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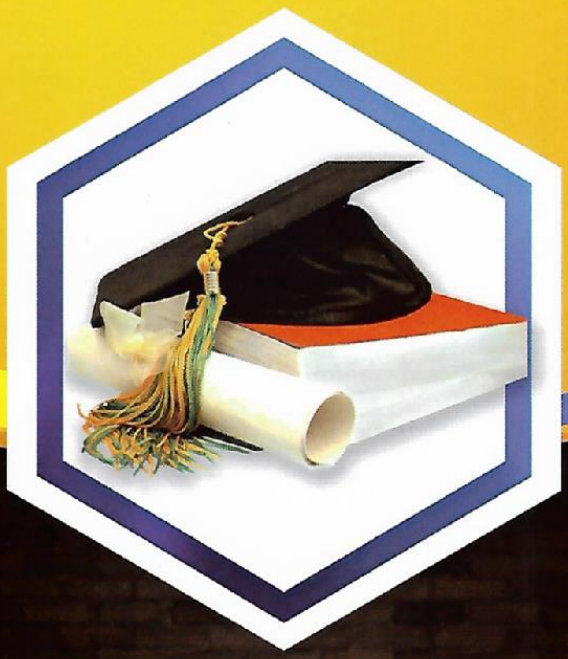

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LEVEL OF UTILIZATION OF E-LEARNING IN TEACHING AND LEARNING OF SELECTED PROGRAMMES IN UNIVERSITIES IN ENUGU STATE, NIGERIA

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Abstract

Level of utilization of e-learning in teaching and learning of selected programmes in universities by Computer Educators(CE) and Mathematics Educators(ME) have been examined .This study is made up of 46 Computer and Mathematics Educators (24 CE and 22 ME) from two universities purposely selected from Enugu State, Nigeria. The entire population was used due to manageable size. Three research questions and three null hypotheses guided the study. A structured questionnaire made up of 20items was used to collect data on the level of utilization of e-learning by the university educators in teaching and learning. The 20-item instrument Computer/Mathematics E-learning activities (COMATEL) with internal consistency of 0.79 was obtained using cronbach alpha. The research questions were answered using means and standard deviations while t-test for independent variables was used for the formulated null hypotheses at 0.05 level of significance. The result revealed among others that Computer Educators utilized online/offline e-learning activities in teaching and learning more than Mathematics Educators. However, significant difference existed in only one item. It was also revealed that there is need for improvement on the level of utilization of e-learning items as seen in the result by both groups of lecturers. It was recommended based on the result that more

trainings on online/offline e-learning be organized for all university Educators especially *Mathematics Educators and Computer Educators that train both other educators and future teachers in computer usage for basic- scientific and technological development.*

Keywords: E-learning in education, teaching, learning, utilization, Computer and Mathematics Education.

Introduction

Background of the Study

Electronic Learning alias e-Learning play a vital role in scientific and technological development everywhere in this technological era. E-Learning makes use of offline/online computer and mobile technologies in teaching and learning. Online e-learning makes use of Internet while offline e-learning makes use of already downloaded materials. In line with this, Ally and Tsinakos (2014) indicated that through e-learning, students are given ability to learn in both offline and online. This implies that e-learning can take place with or without the Internet provided computer or other related devices are used. The development in technology has made it imperative for educational organizations and the industries to constantly upgrade their strategies and policies in teaching and learning as a way to remain effective. Technology develops the human capacity which is the key for sustainable economy. The study of the skills and their application is therefore necessary in e-learning since it is a self-study learning method. The skills are found in activities carried out online, offline or both. Online learning exists when internet is used while offline learning exists when one's computer is not connected to the internet. Technical education encompasses e-learning which helps people learn in ways that are easier and faster. The e-learning tools like hardware and software or the online services enable users to create course, stimulate or do other jobs. These tools need to be used well or operated with care in order to get a task done. Acquiring these skills is the aim of Technical Education. This makes e-learning and technical education to go hand in hand to get a job done by teachers in both online and offline. Teachers' job using e-learning therefore can be online, offline or both.

