. The reliability coefficients for Clusters One, Two & Three are 0.89, 0.94 and 0.75 respectively with an overall reliability coefficient of 0.86. Mean and standard deviation were used to answer the research questions whilea t-test was used to test the null hypotheses at 0.05 level of significance. The findings showed that: basic science teachers are aware of most of these e-learning facilities and gender does not influencebasic science teachers' awareness and usage of these e-learning facilities. The study also revealed some possible factors militating against the effective use of synchronous and asynchronous e-learning facilities which include cost of buying data, inadequate skilled manpower, etc. It was recommended among others, that regular in-service training on the usage of e-learning facilities in teaching should be organized for basic science teachers since they are already aware of these facilities but do not utilize them in teaching.

Keywords: Asynchronousand Synchronous E-learning facilities; Basic science;Gender

Introduction

Basic science also known as integrated science is a subject that provides a fundamental understanding of natural phenomena and the process by which natural resources are transformed. This subject expects to present science in a holistic manner without necessarily showing bias between different science subjects. Basic Science is taught at the primary and junior secondary education level in the Nigerian school system. It is a subject that acts as the bedrock of other core science subjects. This gives Basic Science a position of prominence and importance in the Universal Basic Education (UBE) program. The teaching of basic science is expected to be the starting point for a science career.The United Nations Educational, Scientific and Cultural Organization (UNESCO,

1968) explained several reasons why basic science should be introduced in various countries as an element in basic education. Some of these reasons are: (1) basic science learning at primary and secondary levels can provide a strong basis for students to learn more basic science or specialist subjects; (2) the development of modern science leads to the interdisciplinary nature of science (Oludipe, 2012). With the importance of science in mind, the aim of basic science is to provide learning experiences that will enable students to develop scientific literacy so as to participate actively in our rapidly changing knowledge-based society. To achieve this, it is important that appropriate teaching methods are employed in the teaching of this subject**.** All science teaching methods are either teacher-centred or student-centred Both types of instruction have their place; however, in practice have very different dynamics in the classroom. Some methods that have been used in basic science teaching include lecture method, project-based learning, peer-led team learning, flipped learning, E-learning etc.

E-learning is the use of electronic media and information and communication technologies (ICT) in education. E-learning refers to the use of modern technology, such as computers, digital technology, networked digital devices (e.g., the Internet) and associated software and courseware to facilitate the learning process (FAO, 2011). It is inclusive of and is broadly synonymous with multimedia learning, technology-enhanced learning (TEL), computer-based instruction (CBI), computer-managed instruction, computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education, virtual learning environments (VLE) (which are also called learning platforms), m-learning, and digital educational collaboration (FAO, 2011). According to Scholz (2013), digital learning is part of a student's educational journey. Not only do higher education institutions prefer digital learning, but secondary and high school levels also prefer digital means to improve academic performance. Today, students learn through an "online collaborative environment" where everyone has an equal chance to access educational opportunities. Some other aspects of e-learning involve a situation where the teacher and students come online at the same time for the sake of teaching and learning and other aspects involve students visiting the online platform at their convenience. Because of this, there are two basic methodologies used in electronic learning. They are synchronous and asynchronous learning.

Synchronous learning occurs in real time, with all participants interacting at the same time (FAO, 2O11). Synchronous learning involves the exchange of ideas and information with one or more participants during the same period of time. A face-to-face discussion is an example of synchronous communication. Synchronous learning environments support learning and teaching at the same time and offer students and teachers multiple ways of interacting, sharing, and the ability to collaborate and ask questions in real time through synchronous learning technologies. Examples of synchronous communications include online real-time live teacher instruction and feedback, Skype conversations, chat rooms or virtual classrooms where everyone is online and working collaboratively at the same time. However, there is still another aspect of e-learning which does not occur simultaneously in real time. This leads us to the exploration of the concept of "asynchronous e-learning."

