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## **PRE-SERVICE TEACHERS' PERCEPTIONS TOWARDS ROLE OF E-LEARNING IN SCIENCE EDUCATION IN TEACHER TRAINING INSTITUTIONS**

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### **ABSTRACT**

The study investigated the perception of pre-service teachers towards the role of E-learning in science education in teacher training institutions. The study was carried out in Alvan Ikoku Federal college of Education Owerri, Imo state Nigeria. The sample consists of 350 final year science pre-service teachers drawn through stratified random sampling technique. The descriptive survey research design was adopted in carrying out the study. The instrument used

to gather data required for the study was researchers made Likert four-point type of questionnaire titled “Role of E-learning in Science Education (RESE)”. The instrument had reliability coefficient of 0.82 determined using the Cronbach’s alpha formula. The data generated were analyzed using mean and standard deviation to answer research questions while the hypothesis was tested using t-test statistical tool at 0.05 level of significance. The result of the study revealed that pre-service teachers had positive perceptions towards the role of e-learning in science education as it helped in extended learning, individual learning, access to learning materials, understanding of course content and others. Based on the result of the study it was recommended that, the application of e-learning should be incorporated in the training of science pre-service science teachers to enable them understand their course materials.

**KEY WORDS:** Pre-service teachers, Role, E-learning, Science education

### INTRODUCTION

Teacher training institutions in Nigeria are saddled with the responsibility of training would be science teachers otherwise called pre-service science teachers to take up the task of teaching at various levels of education. This is not without series of difficulties associated with such task in terms of effective dissemination of information in the classroom. This may come in terms of difficulty in handling the population of the students, lack of resources for teaching, shortage of manpower, unfavourable learning environments, lack of support from management or government, use of inappropriate methodology and other associated difficulties. The explosive growth of technology has given way to new environments of learning that can reduce some of the problems militating against effective teaching and learning at higher education level. According to Doung Van (2016) e-learning has become a vital source of expansion and studying in education. Due to the opportunities created by e-learning, teaching and learning can now happen at any time and in anywhere. The new media like the internet has become one of the vital ways to make available resources for research and learning for both teachers and students to share and acquire information. Fry (2001) stated that Technology-based e-learning encompasses the use of the internet and other important technologies to produce materials for learning, teach learners, and also regulate courses in an organization.

E-learning is defined as the application of information and communication technology facilities in accessing online teaching and learning resources including research information. Marcus (2008) defined it as a learning process created by interaction with digitally delivered content, network-based services and tutoring support. E-learning is any technologically mediated learning using computers whether from a distance or in face to face classroom setting (computer assisted learning), it is a shift from traditional education or training to ICT-based personalized, flexible, individual, self-organized, collaborative learning based on a community of learners, teachers, facilitators, experts (Olojo,Adewumi & Ajisola; 2012).

According to Sale in Adu, Eze, Salako, and Nyangechi(2013)e-learning is the use of electronic technology to deliver education and training applications, monitor learner's performance and report learner's progress. Also, Hedge and Hayward (2004), defined it as an innovative approach for delivering electronically mediated, well-designed, learner-centered and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in concern with instructional design principles. OECD (2005) defined e-learning as the use of information and communication technologies in diverse processes of education to support and enhance learning in institutions of higher education, and includes the usage of information and communication technology as a complement to traditional classrooms, online learning or mixing the two modes. Hollow and ICWE in Osuafor and Emeji (2015) refer to e-learning as a wide variety of activities that incorporate Information Communication and Technology (ICT) within education. These activities consist of a wide variety of terms that describe educational technology that electronically or technologically supports teaching and learning. These include, technology-enhanced learning (TEL), computer-based instruction (CBI), computer-managed instruction(CMI), 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 environment (VLE), m-learning and digital education. According to Nwana (2012), e-learning in education is the wholesome integration of modern telecommunication equipment, particularly the internet into the education system.