Teachers and students play vital role in education and education is a process of imparting knowledge to students by teachers. Teaching and learning processes can take place inside and outside a classroom using smart phone or computer system. According to Anumudu (2010), success in education needs good teaching

method which comprises the principles and methods used for instruction. The methods are implemented by teachers to achieve the desired learning by students (Ngwu, 2007). It is generally stated that no education system can rise above the quality of its teachers as the standard of teachers invariably affects the performance of the pupils and students (FME, 2009). This implies that a well-informed teacher informs the students and learning takes place when students, who are learners, change in desired direction.

Efforts are constantly being made by educators in the field to improve the quality of teachers//lecturers through training, re-training, workshops and conferences. Despite the efforts being made, mass failures still exist in key subjects such as English, Mathematics, biology & Computer Studies in external examinations year after year (Azuka,2013; WAEC,2015).There is need to proffer solution. Many programmes are carried out in universities but the researchers selected Computer and Mathematics Education programmes, which involve practical teaching. Lecturers of these programmes carry out data analyses/interpretation of results after research for both themselves and for other lecturers. Charles Babbage, the father of Computer, was a Mathematician (Adebiyi, 2010). Adebiyi brought the two subjects – Computer and Mathematics Education together by indicating that Charles Babbage, otherwise called father of Computer, was a British Mathematician and inventor, who designed and built mechanical computing machine on principles that predicted the modern electronic Computer. In the 1820s, Babbage began developing Difference Engine, a mechanical device that can perform simple mathematical calculations, but was unable to complete it due to lack of funding. The work was however completed in 1991 by another Mathematical Scientist from Britain and the machine worked perfectly well, thereby proving that Babbage's design was a perfect one. This implies that Computer Education is a brain child of Mathematics Education. One can learn from the other and the two can work as a team to move Computer learning activities forward. It, therefore, becomes necessary to explore level of utilization of different activities in online/offline e-Learning in teaching and learning by Computer Education (CE) and Mathematics Education (ME) lecturers. Teachers in these areas ought to teach others how to teach using computer as a medium of instruction.

This study will be beneficial to all educators in the field, especially Computer and Mathematics Educators, as some e-learning activities: online, offline

& online/offline will be seen. It is very apt at a time like this, when students at all levels are seen with mobile phones, laptops and other electronic gadgets, clicking the key board and viewing one form of application and the other. Unfortunately, these gadgets are not often used for learning purposes. One wonders when these students read to enable good grades. It is, therefore, the duty of teachers, as curriculum implementers, to redirect students aright on the correct use of these gadgets in learning processes, where online and/or offline e-learning can be utilized.

Information technologies that promote understanding by students are needed to solve the problem of year by year poor performance by students in science and technological subjects which has Mathematics and Computer Studies as the basics, driving other subjects such as Biology and Technical Education (directly or indirectly).Biology involves life, while Technology involves the acquisition of practical skills used in Computer and Mathematics Education. Everyone, therefore, utilizes Mathematics and Computer Education concepts in teaching and learning. Manipulation of data such as numeric data is a common feature in the two. Also, the two programmes base their measurements in the four scales of measurements namely nominal, ordinal, interval and ratio scales. No wonder some universities have the two subjects in one Department.

Computer and Mathematics Educators ought to utilize online/ offline e-learning activities in teaching and learning to improve students' performance in all subjects including Biology. According to Ude (2011), the knowledge of Biology as a subject by secondary school students makes the students well informed and motivated to assume roles in which the practical and theoretical aspects are used in unravelling some basic problems of life like sickle cell anaemia and albinism. It has also been established that population ecology which is a branch of biology needs the knowledge of mathematics by both the teacher and the students for effective teaching and learning. This can be seen in the determination of population density where the necessity of mathematics is glaring as well as in the development of a simplified framework for studying nature's complex ecological systems. Ecologists are often interested in how populations, communities and ecosystem change in space and time; and dynamical systems theory is a branch of mathematics that deals with dynamics. No wonder Onah (2015) joined other Educators in the field in calling Mathematics queen of all science subjects and king of all Arts subjects.

Utilization and use can be interchangeable in teaching and learning, which means that there are other materials in teaching and learning in addition to the ones being discussed for effective teaching by a teacher. According to Daintith (2004), mobile learning or m-learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT) to enable learning anytime and anywhere, online and or offline. Daintith indicated that the following activities are seen in mobile learning: using mobile learning to access educational resources; connect with others; create content both inside and outside classroom; make efforts to support broad educational goals such as effective administration of the school system; and improved communication between schools and families. One can, therefore, view mobile learning as learning across multiple contexts, through social and content interactions, using personal electronic devices. This is why "Bring Your Own Device" (BYOD) is emphasized in teaching computer concepts offline, online or both.