Asynchronous Learning is a self-paced e-learning method that can be thought of as without synchronization. It allows participants to engage in the exchange of ideas or information without dependency on other participants' involvement at the same time. Learners complete coursework, discussion, questions and etc. when they decide to do it within time limits (Smith, 2009). Asynchronous learning may use technologies such as email, blogs, wikis, and discussion boards, as well as web-supported textbooks, hypertext documents, audio or video courses, and social networking using Web 2.0. Instructors provide materials, lectures, tests, and assignments that can be accessed at any time. Students may be given a timeframe usually one week during which they need to connect at least once or twice. The students are free to contribute whenever they choose (Joseph, 2014). In asynchronous learning, if students need to listen to a lecture a second time, or think about a question for a while, they may do so without fearing that they will hold back the rest of the class (Hrastinski, 2008). Although these two methodologies involve students' active participation, it needs to be orchestrated by the teacher. It is therefore important to find out if the active usage of these e-learning methodologies by teachers is dependent on the teacher's gender.

Gender is the behavioural, cultural, or psychological traits typically associated with one sex (male or female). Ikeh et al (2021) saw gender as the psychosocial aspect of maleness and femaleness. Bronfenbrenner (2005) refers to gender as social differences and relations between men and women. Gender is a social construct, it is not biologically determined but a concept equivalent to race or class (Offorma, 2004). This definition suggests that gender is socially or culturally constructed characteristics and roles, which are associated with males and females in society. Gender differences are one aspect of the overall cultural differences that exist between human beings (Gefen& Straub, 2013). These patterns of perceptions may affect the way each of them handles e-learning facilities.There are different reports in literature patterning how male and female teachers handle ICT resources in teaching and learning. Some agree that gender affects teachers' awareness and usage of e-learning facilities (Okazaki & Santos, 2012; Gefen & Straub, 2013; Ugwu&Ohimekpen, 2015; Idemudia et al, 2017; Mbonu&Okoli, 2019; Vanitha &Alathur, 2020; MbonuBada& Jita, 2021; Mbonu, Eya, Umate& Attah, 2021; Mbonu-Adigwe et al, 2021), some other reports are neutral while few others oppose the discourse (Nkedishu, Egwunyenga&Nwaorgu, 2021). In view of the above, this research will also attempt to assess the level of male and female basic science teachers' awareness of facilities used in synchronous and asynchronous e-learning contexts and the extent to which teachers use these e-learning facilities in teaching basic science in Enugu State, Nigeria.

Research questions

The following research questions guided the study.

1. What is the extent to which basic science teachers are aware of synchronous and asynchronous e-learning facilities?
2. What is the influence of gender on basic science teachers' awareness of synchronous and asynchronous e-learning facilities?
3. To what extent do basic science teachers utilize synchronous and asynchronous e-learning facilities?

4. What is the influence of gender on basic science teachers' usage of e-learning facilities?
5. What are the possible factors militating against the effective use of synchronous and asynchronous e-learning facilities?

Hypotheses

The following hypotheses guided the study and were tested at 0.05 level of significance.

Ho1: There is no significant influence of gender on basic science teachers' awareness of synchronous and asynchronous e-learning facilities.

Ho2: There is no significant influence of gender on basic science teachers' usage of synchronous and asynchronous e-learning facilities.

Method

The design of the study is a descriptive survey research design. The design was considered appropriate because descriptive survey studies are interested in describing the characteristics of certain groups of people considered a representative sample of the entire group. The study was carried out in Udenu Local Government Area of Enugu State.

The population of the study was made up of all 17 basic science teachers from all the 16 public secondary schools in Udenu Local Government Area (Statistics from PPSMB Enugu School Directory, 2022). No sampling technique was employed since the entire population of basic science teachers in the area of study was used for the research.