E-learning environment has opened a lot of avenues for the study of science at various stages of education with more prominence at higher institutions. For instance, with e-learning pre-service teachers have access to learning materials, distance is not a barrier towards learning of science, time of study is no longer an issue, collaborative learning is enhanced in e-learning environment and methods of learning no longer retards the learning of science. Kajetanowicz & Wierzejewski in Etukudo (2012) pinpointed that e-learning has no rival when it comes to generation of intrinsic motivation and initiation of organized active learning in mathematics and science education. They equally see e-learning as an efficient means of promoting self-study cum frequent testing in the form of formative evaluation which engender proper monitoring of educational progress and periodical achievement. NSTA (2016) indicated that e-learning encompasses traditional classroom instruction that incorporates the planned and effective use of collaborative and/or interactive digital tools and resources, blended learning experiences that incorporate various combinations of technology-mediated and traditional classroom instruction, distance delivered courses or programs, as well as the rich collaboration and discourse enabled through online learning networks and communities. Hollow and ICWE (2009) noted that e-learning provides access to quality open educational resources, fosters information exchange and sharing, enables teachers to invest in more innovative teaching, students are active on their own learning, bridges the gap between learner and facilitator and improves the teaching methods. E-learning helps eliminate barriers

that have the potentials of hindering participation including the fear of talking to other learners. E-learning motivates students to interact with each other, as well as exchange and respect different point of views. E-learning eases communication and also improves the relationships that sustain learning (Arkorful, & Abaidoo, 2014). According to Olojo, Adewumi and Ajisola (2012) E-learning technologies offer educators a new paradigm based on adult learning theory, which states that adults learn by relating new learning to past experiences, by linking learning to specific needs, and by practically applying learning, resulting in more effective and efficient learning experiences.

The application of e-learning in content delivery can be in two separate ways which includes the synchronous and asynchronous delivery methods. Synchronous training involves the collaboration of participants with E-mentor via the virtual platform in real time. In other words, synchronous training provides facilities to the participants to discuss with the mentor and also among themselves via the e-classroom with the use/help of tools such as the videoconference and/or chat rooms. Asynchronous mode gives the opportunity to the participants to discuss with the instructors or teachers/mentor as well as among themselves over the internet on his/her own pace without live interaction with the instructor. In this way students are able to learn at a time that suits them the most. However, immediate feedback from instructors, their colleague learners is not receivable (Algahtani, 2011, Almosa, & Almubarak, 2005)

NSTA (2016) supports and makes the following declarations regarding e-learning as a component of teacher preparation and professional learning:

- Teachers, science supervisors, district leaders, and higher education faculty should be educated consumers of online opportunities, programs, and tools to effectively evaluate their quality and to encourage both pre-service and in-service teachers to better understand the value of e-learning.
- Science educators should use online tools to promote sharing of information, discourse, critical analysis, and collaboration between students and teachers at various locations throughout the world.
- School districts and science supervisors should seek, evaluate, and provide teachers of science with high-quality, meaningful learning experiences employing e-learning technologies.
- E-learning experiences should provide teachers of science with accurate, up-to date information relating to science content and pedagogy.
- E-learning experiences should employ three-dimensional teaching and learning strategies and make their use explicit.

- E-learning experiences should give educators opportunities to reflect on the implications of what they are learning to their own practice.

The need to improve science education and its learning process in the nations' tertiary institutions makes it pertinent to embrace technological avenues that will ensure a deviation from the traditional approaches that has been unproductive. According to Nwoke, Ikwuanusi and Ugo (2016) the e-learning is an improvement on the old way of teaching and learning science which is teacher centred and should be given great attention in other to improve the nation science education.

### **STATEMENT OF THE PROBLEM**

Globally, technology has continued to broaden the way teaching and learning is carried out. Many institutions are already keyed into use of online tools in learning and this has reportedly been effective. Keeton (2004) interviewed faculty in postsecondary institutions and rated the effectiveness of online instructional strategies. These instructors gave higher ratings to online instructional strategies that "create an environment that supports and encourages inquiry", "broaden the learner's experience of the subject matter" and "elicit active and critical reflection by learners on their growing experience base".