Some authors view mobile learning as a form of distance education; that m-learners use mobile device educational technology at their convenient time, in both offline and online modes .Distance learning, according to NTI (2015), is the use of offline and online facilities in learning from a distance. Distance learning is also the use of communication facilities in form of interactive websites, e-mailing, audio/video-teleconferencing in e-classroom, audacity software in PowerPoint Presentation in support of teaching and learning. In line with this, Midgley (2016) in answering the question 'what is offline learning?' stated that offline learning is a way of learning remotely without being in regular face-to-face contact with a teacher in a classroom. Using a practical example, Midgley indicated that the advent of internet and wide spread of the use of computer has made it possible for huge growth in distantly delivered tuition and study. Midgley also stated that in the US, more than 270,000 undergraduates were, at that time, taking their first degrees via offline learning, together with some 108,000 postgraduate students.

Mobile learning and distance learning are also seen in online. Offline e-learning. Rosenberg in Onah (2015) viewed e-learning as the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance. This means that Internet facilities must be present before e-learning can take place thereby suggesting online learning. However, e-learning has many definitions. Some educators view the concept as learning with computer in an

online environment while others define it to be learning in an offline environment with computer as the medium for downloading materials from the Internet. In this research, learning outcome from online, offline and online/offline activities are part of e -learning since computer is used as a medium of instruction in each case. The only difference is on the type of environment: offline or online environment. Any lecturer can use one's smart phone or laptop with Modern for online teaching and learning or to download materials for online instructions. One can also use already downloaded materials for offline learning.

In this research, learning using e-learning activities can be offline or online. Also, mobile device can be used. Citing an example for instance, there is a centre for distance e-learning (CDel) in University of Nigeria Nsukka. Here, a facilitator can employ mobile smart phone in teaching. Hence, learners can follow suit. In this context as earlier stated, the only difference between online, offline, online/offline e-learning activities in the provision of Internet facilities for teaching and learning materials when learning is taking place by the students. Activity mainly involved in online, offline, online/offline e-learning can be used as a focus in each case. Some of the activities are, however, interwoven especially in online/offline e-learning activities. Learning is a dynamic process because one continues to learn until death.

Since Computer and Mathematics Education lecturers can facilitate learning processes using computer as a medium of instruction, carryout data analyses/interpretation of results after research for both themselves and other lecturers more often than others, it becomes necessary to explore levels of utilization of different activities online/offline online, offline and online/offline e-learning in teaching and learning of selected programmes in Universities in Enugu State. This has necessitated for this research work to examine and proffer solution.

Statement of the Problem

Mass failures of students have been recorded, especially in the Science and Technological subjects including Computer studies and Mathematics. This constitutes worries to Educators in the field. Most students are also found to be using mobile phones and laptops. However, students use these gadgets mainly for social activities. If teachers, especially Computer and Mathematics Educators, utilize online/offline e-learning activities in teaching and learning, students may be

redirected to the right use of their electronic gadgets, as it concerns learning. Things may change in the Education industry in the positive direction. The question now is: Will the use of Computer and Mathematics E-learning (COMATEL) make any impart?

Purpose of the Study

The main purpose of this study is to find out the level of utilization of e-learning in teaching and learning of selected programmes in universities. Specifically, this study sought to determine: the level in which Computer Educators and Mathematics Educators' University lecturers utilize:

1. Online e-learning activities in teaching and learning.
2. Offline e-learning activities in teaching and learning.
3. Online/offline .e-learning activities in teaching and learning.

Research Questions

1. What is the level of utilization of online e-learning activities in teaching and learning by Computer and Mathematics Education lecturers?
2. What is the level of utilization of offline e-learning activities in teaching and learning by Computer and Mathematics Education lecturers?
3. What is the level of utilization of online/offline e-learning activities in teaching and learning by Computer and Mathematics Education lecturers?