A researcher-designed questionnaire was used for this study. The questionnaire is titled: Questionnaire on Awareness and Usage of Synchronous and Asynchronous E-learning Facilities in Enugu State (QAUSAEF). The items that make up the questionnaire are compiled from the available literature on e-learning facilities that can be used for teaching basic science. The final draft of the questionnaire is made up of three clusters.

The first cluster deals with awareness of e-learning facilities that can be used to teach basic science among secondary school basic science teachers, the second cluster focuses on the extent of usage of these facilities during secondary school basic science teaching while the third cluster focuses on the possible factors militating against the effective use of these facilities. Each cluster is divided into two sections. Section A elicited demographic information of the respondents while section B is made up of the item statements

The instrument was validated and the suggestions of the validators were duly accepted and effected before adopting the final draft.The reliability of the questionnaire was achieved by administering the instrument to twenty (20) basic science teachers from Nsukka Local Government Area. The data obtained was subjected to Cronbach Alpha and the reliability coefficients of 0.89, 0.94and 0.75 were obtained for clusters one, two and three respectively with an overall reliability coefficient of 0.86.QAUSAEF was distributed to the basic science teachers and retrieved on the spot to ensure a 100% return.Mean and standard deviation were used to answer the research questions while a t-test was used to test the hypotheses at 0.05 level of significance. The real limit of number used for clusters one and two and their decision are listed as follows:0.5-1.49 = Very Low Extent (VLE), 1.5-2.49 = Low Extent (LE), 2.5-3.49 = High Extent (HE), 3.5-4.49= Very High Extent

(VHE). The decision rule for cluster three is that any mean score of2.5 and above stands for agree and strongly agreed while a mean score below 2.5 stands for disagree and strongly disagreed.

Results

The results will be resented according to their research questions.

Research question one: What is the extent to which basic science teachers are aware of synchronous and asynchronous e-learning facilities?

Table 1: *Mean and Standard Deviation of the extent to which basic science teachers are aware of synchronous and asynchronous e-learning facilities*

S/N	Item Statement	N	$\bar{X}$	*SD*	Remark
1	Audio Tapes	17	2.65	.79	HE
2	Desktop Computer	17	3.41	.71	HE
3	Laptop	17	3.59	.62	VHE
4	Smart Phones	17	3.47	.62	HE
5	E-mail	17	3.65	.49	VHE
6	E-book Readers	17	3.47	.80	HE
7	Flash Drive	17	2.76	.83	HE
8	Interactive White Board	17	2.94	.90	HE
9	Internet Facility/Network	17	3.18	.64	HE
10	IPad	17	2.18	.95	LE
11	Local Area Network	17	1.82	.95	LE
12	Modem	17	2.65	.93	HE
13	Power Point Software	17	2.94	.75	HE
14	Projection Screen	17	2.94	.83	HE
15	Projector	17	3.29	.77	HE
16	Virtual Classroom	17	3.41	.62	HE
17	Video Conferencing	17	3.06	.82	HE
18	E-books	17	2.71	.77	HE
19	E-journals	17	2.29	1.05	LE
20	Digital Library	17	2.53	.94	HE
21	Google Classrooms	17	2.76	.97	HE
22	WhatsApp	17	2.94	.83	HE
23	Zoom	17	3.35	.86	HE
24	Skype	17	1.52	.62	LE
25	Facebook Messenger	17	2.88	.86	HE
	Cluster mean	**17**	**2.96**	**.15**	**High Extent**

The result in Table 1 presents the findings from the analysis of data collected to determine the extent to which basic science teachers are aware of synchronous and asynchronous e-learning facilities. The cluster mean value of 2.96 which lies within the real limit of 2.5-3.49 indicates that basic science teachers to a high extent are aware of these synchronous and asynchronous e-learning facilities. Basic science teachers are aware of all the synchronous and asynchronous e-learning facilities except IPad, local area networks, e-journals and Skype.

Research question two: What is the influence of gender on basic science teachers' awareness of synchronous and asynchronous e-learning facilities?