Based on the foregoing, this study was carried out to determine pre-service teachers' perceptions on the role of e-learning on science education in teacher training institutions.

### **PURPOSE OF THE STUDY**

The main purpose of the study was to determine pre-service teachers' perceptions on the role of e-learning in science education in teacher training institutions. Specifically, the study will determine:

1. The role of e-learning in science education in teacher training institutions.
2. Whether there is a difference between the mean responses of NCE and Degree pre-service teachers on the role of e-learning in science education in teacher training institutions.

### **RESEARCH QUESTIONS**

The following research questions were formulated to guide the study

1. What are the roles of e-learning in science education in teacher training institutions?
2. What is the difference between the response mean of NCE and Degree pre-service teachers on the role of e-learning in science education in teacher training institutions?

### **HYPOTHESIS**

The following hypothesis was formulated to guide the study

**H<sub>01</sub>:** There is no significant difference between the response mean of NCE and Degree pre-service teachers on the role of e-learning in science education in teacher training institutions.

### METHODOLOGY

The descriptive survey research design was adopted in carrying out the study to determine the perceptions of pre-service teachers on the role of e-learning in science education in teacher training institutions. The population of the study consists of all the final year NCE and Degree pre-service teachers in school of science Alvan Ikoku Federal College of Education Owerri, Imo State Nigeria. A sample of 350 degrees and NCE pre-service science teachers were drawn through stratified random sampling technique. This consists of sixty (60) NCE and two hundred and ninety (290) final year degree science pre-service teachers. The instrument for data collection was a 16-item Likert 4-point type questionnaire titled "Role of E-learning in Science Education(RESE)" drawn by the researchers. It was divided into two sections, section one contained respondents' demographic variables while section two contained items relevant to the role of e-learning in science education. The responses were ranged as follows: Strongly Agree (SA)=4points, Agree (A)=3points, Strongly Disagree(SD)=2points, Disagree(D)=1point. The face and content validity of the instrument were determined by 2 science educationist and a measurement and evaluation expert from the same institution, their inputs guided the restructuring of the instrument. To determine the reliability of the instrument, it was administered to 30 pre-service teachers outside the selected sample. The result gave a reliability coefficient of 0.81 determined using Cronbach's alpha method. To administer the instrument, the researchers approached the representatives of the various groups selected for the study and explained the purpose of the study and assured them of confidentiality of any information given tendered for the study. The instrument was distributed to the respondents through the help of their representatives; the instruments were filled out and returned to the researchers on the spot. All the instruments distributed were recovered and the entire process lasted for 2 days.

The data generated were analysed using mean and standard deviation to answer research questions. Any item mean within and above the criterion mean of 2.50 was accepted while any below was rejected. The hypothesis was tested at 0.05 level of significance using t-test statistical tool.

### RESULT

Research question 1: What are the roles of e-learning in science education in teacher training institutions?

**Table 1:** Summary of pre-service science teachers’ responses

S/N	Item	Mean	SD	Remark
1	E-learning enhances access to course materials	<b>3.21</b>	<b>0.67</b>	<b>Accept</b>
2	e-learning enhances pre-service teachers’ interest to learn	<b>3.02</b>	<b>0.71</b>	“
3	Pre-service teachers can learn at their own pace through e-learning environment	<b>3.12</b>	<b>0.62</b>	“
4	e-learning environment motivates pre-service teachers to learn	<b>3.30</b>	<b>0.81</b>	“
5	e-learning environment grants pre-service teachers access to virtual laboratory	<b>3.00</b>	<b>1.00</b>	“
6	e-learning enhances pre-service teachers’ performance and retention in science courses	<b>2.82</b>	<b>1.05</b>	“
7	e-learning ensures that pre-service teachers are active in classroom	<b>3.02</b>	<b>0.73</b>	“
8	e-learning ensures distance is not a barrier to learning	<b>3.32</b>	<b>0.11</b>	“
9	Time is not a barrier to learning in e-learning environment	<b>2.87</b>	<b>1.05</b>	“
10	e-learning takes care of individuals with learning differences	<b>2.91</b>	<b>1.00</b>	“
11	e-learning reduces the problem of limited academic staff	<b>2.93</b>	<b>.06</b>	“
12	e-learning allows for collaborative learning among pre-service teachers in science classrooms	<b>3.03</b>	<b>.05</b>	“
13	e-learning allows pre-service teachers to revisit learned materials	<b>2.86</b>	<b>1.20</b>	“
14	e-learning enhances understanding of learned materials	<b>3.01</b>	<b>.09</b>	“
15	e-learning enhances extended learning among pre-service teachers	<b>3.03</b>	<b>1.34</b>	“
16	Diversified teaching method is achieved through e-learning	<b>2.76</b>	<b>1.32</b>	“
<b>Grand Mean = 3.01</b>				