Hypotheses

The following null Hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean response of Computer Educators and Mathematics Educators on the use of online e-learning activities in teaching and learning.
2. There is no significant difference in the mean responses of Computer Educators and Mathematics Educators on the use of offline e-learning activities in teaching and learning.
3. There is no significant difference in the mean responses of Computer Educators and Mathematics Educators on the use of online/offline e- learning activities in teaching and learning.

Methodology

A descriptive survey design was adopted in this study to determine the level of utilization of online, offline, online/offline e-learning activities in teaching and learning by Computer Education and Mathematics Education University lecturers in Enugu state. Purposive random sampling was employed in selecting two Universities in Enugu state that have Computer and Mathematics Education in the same Department, called Science Education Department. The Universities are Enugu State University of Science& Technology (ESUT) and National Open University (NAOU), Enugu State branch. The population comprised of 46 (24CE, 22ME) Educators, 27 CE & ME from ESUT, and 19 CE &ME lecturers from NAOU. The entire population of 46 Educators was used due to manageable size. The Mathematics, Computer E-learning (COMATEL) instrument used was adapted in a four point likert scale. The response categories are as follows: Very Great Use (VGU), Great Use (GU), Low Use (LU) and Very Low Use (VLU), with weightings: 4points, 3points, 2points and 1point respectively. The instrument COMATEL was face validated by 5 experts in the field (3CE and 2ME experts) from the University of Nigeria Nsukka. COMATEL was trial tested in a similar department from Ebonyi State University and the reliability coefficient was found to be 0.79 using cronbach alpha.

The copies of COMATEL were distributed to respondents by the researchers with the help of two research assistants from each of the two universities studied, and retrieved on the spot. Data collected was analysed using mean for research questions, and t-test statistics was used for testing the null hypotheses at 0.05 level of significance.Mean≥2.50 implies Great Use (GU), while Mean ≤2.49 signifies Low Use(LU).Critical t-test from table = 2.02 at 44 degrees of freedom(i.e. 24+22 -2= 44). The null hypotheses were upheld when t-calculated was less than critical t-value of 2.02 (i.e. t-cal. =2.02) but rejected when the t-calculated was greater than critical t-value of 2.02 for 44 degrees of freedom.

Result

Research Question 1: What is the level of utilization of online e-learning activities in teaching and learning by Computer and Mathematics Education lecturers?

Table1:
Mean, standard deviation and t-test results of Lecturers on the level of utilization of online e-learning activity in support of teaching and learning.
Use of e- learning involving online to:

		Computer Educators (CE)			Mathematics Educators(ME)				
								t-crit=2.02	
S/N	ITEMS	Mean (M1)	SD1	RMK (RQ1)	Mean (M2)	SD2	RMK (RQ2)	t-cal.	RMK (HO1)
1.	Access educational resources Online.	3.12	0.64	GU	2.95	0.99	GU	0.06	NS
2.	Connect with others through e-mails.	2.83	1.72	GU	2.78	1.09	GU	0.18	NS
3.	Download different online strategies for teaching.	3.17	0.75	GU	3.00	0.97	GU	0.07	NS
4.	Develop students' capacities through Internet.	3.00	1.10	GU	2.97	1.05	GU	0.12	NS
5.	Supervise students' projects online.	2.97	1.17	GU	1.95	1.15	GU	0.14	NS
6.	Access students' assignment online.	3.37	1.51	GU	3.20	0.96	GU	0.09	NS

Key to tables 1, 2& 3:
Degrees of freedom =n1+n2-2= 22+24-2 = 44 for this research, giving a **t-critical** value of 2.02 at 0.05 level of significance for two tailed test from critical t-value(i.e **t-crit**=2.02).
M1, SD1 & n1 imply Mean, Standard deviation & number for Computer Educators (CE).
M2, SD2 & n2 imply Mean, Standard deviation &number for Mathematics Educators (ME)

Result in Table 1 indicated that in all the six items, both groups of lecturers utilized online activities in teaching and learning. The mean for each group in each item is above 2.50 which is the criterion mean in a 4point scale, showing high level of use [i.e. great use (GU)].T-test calculated values in each activity is less than the table value of t (ie t-critical) in each activity, signifying that there is no significant difference on their mean responses.

Research Question2: What is the level of utilization of offline e-learning activity in teaching and learning by Computer and Mathematics Education Lecturers?