Table 2: *Mean and Standard Deviation of the influence of gender on basic science teachers' awareness of synchronous and asynchronous e-learning facilities*

		Male-NO: 07		Female-NO: 10	
S/N	**E-learning Facilities**	$\bar{X}$	***SD***	$\bar{X}$	***SD***
1	Audio Tapes	3.43	.79	3.40	.70
2	Desktop Computer	3.71	.49	3.50	.70
3	Laptop	3.57	.54	3.40	.70
4	Smart Phones	3.71	.49	3.60	.52
5	E-mail	3.14	1.07	3.70	.48
6	E-book Readers	2.00	1.00	1.70	.95
7	Flash Drive	3.00	.82	2.90	.99
8	Interactive White Board	2.00	1.00	2.30	.95
9	Internet Facility/Network	3.29	.49	3.10	.74
10	IPad	2.71	.76	2.80	.92
11	Local Area Network	2.71	.95	2.60	.97
12	Modem	3.00	.82	2.90	.74
13	Power Point Software	3.14	1.07	2.80	.63
14	Projection Screen	3.43	.79	3.20	.79
15	Projector	3.29	.76	3.50	.53
16	Virtual Classroom	2.71	.76	3.30	.82
17	Video Conferencing	2.86	.69	2.60	.84
18	E-books	2.29	.95	2.30	1.16
19	E-journals	2.29	1.11	2.70	.82
20	Digital Library	3.00	1.00	2.60	.97
21	Google Classrooms	2.57	.79	3.20	.79
22	WhatsApp	3.57	.54	3.20	1.03
23	Zoom	2.86	.90	2.90	.88
24	Skype	1.57	.79	1.50	.53
25	Facebook Messenger	3.57	.54	3.30	.48
	Cluster mean	**2.93**	**.09**	**2.92**	.17

The result in Table 2 above shows the extent of the influence of gender on basic science teachers' awareness of synchronous and asynchronous e-learning facilities. The cluster mean score of the male teachers of 2.93 which lies within the real limit of 2.5-3.49 indicates that male basic science teachers are aware of these synchronous and asynchronous e-learning facilities to a high extent. The female teachers have an overall average of 2.92 which lies within the reallimit of 2.5-3.49 indicating that female basic

science teachers are also aware of these synchronous and asynchronous e-learning facilities to a high extent.

Research question three: To what extent do basic science teachers utilize synchronous and asynchronous e-learning facilities?

Table 3: *Mean and Standard Deviation of the extent of basic science teachers' utilization of synchronous and asynchronous e-learning facilities*

S/N	E-Learning Facilities	N	$\bar{X}$	*SD*	Remark
1	Audio Tapes	17	2.82	.73	HE
2	Desktop Computer	17	2.47	.80	LE
3	Laptop	17	2.65	.79	HE
4	Smart Phones	17	3.12	.93	HE
5	E-mail	17	2.47	.94	LE
6	E-book Readers	17	1.29	.47	VLE
7	Flash Drive	17	1.71	.59	LE
8	Interactive White Board	17	1.76	1.15	LE
9	Internet Facility/Network	17	1.65	.70	LE
10	IPad	17	1.35	.49	VLE
11	Local Area Network	17	1.24	.44	VLE
12	Modem	17	1.53	.62	LE
13	PowerPoint Software	17	1.65	.79	LE
14	Projection Screen	17	1.76	.90	LE
15	Projector	17	1.47	.80	VLE
16	Virtual Classroom	17	1.47	.80	VLE
17	Video Conferencing	17	1.41	.51	VLE
18	E-books	17	1.35	.70	VLE
19	E-journals	17	1.65	.86	LE
20	Digital Library	17	1.76	.97	LE
21	Google Classrooms	17	1.71	.77	LE
22	WhatsApp	17	2.47	1.18	LE
23	Zoom	17	1.88	.49	LE
24	Skype	17	1.53	.72	LE
25	Facebook Messenger	17	2.41	.87	LE
	Cluster mean	**17**	**1.86**	**.42**	**Low Extent**

Result in table 3 above shows the extent of basic science teachers' utilization of synchronous and asynchronous e-learning facilities. The cluster mean of 1.86 which lies within the real limit of 1.5-2.49 indicates that basic science teachers only utilize synchronous and asynchronous e-learning facilities to a low extent. The extent of the utilization of these facilities by the basic science teachers is only high for audio tapes, desktop computers, laptops and smartphones. The utilization of other facilities is either to a low extent or to a very low extent.

