

Adoption and Utilization of Open Educational Resources (OER) and Undergraduate Students' Learning Outcome

¹Emmanuel Emanghe Emanghe, Ph.D

[*emmanuelemanghe@gmail.com*](mailto:emmanuelemanghe@gmail.com)

Victor Effiom Ita

Department of Educational Foundations

University of Calabar, Calabar

[*vemmvann@gmail.com*](mailto:vemmvann@gmail.com)

¹P. O. Igbineweka

¹G. I. Ushie

¹Department of Educational Management

University of Calabar, Calabar



Abstract

This study adopted the randomized control trial design to investigate the adoption and utilization of open educational resources (OER) among undergraduate students and their learning outcome. The stratified random sampling technique was used to select 180 undergraduates, who were divided into the intervention and control groups. Two instruments were administered; researchers-developed questionnaire and Educational Management Achievement Test (EMAT). In addition to lessons on Educational Management administered on the entire sample over a course of two weeks, students in the intervention group were given a material on open educational resources. The study found that there is a significant mean difference in learning outcomes of students provided with OER material and those without it, and that there is no significant difference in the knowledge and utilization of OER among the male and female undergraduate students. Based on these findings, the study concluded that OER can play a major role in inculcating knowledge, skills and resourcefulness in Nigerian students, to stimulate the much-needed economic growth and development of the country. It was therefore recommended, among others, that an orientation exercise on the importance, availability and utilization of OER should be conducted in universities.

Keywords: open, educational, resources; ict, utilization

Introduction

The Nigerian society today is highly dependent on knowledge, skills and resourcefulness of its people, and one major source of inculcating these qualities in an individual is education. Education is a critical requirement for the creation of knowledge societies, which can stimulate economic growth, development and prosperity (Butcher, 2011). Like

in many other countries, educational institutions in Nigeria are striving to satisfy the ever-increasing demand for education in response to the urgent and growing need for training, retraining and continuous refreshing of knowledge and skills of the nation's workforce. Whilst there is an unprecedented demand for access to higher education in Nigeria, the government has faced many challenges in providing the necessary learning resources to support public educational institutions. These learning resources, often considered key intellectual property in a competitive higher education world (Wiley, 2007), are more and more being provided and shared by institutions and individuals over the internet openly and at no cost; this is what is known as open educational resources (OER).

Open educational resources (OER) are the teaching, learning and research materials that are available under an open-source or licence agreement that allows for sharing, accessing, repurposing for faculty and students' needs (Atkins et al., 2007). UNESCO (2015) defines it as the "Teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with limited or no restrictions", while The William and Flora Hewlett Foundation (n.d) views it as "the teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others". They include course materials, textbooks, modules, streaming videos, software, tests, and any other tools, materials or techniques used to support access to knowledge.

OER is a mix of three components: content, tools and capacity; all of which are aimed at ensuring resource usability, durability, accessibility and effectiveness (Stephen, 2009). The contents of OER can be reused, retained, revised, repurposed and remixed without any restrictions; these signify the 5Rs of OER (Grodecka & Sliwowski, 2014).

Identifying and developing learning resources are both integral to helping higher education institutions in Nigeria play critical roles in supporting their teaching staff to create effective teaching and learning environments for students and providing ongoing opportunities for professional development (Bello et al., 2021). The traditional knowledge sharing culture ingrained in Nigerian universities today usually includes organizing conferences, public lectures, seminar series, workshops, and inaugural lectures, mostly on a face-to-face basis. Others are conference proceedings, journals, compendiums and communicate shared online and in print to be used by academics (Bello et al., 2021). However, the introduction of OER as an internet-based global repository has digitized the process of sharing educational resources. Now, educational resources and materials are made openly available through the internet for use by students and educators, with no need for the payment of licence fees or royalties (Wiley, 2015).

The OER declaration had directed that all countries should release the teaching, learning and research materials developed with public funds under an open licence so that they can be reused, revised, remixed and redistributed without the permission of the copyright

holders (UNESCO, 2012). Following this declaration, the Federal Ministry of Education (FME) have formally released OER Policy for Higher Education in Nigeria which mandates all universities in Nigeria to create and use OER to increase access and support quality teaching, learning and research (FGN, 2017). By this policy, higher education should create and source for OER from elsewhere since well-designed learning resources encourage greater individual engagement by students with information, ideas and content than is possible with lectures alone. By making such resources an integral part of the teaching and learning process, limited face-to-face teaching time with students can be more effectively used to foster engagement and to nurture discussion, creativity, practical applications and research activities (Silas, 2010).

