FIRST YEAR LEARNING EXPERIENCES OF UNIVERSITY UNDERGRADUATES IN THE USE OF OPEN EDUCATIONAL RESOURCES IN ONLINE LEARNING

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Abstract
This paper examined the first year University undergraduates' experiences in the use of OER in selected Physics difficult concepts. Mixed research design was adopted using Questionnaire and OER Physics Achievement Test (OPAT) with a reliability coefficients of 0.85 and 0.89 respectively using Cronbach's Alpha for data collection. Data were analysed using diffusion theory of innovation and t-test. A total number of 106 University undergraduates participated in the study. The results showed that OER was able to improve undergraduate's perception, attitude and achievement in and towards learning of difficult concept in Physics and its use in other subjects should be encouraged.
Keywords: Open and Distance Education (ODE), E- Learning, Learning Management System (LMS) and Open Education Resources (OER).

Introduction

First year undergraduates are faced with challenges of adjusting to new learning styles when transiting from secondary education to University education most especially the Open and Distance Education(ODE) where learners are expected to transform from passive to active learners providing opportunities to explore and acquire new knowledge on their own (Prensky, 2001, Secreto, 2013).

Facilitating Physics courses in Distance Learning Institute, University of Lagos, Nigeria could be challenging as facilitators are confronted with the problem of learners coming with different previous knowledge of Physics background from their secondary schools education. Comprehending and mastering quantitative concepts characterized by Physics courses, and connecting them to real life situation are among challenges facing learners. Another prominent challenge is that a fraction of first year undergraduates are not versatile in the use of technological tools for learning. This could be reasons why first year undergraduates are underachieved in Physics courses in their first year. To support learners, the Institute provides printed learning materials (Moodles) and the Learning Management System (LMS) which covers a wide range of different applications such as assignment, quiz, wiki, workshop, forum, lessons etc

Distance Learning Institute (DLI), University of Lagos provides support services for their undergraduates where they can interact with facilitators, ask questions, discuss and brainstorm with their peers while facilitator clarifies their misconceptions, and grade assignment given online. Efforts of the Institute were channeled towards creating educational experience of equal qualitative values for learners to suit their need outside the classroom. Despite these efforts put in place, undergraduates' academic achievement in some concepts in physics has not improved to an appreciable level. Hence, there is need to introduce, adopt, adapt more viable support services which involves active participation, capable of sustaining and stimulating the interest of learners for a change of attitude towards Physics. Therefore, the thrust of this paper is to investigate the experience of first year university undergraduates exposed to OER in online learning probably this might lead to an appreciable academic achievement of undergraduates in physics.

Open Educational Resources (OER) are defined as technology enabled open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes (Harsasi, 2015). Downes (2011) defined OER as materials used to support education that may be freely accessed, reused, modified and shared by anyone. In the same vein, Organisation for Economic Co-operation and Development (2007) defined OERs as digitized materials offered freely and openly for educators, students and self learners to use and reuse for teaching, leaning and research.

OER was first used by UNESCO in 2002 at its forum on the impact of Open Courseware for Higher Education in Developing countries, and has since then gained significant prominence in recent years throughout the world (Hew & Cheung (2013). Types of OER include lessons, modules, full courses/programmes, guides, e-texts, articles, audio tracks, videos, multimedia and any other learning materials (Hylen, 2007). The advantages of using OER includes: the materials are free for usage no subscription fee attached, there is easy accessibility to materials, continuous access to resources without restriction, it provides the student with ability to pursue topics thoroughly, ability to learn for personal knowledge or enjoyment, and available in different visual representations among others (Harsasi, 2015). However, barriers associated with the use of OER as enumerated by D'Atoni (2009) are:

The broad band access, Time and expense associated with gaining permission to use third party owned copyrighted materials or its removal from material, Inadequate resources to invest in the necessary software and hardware, Lack of skills needed to use technology, Lack of academic recognition of the development of OER by teaching staff.

Hew & Cheung (2013) found out that the use of OER has been limited to the western countries and only very few students believed that an open course ware site would be valuable to enhance their own knowledge about certain topics. Research on the use of OER in Africa is new and uncommon. This study therefore, will investigate the experience of first year University undergraduates when exposed to the use of OER in learning difficult concepts in physics.

This study is founded in Diffusion of Innovation (DOI) Theory. Diffusion of innovation theory is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). The characteristics which determine an innovation's rate of adoption are: Relative advantage, Compatibility, Complexity, Trialability, Observability to those people within the social system.