Research question four: What is the influence of gender on basic science teachers' extent of usage of e-learning facilities?

Table 4: *Mean and Standard Deviation of the influence of gender on basic science teachers' usage of synchronous and asynchronous e-learning facilities*

		Male – NO: 07			Female – NO: 10		
S/N	**E-learning Facilities**	$\bar{X}$	***SD***	**Remark**	$\bar{X}$	***SD***	**Remark**
1	Audio Tapes	2.86	.69	HE	2.80	.79	HE
2	Desktop Computer	2.29	.49	LE	2.60	.97	HE
3	Laptop	2.29	.76	LE	2.90	.74	HE
4	Smart Phones	3.14	.69	HE	3.10	1.10	HE
5	E-mail	2.57	.79	HE	2.40	1.08	LE
6	E-book Readers	1.29	.49	VLE	1.30	.48	VLE
7	Flash Drive	1.71	.49	LE	1.70	.68	LE
8	Interactive White Board	1.57	1.13	LE	1.90	1.20	LE
9	Internet Facility/Network	1.57	.54	LE	1.70	.82	LE
10	IPad	1.29	.49	VLE	1.40	.52	VLE
11	Local Area Network	1.29	.49	VLE	1.20	.42	VLE
12	Modem	1.29	.49	VLE	1.70	.68	LE
13	Power Point Software	1.71	.76	LE	1.60	.84	LE
14	Projection Screen	1.71	.76	LE	1.80	1.03	LE
15	Projector	1.29	.76	VLE	1.60	.84	LE
16	Virtual Classroom	1.29	.49	VLE	1.60	.97	LE
17	Video Conferencing	1.29	.49	VLE	1.50	.53	LE
18	E-books	1.29	.76	VLE	1.40	.70	VLE
19	E-journals	1.43	.79	VLE	1.80	.92	LE
20	Digital Library	1.57	.79	LE	1.90	1.10	LE
21	Google Classrooms	1.29	.49	VLE	2.00	.82	LE
22	WhatsApp	3.29	.76	HE	1.90	1.10	LE
23	Zoom	2.00	.58	LE	1.80	.42	LE
24	Skype	1.14	.38	VLE	1.80	.79	LE
25	Facebook Messenger	2.29	.95	LE	2.50	.85	HE
	Cluster mean	**1.78**	**3.9**	**Low Extent**	**1.89**	**.46**	**Low Extent**

The result in table 4 above shows the extent of the influence of gender on basic science teachers' usage of synchronous and asynchronous e-learning facilities. The cluster mean scores of 1.78 and 1.89 of male and female basic science teachers respectively are closer and they both fall within the real limit of 1.5-2.49 indicating low extent of usage of synchronous and asynchronous e-learning facilities.

Research question five: What are the possible factors militating against the effective use of synchronous and asynchronous e-learning facilities?