Table2:

Mean, standard deviation and t-test results of Lecturers on the level of utilization of offline e-learning activity in teaching and learning.

Use of offline e-learning to:

		Computer Educators (CE)			**Mathematics** Educators (ME)				**t-crit=2.02**
S/N	ITEMS	Mean (M1)	SD1	RMK (RQ3)	Mean (M2)	SD2	RMK (RQ3)	t-cal.	RMK (HO2)
7.	Study downloaded materials without Internet.	3.34	0.52	GU	3.33	0.92	GU	0.01	NS
8.	Practice downloaded MS Excel concepts.	2.77	1.17	GU	2.69	1.12	GU	0.19	NS
9.	Receive help from offline mails.	3.05	1.05	GU	3.02	0.95	GU	0.06	NS
10.	Teach students construction of SMS offline.	3.20	0.95	GU	3.20	0.91	GU	0.01	NS
11.	Interact with students in table creation.	2.71	1.13	GU	2.69	1.12	GU	0.08	NS
12.	Connect with students by teaching genotype.	2.70	1.16	GU	2.67	1.09	GU	0.13	NS

Result in Table 2 indicated that in all the six items, both groups of lecturers utilized offline e-learning activities in teaching and learning. The mean for each group in each item is above 2.50 which is the criterion mean in a 4point scale, showing high level of use [great use (GU)]; and t-calculated value in each activity is less than the table value of t (t-crit=2.02) in each activity, signifying that there is no significant difference in the mean achievement scores of both lecturers – Computer Educators and Mathematics Educators – in online/offline e-learning activities.

Research Question 3: What is the level of utilization of online/offline e-learning activity in teaching and learning by Computer and Mathematics Education Lecturers?

Table3: Mean, standard deviation and t-test results of Lecturers on the level of utilization of online/offline e- learning activity in teaching and learning.

Use of online/offline e-learning activities in:

ComputerEducators(CE) MathematicsEducation(ME)

t-crit=2.02

S/N	ITEMS	Mean (M1)	SD1	RMK (RQ1)	Mean (M2)	SD2	RMK (RQ1)	t-cal.	RMK (HO3)
13.	Asking students what their goals are using information from the Net.	3.30	0.97	GU	3.29	0.87	GU	0.05	NS
14.	Triggering prior knowledge in an online environment using CAI package.	2.70	0.92	GU	2.69	0.90	GU	0.01	NS
15.	Using real life scenarios from online/ offline materials in PowerPoint slides.	3.31	0.89	GU	3.30	0.95	GU	0.02	NS
16.	Retrieving downloaded materials in CD/Flash.	2.71	1.14	GU	2.69	1.17	GU	0.01	NS
17.	Finding out what students are and stimulating them to desire more through audacity usage and web uploading.	2.90	0.82	GU	2.89	0.88	GU	0.09	NS
18.	Showing students how to learn in both offline/online environments.	2.85	0.99	GU	2.84	1.00	GU	0.01	NS
19.	Connecting/interacting with the students practically.	3.97	1.10	GU	2.45	1.32	LU	4.07	S
20.	Asking students to share their challenges with the class using phones or laptops.	2.60	1.21	GU	2.58	1.25	GU	0.09	NS

Table 3 result indicated that for all the 8 items for online/offline e-learning, both groups of lecturers utilized e- learning activities in teaching and learning in 7items.For item 19, Computer Educators also registered Great Use (GU) but Mathematics Educators registered Low Use (LU). The mean for each group in each of the 7 items is above 2.50 while item 19 had a mean value of 2.45 which is below 2.50. Also, hypothesis in each case showed no significant difference since calculated t value presented in the table is less than t-critical value of 2.02 in each of the 7items.Item 19 needs to be addressed especially on the part of Mathematics Education lecturers that registered Low use(LU). There was also a significant difference in the mean responses of Computer Educators and Mathematics Educators on e-learning activity involving connecting and interacting with the students practically, as seen in item 19. This is because t-calculated value of 4.07 is greater than critical t value of 2.02, for only item 19.