Though, Rogers (2003) opined that innovation offering more relative advantage, compatibility, trialability, and observability will be adopted faster than other innovations. He then cautioned that getting a new idea adopted, even when it has obvious advantages, is difficult. Therefore, the availability of all these variables of innovations speeds up the innovation-diffusion process.

Statement of the Problem

This study attempts to explore the learning experiences and achievement of first year University undergraduates when exposed to the use of OER (audios and video clips).

Purpose of the Study

The study is specifically designed to achieve the following objectives:

1. To determine if the introduction of OER is a useful innovation to the learning of difficult concepts in physics by University undergraduates.
2. If the use of OER will improve first year undergraduates' understanding difficult concepts in Physics

Research Questions

For the purpose of the objectives stated above, the following research questions were raised:

1. Does OER have user advantages and compatible with past experience?
2. Does OER allow trial ability, result oriented and difficult to use and understand?

Research Hypothesis

The following hypothesis are tested at $P<0.05$

- There is no significant difference between achievement of first year undergraduates exposed to the use OER and those not exposed to OER
- There is no significant difference between achievement of male and female undergraduates exposed to the use of OER

Research Method

This study adopted survey and quasi-experimental research designs. The survey was used as a preliminary study to examine the acceptability of OER usage by undergraduates before designing intervention for teaching difficult concepts in physics. The population consisted of all Education science University undergraduates who registered for courses in Physics either as elective or compulsory at first year. Thirty-five undergraduates were used as control where seventy-one were used for the main experiment. A total number of one hundred and six undergraduates participated in the study. Data were gathered from them by sending 19-item Questionnaire to predetermine responses whereby the experience and perceptions of University undergraduates can be measured via e-mail. All

questions were answered on likert scale; Strongly Disagree = SD, Disagree D, Agree = A Strongly Agree =SA. Thereafter, OPAT was administered to ascertain if the intervention was able to improve their achievement in understanding difficult concepts in physics (waves) and more so if it is gender friendly. To identify difficult concepts researcher sampled the opinion of learners by asking them to identify the most perceived difficult concepts in Physics via e-mail. Their various responses were collated as displayed in the table 1:

Table 1: Undergraduates' rating of Physics Concepts Difficulty

N=71

Concepts	**Motion**	**Nuclear Physics**	**Waves**	**Conservation Principles**
Frequency of Occurrence	14	16	29	12
Percentages	19.72	22.54	40.85	16.90

University undergraduates rated waves has the most difficult concepts among others with highest frequency of (29) and highest percentage (40.85%). This supports the findings of (Owniouduokit, 2000) which pointed out that waves is a concept involving a function of two variables- distance and time.

Facilitators exposed Undergraduates to interaction with OER for one week using topic one as an example, there after undergraduates where left to interact with OER on their own and provide answers to questions raised for duration of one month on the stated topics. At the end of the due date, questionnaire were collected and analysed according to the stated research questions. The result obtained allowed the researcher to design intervention. A total number of Eighty-six questionnaires were sent out to learners, only seventy-one questionnaires were returned.

The test of reliability result of the responses on First Year University undergraduates Experience in the use of Open Educational Resources was calculated to be 0.855 using Cronbach's Alpha. This indicates that the instrument is reliable. The validation of reliability result of instrument using the analysis of variance (ANOVA) test, which suggests that there is no significance variation on how the respondents rated the items at F-value = 5.900 . Generally, there is an internal consistency of the answers provided by the respondents and therefore, the data do not violate the assumptions of reliability.

Research Question 1: Does OER have user advantage?

Table 2: Relative advantage of using OER

Items	Frequency (%)				Mean Response Rating	
	SD	D	A	SA	Mean	SD
The OER is a positive innovation	2 (2.8)	6 (8.5)	23 (32.4)	40 (56.3)	1.82	0.703
OER makes it more convenient to communicate with facilitators and friends	4 (5.6)	19 (26.8)	33 (46.5)	15 (21.1)	2.17	0.828
Using OER saves time	3 (4.2)	5 (7.0)	38 (53.5)	25 (35.2)	1.80	0.749
OER makes learning more meaningful	10 (14.1)	2 (2.8)	17 (23.9)	42 (59.2)	1.96	0.706
OER is the fast and efficient way of getting information	13 (18.3)	7 (9.9)	23 (32.4)	28 (39.4)	2.06	0.954

Table 2 shows that 40 (56.3) and 28 (39.4) strongly agree that OER is a positive innovation and fast and most efficient way of getting information. Few of learners disagree (12+23) that OER make it more convenient to communicate with facilitators and friends and makes learning more meaningful. If the good responses are merged together, one could conclude that OER has a relative advantage its usage in teaching physics concepts. This is in agreement with the findings of Harsasi (2015) that OER enhances students' online learning and facilities usage.