Table 5: *Mean and Standard Deviation of the possible factors militating against the effective use of synchronous and asynchronous e-learning facilities*

S/N	Item Statement	N	$\bar{X}$	*SD*	Remark
1	Lack of computers	17	1.59	.51	D
2	Poor awareness	17	2.82	.95	A
3	Teachers' resistance to change	17	1.94	.83	D
4	Inadequate infrastructure	17	2.76	.90	A
5	Cost of buying data	17	3.29	.69	A
6	Lack/epileptic power supply	17	3.18	.64	A
7	Low funding of education in Nigeria	17	3.29	.69	A
8	Inadequate skilled manpower	17	3.35	1.00	A
9	Lack of training on the use of e-learning	17	3.06	.66	A
10	Poor network/internet connection	17	3.18	.73	A
11	Fear of using e-learning facilities	17	1.88	.78	D
12	Poor skills for operating e-learning facilities	17	1.53	.62	D
13	Students don't understand concepts taught with e-learning facilities	17	2.65	.70	A
14	My school does not encourage the use of e-learning facilities in teaching	17	1.35	.79	SD
15	The use of e-learning facilities is time consuming	17	1.29	.47	SD
16	It is difficult to find the appropriate virtual classroom to use for basic science classes	17	1.71	.77	D
17	Virtual classrooms are difficult to navigate	17	1.47	.62	SD
18	Basic science students are not conversant with internet-enabled devices	17	1.76	.83	D
	Cluster mean	**17**	**2.35**	**.32**	**Disagree**

Result in Table 5 above shows the possible factors militating against the effective use of synchronous and asynchronous e-learning facilities. The real limit of 2.5-3.49 indicates that some of the factors militating against the effective use of synchronous and asynchronous e-learning facilities are poor awareness, inadequate infrastructure, cost of buying data, low funding, inadequate skilled manpower etc. The real limit of 0.5-2.49 indicates that lack of computers, teachers' resistance to change, fear of using the facilities, poor skills in operating e-learning facilities, and difficult navigation of virtual classrooms, among others are not factors militating against effective use of the e-learning facilities. The cluster mean score of 2.35 shows that majority of the basic science teachers disagreed to most of the items as factors militating against the effective use of synchronous and asynchronous e-learning facilities.

Testing the null hypotheses

Hypothesis one: There is no significant influence of gender on basic science teachers' level of awareness of synchronous and asynchronous e-learning facilities.

Table 6: *The t-test analysis of the difference of gender on basic science teachers' level of awareness of synchronous and asynchronous e-learning facilities*

Gender	N	$\bar{X}$	SD	df	t-value	Sig. (2-tailed)
Male	7	2.93	0.09	15	0.240	0.814
Female	10	2.92	0.17			

From Table3 above, the probability value of 0.814 is greater than 0.05 level of significance at 15df. The null hypothesis is therefore not rejected. This implies that there is no significant difference in the influence of gender on basic science teachers' level of awareness of synchronous and asynchronous e-learning facilities.

Hypothesis two: There is no significant influence of gender on basic science teachers' usage of synchronous and asynchronous e-learning facilities.

Table 7: *The t-test analysis of the difference in gender Basic Science teachers' usage of synchronous and asynchronous e-learning facilities*

Gender	N	$\bar{X}$	SD	df	t-value	Sig. (2-tailed)
Male	7	1.78	0.38	15	-0.605	0.554
Female	10	1.91	0.45			

From Table 6 above, the probability value of 0.554 is greater than 0.05 level of significance at 15 degrees of freedom (df). The null hypothesis is therefore not rejected. This implies that there is no significant influence of gender on basic science teachers' level of awareness of synchronous and asynchronous e-learning facilities.

Discussion of findings

The result of this study revealed that basic science teachers in junior secondary schools inUdenu Local Government Area in Enugu State are aware of synchronous and asynchronous e-learning facilities to a high extent. Most basic science teachers are aware of the synchronous and asynchronous e-learning facilities such as audio tapes, desktop computers, laptops, smartphones, e-mail, e-book readers, flash drives, interactive whiteboards, internet facilities/networks, IPad, modems, PowerPoint, projectors, virtual classroom, video conferencing, e-books, digital library, google classrooms, WhatsApp, Zoom and Facebook messenger. However, their extent of awareness of some other e-learning facilities is low.These facilities include IPad, Local Area Network, e-journals and Skype. Basic science teachers' awareness of the majority of the items outlined as the e-learning facilities is an indication that the teachers are already aware of the global trend, where the uses of ICT resources have become the order of the day in different areas of life. Their high extent of awareness indicates that working with the basic science teachers in

Udenu LGA in Enugu state for the adoption of e-learning in curriculum delivery will not be a much difficult task.