Discussion of Results

The result in Table 1 shows that online e-learning activities were utilized by both Computer and Mathematics Education lecturers in teaching and learning. There was no significant difference in the mean responses of two groups of lecturers in the level of the use of online e-learning while teaching. Similarly, result in Table 2 shows that offline e-learning activities were utilized by the two groups of lecturers, and there was no significant difference in the mean responses of the two groups of lecturers in the level of use of distance learning while teaching. Result in Table 3, however, shows that the two groups of lecturers utilized online/offline e-learning activities while teaching the students in some items, but there was a significant difference in the mean response of Computer and Mathematics Education lecturers in e-learning activities involving connecting and interacting with the students while teaching. The significant difference was observed in favour of Computer Education lecturers who utilized the item more than the Mathematics Education lecturers. Although both groups of lecturers recorded great use in many items, Mathematics Educators had lower mean in many items, but there was no significant difference in the mean response of the two groups except in item 19.

Generally, the finding in each case is in agreement with Adebiyi (2010) who opined that Charles Babbage, alias the father of Computer, was a British Mathematician who designed and built mechanical computing machine on the principles that predicted the modern electronic Computer. The two groups can, therefore, work harmoniously to move basic computer concepts to higher level. In line with this, Olaitan and Ekong (2015) stated that there is need for expert functionality for facilitated problem-solving. The authors are of the view that Mathematicians can formulate mathematically related problems; that effective solution of the problems justifies the need for integration of experts into a team called interdisciplinary team. This team would be in a position to design different strategies for solving the problems depending on which of the specialized area the problem emanated from. Similarly, interdisciplinary subject are to be encouraged by many educators in the field.

In the words of Obe (2014), the interdisciplinary nature of any text or journal singles it as a unique write up which is full of advantages. According to Onah&Onah (2016), advantages of Computer Aided Learning (CAL) and Computer Aided Instruction (CAI) demand the need to create computer awareness

everywhere by all and sundry.Also, Onah&Obi (2016) developed ELEPAN package in Computer Networking and found the package to be very effective in teaching students basic concepts in Computer Networking. It was found to expose students more to mobile, distance and e-learning activities needed for scientific and technological development. Cook &Smith (2009) also opined that mobile learning can be used in many ways.

At this juncture, one can state that interdisciplinary approach of problem-solving makes for effectiveness and every lecturer needs to utilize mobile, distance and e-learning in support of teaching and learning, especially Computer Education and Mathematics Education lecturers that teach other basic computer concepts. The findings were also in line with Brindly, Walti & Blaschke (2009) who listed some tips to improve online learners. The researchers are of the view that computer usage ought to teach both lecturers and students current e-learning activities involved in teaching and learning. Teachers can introduce practically how to include audacity in PowerPoint presentation to enrich each slide with audio presentation while teaching is going on. This is apt since the result revealed lower level of utilization by Mathematics educators in e-learning activity involving practical.

More practical work are needed by all teachers especially Mathematics Educators that teach computer concepts to others along with Computer Educators. When this is done, Scientific and technological development is expected since Computer and Mathematics Educators will expose students to needed online and/or offline e-learning activities for scientific and technological development. Biology and Vocational Technical Educators can follow suit.

Conclusion

Based on the findings of the study, there is great need to devise means of utilizing online, offline and online/offline e-learning activities in teaching and learning at all education level. Students will be redirected in the use of their gadgets – laptops and smart phones – positively, to enhance learning. Computer and Mathematics Educators can work hand in hand in teaching online, offline and online/offline e-learning activities practically. Utilization of online, offline and online/offline e-learning in teaching and learning has positive effects generally and ought to be encouraged by all and sundry for scientific and technological development in Enugu state particularly and Nigeria at large.

Recommendations

1. Computer and Mathematics Educators should incorporate and encourage activities that promote the utilization of online e-learning, via teaching their students in this line, using the devices available to the students. (i.e. mobile phones and laptops.)
2. Computer and Mathematics Educators, in collaboration with the government, also need to train and retrain teachers at all levels of education through organized conferences and workshops where awareness on the benefits of offline e-learning would be created. Dissemination of information can be done on how to utilize offline e-learning for national development both scientifically and technologically.
3. Interdisciplinary research should be encouraged by researchers for information sharing and production of quality research work on online/offline e-learning activities. Computer and Mathematics educators should teach students practically. Other science/vocational teachers and student-teachers in the field of study can equally be taught so as to teach online/offline e-learning to all and sundry.

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