Research Question 2: Does OER compatible with your past experience

Table 3: Compatibility of OER

Items	Frequency (%)				Mean Response Rating	
	SD	D	A	SA	Mean	SD
Using OER would require me to change my study habit	16 (22.5)	5 (7.0)	18 (25.4)	32 (45.1)	2.11	0.871
I am eager to respond to the discussion group on OER via LMS	17 (23.9)	3 (4.2)	22 (31.0)	29 (40.8)	2.01	0.853

OER is compatible with the way I work	15 (21.1)	8 (11.3)	23 (32.4)	25 (35.2)	2.11	0.994
Using OER increases my interaction with the subject matter	10 (14.1)	2 (2.8)	17 (23.9)	42 (59.2)	1.96	0.706

Table 3clearly displayed that majority of University undergraduates found OER compatible with their study habits (45.1 and 25.4) and the ways they work, which must have led to increase in interaction with subject matter (59.2 and 23.9) and eagerness in responding to discussions on the LMS (40.8 and 31.0). This could be as result as stated by Govender, Dhurup, & Mudaly (2014) that new generation of learners witnessing the era of digital technologies which has been fully integrate into their lives that could be a reason while OER was able to change their study habit.

Research Question 3: Does OER allow trialability?

Table 4: Trialability of the OER

Items	Frequency (%)				Mean Response Rating	
	SD	D	A	SA	Mean	SD
OER does not intimidate me	9 (12.7)	7 (9.9)	25 (35.2)	30 (42.3)	2.42	0.839
I am confident in my ability to use OER	11 (15.5)	8 (11.3)	11 (15.5)	41 (57.7)	2.27	0.910
I do trial and error in working with OER	10 (14.1)	10 (14.1)	17 (23.9)	34 (47.9)	2.38	0.909
I can learn at a comfortable pace using OER	14 (19.7)	6 (8.5)	17 (23.9)	34 (47.9)	2.13	0.877

Table 4 shows that (47.9 and 23.9) agree that the working with OER is on trial an error while 47.9 and 23.9) which may appear the same set of undergraduates uses OER to learn at their comfortable pace. As first year undergraduates, it is good to note that (42.3 and 35.2) were not intimidated but developed more confidence (57.7 and 15.5) in the use of OER. This supported Rogers (2003) that believed that trialability is positively related to the likelihood of adoption.

Research Question 4: Does the result of using OER visible to you?

Table 5: Observation recorded on the use of OER

Items	Frequency (%)				Mean Response Rating	
	SD	D	A	SA	Mean	SD
I am aware of OER before I got admission	11 (15.5)	24 (33.8)	18 (25.4)	18 (25.4)	2.61	1.035
OER makes teaching real	18 (25.4)	15 (21.1)	20 (28.2)	18 (25.4)	2.46	1.13
I have seen other schools using OER	25 (35.2)	33 (46.5)	8 (11.3)	5 (7.0)	1.90	0.864

Table 5 indicates that majority of undergarduates (46.5 and 35.2) have not seen the use of OER before or heard from other schools. This shows the background of the learners and difficulty they experience during the period of their transition from secondary school to tertiary institutions. However, (25.4 and 25.5) percentage are aware of OER before they got admission but do not use it. It is interesting to note that (25.4 and 28.2) agreed that OER made teaching real. This is in line with Rogers (2003) assertion that if observability is positively received then the rate of adoption is greater.

Research Question 5: Does OER difficult to use and understand?

Table 6: Complexity of the OER

Items	Frequency (%)				Mean Response Rating	
	SD	D	A	SA	Mean	SD
OER is user friendly	13 (18.3)	9 (12. 7)	20 (28.2)	29 (40.8)	2.15	0.980
When using OER, I find it easy to navigate from	10 (14.1)	4 (5.6)	23 (32.4)	34 (47.9)	2.30	0.782

one screen to another						
Am confident in my ability to use OER	13 (18.3)	7 (9.9)	23 (32.4	28 (39.4)	2.06	0.954

Table 6 reveled that (40.8 and 28.2) agreed that OER is user friendly while (47.9 and 32.4) also found OER easy to navigate. This might have built in them confidence and believe in the use of OER. This also indicates that it is a good condition for students to work independently.