This result is in line with the findings of some earlier research works which also examined the extent of teachers' awareness of e-learning facilities. For instance, Bada and Jita (2021) revealed that teachers are aware of most of the e-learning facilities for teaching secondary school physics. However, the findings differ from that study of Ugwu and Ohimekpen (2015) who reported that a number of teachers are not aware of e-learning resources.The t-test analysis of hypothesis one revealed that teachers' gender has nosignificant influence on their awareness of synchronous and asynchronous e-learning facilitiesVanitha and Alathur (2020).

The findings from Table3 show that the extent of utilization of synchronous and asynchronous e-learning facilities is low. The extent of the utilization of these facilities by basic science teachers is high for audio tapes, desktop computers, laptops and smartphones. The utilization of other facilities is either to a low extent or to a very low extent. The result revealed that most basic science teachers do not use e-learning facilities in curriculum delivery. The implication of this is that basic science teachers in Udenu LGA in Enugu State are still stuck with the traditional methods of teaching which do not yield the best results. These findings are in agreement with Bada and Jita (2021) who concluded that e-learning facilities were not used in teaching secondary school physics in Ondo State.

The hypothesis test also showed that gender has no influence on basic science teachers' extent of usage of e-learning facilities. This is an indication that gender is not a barrier in the utilization of e-learning facilities in curriculum delivery. This finding differs from Okazaki and Santos (2012) who in their study to examine factors influencing e-learning adoption and the moderating role of gender revealed that gender affects the utilization of e-learning facilities.

The findings from Table5 show that some of the factors militating against the effective use of synchronous and asynchronous e-learning facilities for curriculum delivery include inadequate infrastructure, cost of buying data, lack/epileptic power supply, low funding of education in Nigeria, inadequate skilled manpower and lack of training on the use of e-learning. Lack of computers, teachers' resistance to change, fear of using the facilities, and poor skills in operating e-learning facilities. The majority of the basic science teachers disagreed with most of the items as factors militating against the effective use of synchronous and asynchronous e-learning facilities. However, the possible factors militating against the effective use of e-learning facilities need to be well managed if basic science teachers in Udenu LGA in Enugu state are to key into the global trend of using e-learning facilities for effective and efficient lesson delivery.

These findings are in agreement with Hassan and Aziz (2019) who revealed that teachers face various challenges in using ICT.

Conclusion

From the findings of the study and the discussions, the following conclusions were drawn: basic science teachers are aware of these e-learning facilities to a high extent. Teacher gender does not affect the awareness of synchronous and asynchronous e-learning facilities. Basic science teachers only use a few e-learning facilities in teaching basic

science students. Both male and female basic science teachers use synchronous and asynchronous e-learning facilities to a low extent.

Possible factors militating against the effective use of synchronous and asynchronous e-learning facilities are poor awareness, inadequate infrastructure, cost of buying data, low funding, inadequate skilled manpower, etc. Teachers' gender does not affect the usage of synchronous and asynchronous e-learning facilities in teaching basic science.

Recommendations

Based on the findings of the study the following recommendations are made:

1. Enugu state government should, as a matter of urgency, make computer literacy compulsory for all the teachers in her employ.
2. It was observed that so many e-learning facilities are lacking in junior secondary schools, therefore, the government should do their best to provide more e-learning facilities across the junior secondary schools.
3. Regular in-service training and workshops on the usage of e-learning facilities in lesson delivery should be organized for basic science teachers since most of the teachers are already aware of the e-learning facilities but do not utilize them in teaching.
4. The Local and State government should provide internet access subscriptions in all secondary schools, and provide alternative sources of power supplye.g.,solar energy in all secondary schools.

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