Previously, in developing courses and learning resources, teaching staff naturally used what was available. Now, in line with the OER policy, tertiary institutions in Nigeria have introduced OER repository and mandated lecturers to upload teaching and learning resources under their possession for public use (OER Policy, 2017). However, OER is not limited to uploading resources in the university OER repository but also includes downloading the shared OER and using it for teaching, learning and research purposes. The result of this is an increasing pool of OER that not only widens lecturers' choice, but also creates opportunities for new resources to be adapted to fit the local context in terms of culture and learning needs without necessitating lengthy copyright negotiations or duplicating content development. Experience shows that when institutions make good quality courses and materials publicly available online, they can attract new students, expand their institutional reputation and advance their public service role. However, research institutions have to position OER within their institutional branding and take into account any income that the sales of their educational materials may generate (Silas, 2010).

There is no agreement among researchers on the level of adoption and utilization of OER among university students in Nigeria. While some researchers report a high level of usage, others found it to be relatively low. An example of the former is Akomolafe and Olajire (2014), who noted that there is a fairly good use of OER among undergraduate students as a large number of students access these learning resources in various forms like text, audio and video through the internet, to support learning activities. On the contrary, Nwana et al. (2017) reported a low percent of level of usage of the OERs, and further revealed that even with a high level of awareness of OER among undergraduate students, the level of utilization has been very low.

Onaifo (2016) discovered, from his study investigating the use of OER by students at the University of Lagos in Nigeria, that even though participants frequently used OER, they still had limited knowledge of these resources. These participants were not fully aware of OER repositories, nor did they understand the concept of OER. Nonetheless, they had a positive attitude towards OER and benefited from using the resources in several ways, such as the completion of assigned academic tasks.

With regard to the academic performance of students based on their use of OER, Afolabi (2017) revealed that students who have been exposed to OER have a positive attitude towards its use, and this reflects in their academic performance as shown in the significant difference reported between their pre-test and post-test scores. This finding is similar to that of Venegas-Muggli and Westerman (2019), who reported an improvement in the academic performance of students who had been exposed to the use of OER when compared to those who relied on the traditional learning materials alone. The reason for these reported significant differences could be because students are more motivated to learn when they enroll in a course that is delivered systematically using technology (Vaskovic et al., 2014).

Other considerations for using OER among undergraduate students are their sex and the area of specialization. Findings from Bassi and Camble (2011) reveal that a significant statistical difference exists between male and female students using electronic resources, primarily because females find it more difficult to access information online than males. This finding was however not in agreement with that of Ikolo and Okiyi (2012) who discovered, from their study on gender differences in computer literacy among medical students in selected southern Nigerian universities, that female students use the internet more than their male counterparts. But Sivathaasan et al. (2014) found an even utilization of OER among male and female users. With regard to area of specialization, Issa et al. (2020) observed that undergraduate students studying courses that make use of ICTs more may be more used to using e-resources than those who rarely use ICT for their activities.

From the literature, it has been observed by the researchers that OER is a relatively new concept in Nigeria and is more commonly used by faculty for teaching. Although there is a fair usage of OER among the undergraduate students in the country, the level of awareness and understanding of the concept is still very low. This study is therefore aimed at examining how the management of educational resources through ICT impacts on the learning outcome of undergraduate students of the University of Calabar, Cross River State, Nigeria.

Research questions

The following research questions have been raised to guide the study:

1. What is the effect of the utilization of OER on students' learning outcome in the University of Calabar?
2. Does sex influence the use of OER for learning by undergraduate students in the University of Calabar?

Hypotheses

The following null hypotheses were tested in the study:

Ho1: There is no significant mean difference in learning outcomes of students provided with OER material and those not provided with it.

Ho2: Sex does not significantly influence the use of OER for learning by undergraduate students in the University of Calabar.

Methodology

The randomized controlled trial (RCT) research design was adopted for this study. RCTs have been increasingly used in the field of education over the last twenty years (Connolly et al., 2018), even though their use has also been subjected to strong criticisms from scholars. Some of the major criticisms have been that it is not practical to use RCTs in education (Cohen et al., 2011); RCTs ignore context and experience (Hodkinson & Smith, 2004), RCTs seek to generate universal laws of ‘cause and effect’ (Morrison, 2001); and that RCTs are inherently descriptive and do not contribute much to theory (Elliot, 2004). Despite the above criticisms, these researchers adopted it because it provides very reliable evidence on the effectiveness of interventions since its processes minimize the risk of confounding factors influencing the results.

The sample for this study comprised of 180 undergraduate students of the Department of Educational Management, University of Calabar. The students, who were selected from the Year 3 (300 level) and Year 4 (400 level) of the Department, were divided into two groups of equal numbers, the control and intervention groups. The researchers ensured an adequate representation of male and female students in both the control and intervention groups using the stratified random sampling technique. Table 1 shows a breakdown of the sample.

Table 1: Sample distribution

S/N	Department of Educational Management	Control group		Intervention group		Total
		M	F	M	F	
1	Year 3	28	22	25	27	102
2	Year 4	24	16	23	15	78
	Total	52	38	48	42	180

At baseline, two instruments were administered on students in both the intervention and control groups; a researchers-developed questionnaire to collect information on students’ knowledge about open educational resources, and an achievement test titled Educational Management Achievement Test (EMAT) consisting of 20 multiple choice objective items which was administered as pre- and post-test on both the intervention and control groups.