After the results, the intervention was carried out and the hypotheses were tested at $p<0.05$ and the result were as follows:

Hypothesis I: There is no significant difference between achievement of first year undergraduates exposed to the use OER and those not exposed to OER

Table 7: Descriptive Statistics and t-test for Equality of Means

Score	Treatment	Group Descriptive Statistics				Levene's Test for Equality of Variances		t-test for Equality of Means			
		N	Mean	SD	CV	F	Sig.	Mean Difference	T	df	Sig.
Pre-test Achievement Score	Exposed to OER	71	9.68	5.419	0.56	2.393	0.125	1.876	2.035	104	0.045
	Not Exposed to OER	35	7.80	3.909	0.50						
Post-test Achievement Score	Exposed to OER	71	63.11	12.145	0.19	1.158	0.284	40.198	17.630	104	0.000
	Not Exposed to OER	35	22.91	10.453	0.46						

SD = Standard Deviation, CV = Coefficient of Variation

The descriptive statistics indicates that the mean pre-test achievement score for the respective groups is obtained as 9.68 (Exposed to OER) and 7.80 (Not exposed to OER) with CV = 0.56 and 0.51 > 0.50 threshold value, respectively, indicating that the scores are not homogeneous. The test for significance difference is carried out using independent samples t-test. The result indicates that, when unequal variances are assumed based on Levene's test, there is a significant mean difference (1.876) between students exposed to OER and students not exposed to OER on pre-test achievement scores at $t = 2.035$ ($p<0.05$). The null hypothesis is rejected, and concluding that there is significant difference between students exposed to OER and those not exposed. Hence, better performance is achieved when the students are exposed to OER. Further, the mean post-test achievement score for the respective groups is obtained as 63.11 (Exposed to OER) and 22.91 (Not exposed to OER) with CV = 0.19 and 0.46 < 0.50 threshold value, respectively, indicating that the scores are homogeneous. The independent samples t-test result indicates that, when unequal variances are assumed based on Levene's test, there is a significant mean difference (40.198) between students exposed to OER and students not exposed to OER on post-test achievement scores at $t = 17.630$ ($p<0.05$). The null hypothesis is rejected, and concluding that there is significant difference between students exposed to OER and those not exposed. Hence, better performance is achieved on exposure to OER.

Hypothesis II: There is no significant difference between achievement of male and female undergraduates exposed to the use of OER

Table:8 Descriptive Statistics and t-test for Equality of Means (Exposed)

Score	Gender	Group Descriptive Statistics				Levene's Test for Equality of Variances		t-test for Equality of Means			
		N	Mean	SD	CV	F	Sig.	Mean Difference	t	df	Sig.
Pre-test Achievement Score	Male	32	9.16	4.495	0.49	0.975	0.327	-0.946	-0.752	69	0.455
	Female	39	10.10	6.099	0.60						
Post-test Achievement Score	Male	32	63.53	11.069	0.17	0.994	0.322	0.762	0.266	69	0.791
	Female	39	62.77	13.096	0.21						

SD = Standard Deviation, CV = Coefficient of Variation

The descriptive statistics indicates that the mean pre-test achievement score for the male and female students exposed to OER is obtained as 9.16 (Males) and 10.10 (Females) with CV = 0.49<0.50 and 0.60>0.50 threshold

value, respectively, indicating that the scores are not homogeneous for females while homogeneous for males. The test for significance difference is carried out using independent samples t-test. The result indicates that, when unequal variances are assumed based on Levene's test, there is no significant mean difference (-0.946) between male and female students exposed to OER on pre-test achievement scores at t = -0.752. The null hypothesis is accepted, and concluding that there is no significant difference in the performances of female and male students exposed to the use of OER. Further, the mean post-test achievement score for the male and female students exposed to OER is obtained as 63.53 (Males) and 62.77 (Females) with CV = 0.17, 0.21<0.50 threshold value, respectively, indicating that the scores are homogeneous for both gender. The independent samples t-test result indicates that, when unequal variances are assumed based on Levene's test, there is no significant mean difference (0.762) between male and female students exposed to OER on post-test achievement scores at t = 0.266. The null hypothesis is accepted, and concluding that there is no significant difference in the performances of female and male students exposed to the use of OER

Recommendations and Conclusion

This study investigated first year University Undergraduates experience when expose to the use of OER in teaching difficult concepts in physics. According to DLI undergraduates, introduction of OER makes learning to be real and exposure to the new technology change their perception and attitude to understanding Physics. However, OER videos which they prefer most are often of poor quality and sound. Another challenge is high data consumption rate which make the use of OER expensive. To this end, distance educators should provide wide range of learning support services to distance learners which will enhance their academic achievement not only in physics but all courses. It is evident that OER is useful and its use must be encouraged in teaching and learning among distance learning institutions.

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