Table 1 shows that all the items had response mean greater than the criterion mean of 2.50. The deviation of the response mean is also indicated on the table. Based on the result, all the items were accepted as the role of e-learning in science education in higher institutions. Also, the grand mean of 3.01 is above the criterion mean which is an indication of high positive perception.

**Table 2:** Summary of NCE and Degree pre-service teachers' response

Group	N	Mean	SD	Diff	df	t <sub>cal</sub>	t <sub>0.05</sub>	Remark
Degree	290	3.26	0.84	0.43	358	0.41	1.64	NS
NCE	60	2.83	1.25					

Table 2 shows that pre-service teachers in the degree programme had response mean of 3.26 with standard deviation of 0.84 while their NCE counterparts had mean response of 2.83 with standard deviation of 1.25. These gave a difference in response mean of 0.43 in favour of the Degree pre-service teachers.

**H<sub>01</sub>:** There is no significant difference between the response mean of NCE and Degree pre-service teachers on the role of e-learning in science education in teacher training institutions.

Table 2 also shows that the calculated t value of 0.41 is less than the critical value of 1.64 at degree of freedom 358 and 0.05 level of significance. Based on the result, the null hypothesis is upheld at 0.05 level of significance.

### DISCUSSION OF FINDINGS

The result of the study revealed that e-learning plays a positive role in the training of pre-service teachers in science education in higher institutions. This was indicated in the response mean of the pre-service teachers towards items of the questionnaire. All the items were accepted as roles of e-learning in science education as they had response means greater than the criterion mean. These includes, access to course materials, enhancing interest towards learning, pre-service teachers learning at their own pace, motivation towards learning, access to virtual laboratory, ensuring learning at any time and distance, enhancing performance and retention, etc. this result is in line with the findings of Nwoke et al (2016) Arkorful, and Abaidoo (2014), Algahtan (2011), Veena, Sufian, and Anuradha, (2012) who variously identified that e-learning in science education can give pre-service teachers an opportunity to learn at their own pace and help them build up their self-confidence. It can give them a lot of exposure and help them develop insights.

The result of the study also revealed that, the role e-learning in not dependent on pre-service teachers' type of programme. Their response mean revealed that, there was no significant difference between the response mean of NCE and Degree pre-service teachers on the role of e-learning in science education in teacher training institutions. This result is in line with Veena, Sufian, and Anuradha, (2012) and Nwoke et al (2016) which indicated that e-learning benefits is not dependent on gender, race and type of education.



### CONCLUSION

The study revealed that, pre-service teachers have high positive perceptions about the role of e-learning in science education in institutions and the role of e-learning is not dependent on the type of programme of the pre-service teachers in teacher training institutions.

### RECOMMENDATIONS

Based on the result of the study, the following recommendations are made;

1. The use of e-learning should be emphasized in the training of pre-service teachers of science education.
2. Hardware such as computers should be made available in teacher training institutions to enable pre-service teachers make use of them.
3. There should be fast internet connectivity in teacher training institutions so that pre-service teachers can have access to online learning.
4. The government should make appropriate policies that will permit e-learning in teacher training institutions.
5. There should be constant and alternative power supply in teacher training institutions to allow pre-service teachers have access to e-learning.
6. Pre-service teacher educators should update themselves on the application of e-learning through conferences and workshops.

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