In addition to lessons on Educational Management developed by the researchers and administered on the entire sample over a course of two weeks, students in the intervention group were given a material on open educational resources. The material contained information about the importance of OER and how to access the major OER repositories within and beyond the University of Calabar.

To test for reliability of EMAT, a random sample of 50 undergraduate students who were part of the research population but not part of the sample for the study were selected as pilot sample, and the test instrument administered on them. The data collected was tested

for reliability using the test-retest reliability method. The reliability coefficient of the instrument was calculated to be 0.89 using the Pearson product moment correlation.

Presentation of results

Ho1: There is no significant mean difference in learning outcomes of students provided with OER material and those not provided with it.

To test this hypothesis, the independent t-test statistical method was adopted. The result of the test is presented in table 2.

Table 2: Summary of the results of independent sample t-test of the difference in learning outcomes after the intervention (n = 180)

Groups	N	Mean	SD	SE	MD	t	p
Control group	90	13.90	1.41	.15395			
					-4.31399	-1.037	0.001
Intervention group	90	18.23	1.036	.10493			

Degree of freedom = 178; level of significance = 0.05

Table 2 reveals that the p-value of 0.000 is less than the alpha value of 0.05 at 178 degree of freedom and t = -23.636. Therefore, in line with the decision rule, the null hypothesis which states that there is no significant mean difference in learning outcomes of students provided with OER material and those not provided with it was rejected; this implies that the utilization of OER by undergraduate students significantly influences their learning outcomes. The table shows that the intervention group with a mean score of 18.23 performed better than the control group with a mean score of 13.90.

Ho2: Sex does not significantly influence the use of OER for learning by undergraduate students in the University of Calabar.

To test this hypothesis, the chi square statistical method was adopted. The result of the test is presented in table 3.

Table 3: Chi-square test of the difference in utilisation of OER between male and female students of the University of Calabar

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.090 ^a	1	.765		
Continuity Correction ^b	.022	1	.881		
Likelihood Ratio	.090	1	.765		
Fisher's Exact Test				.881	.441
Linear-by-Linear Association	.089	1	.765		
N of Valid Cases	180				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 41.00.

b. Computed only for a 2x2 table

Table 3 reveals a p-value of .441 which is greater than the alpha-value of 0.05. With this result, the null hypothesis that sex does not significantly influence the use of OER for learning by undergraduate students in the University of Calabar is retained. This result indicates that both male and female undergraduate students had similar knowledge and utilisation of OER before the intervention was administered.

Discussion of the findings

This study investigated the adoption and utilization of open educational resources (OER) among undergraduate students and their learning outcomes in the University of Calabar, Nigeria. As the test result shows, the first hypothesis which stated that there is no significant mean difference in learning outcomes of students provided with OER material and those not provided with it, was rejected. This result agrees with the finding Onaifo (2016) who found that, even though undergraduate students of the University of Lagos had limited knowledge of OER, they nonetheless benefited from using the resources in several ways, such as the completion of assigned academic tasks. Similar findings were also reported by Afolabi (2017) and Venegas-Muggli and Westerman (2019), both of whom reported an improvement in the academic performance of students who had been exposed to the use of OER when compared to those who relied on the traditional learning materials alone.

The result of the test of the second hypothesis revealed that there was no significant difference in the utilization of OER among the male and female undergraduate students of the University of Calabar. While this finding is in agreement with that of Sivathaasan et al. (2014), it negates those of Bassi and Camble (2011) and Ikolo and Okiyi (2012), both of which discovered significant statistical differences between male and female students using OER.

Conclusion

The findings of this study revealed that using OER both by students and faculty helps to improve the teaching and learning process and outcomes, and that there is no significant

difference of use between male and female students. Drawing from these findings, this study concludes that OER can play a major role in inculcating knowledge, skills and resourcefulness in Nigerian students, to stimulate the much-needed economic growth and development of the country. The creation and management of the OERs, complemented with the adequate provision of ICT and internet facilities in Nigerian universities, can help to support their teaching staff to create effective teaching and learning environments for students and provide ongoing opportunities for professional development.

Recommendations

Based on the findings of this study, the following recommendations are put forward:

1. An orientation exercise on the importance, availability and utilization of OER should be conducted in the university. The aim of such exercise is to help the students understand where and how to access these OERs, and how they can be used to complete assigned tasks.
2. The university should ensure that internet facilities are provided in the school libraries and laboratories so that students can easily access OERs through them.
3. Academics should be encouraged to make OERs a part of their teaching and research resources. This will make teaching, learning and research more practical and enjoyable.
4. The University of Calabar should create its own repository where researches and other academic works conducted within the institution, and those sourced from outside the institution, can be uploaded and made available to students and faculty.

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