

LEARNING FOR SUSTAINABLE DEVELOPMENT: ANALYSIS OF OPEN DATA IN COURSEWARE OF UNIVERSITIES IN NIGERIA

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Abstract

Open data has been defined in several ways with the underlying nonality being data available to the public without restrictions. In the xt of curriculum delivery, data can range from the course outline to ed course notes for the benefit of the learner, which in turn is referred courseware. When this content is open to the public, it is often referred open courseware which in this study is framed as open data in e-learning. Properly harnessed, open data in courseware which is necessary learning can be a driver for sustainable development. This study igated the extent to which universities in Nigeria exploit the unities provided by information and communication technologies to make the content of their academic programmes open to the public eir counterparts in other countries. This study, therefore, examined and ed the courseware of some selected universities in Nigeria through a l and qualitative content analysis. The major finding of the study is igerian universities are yet to fully appreciate the connection of open n courseware and sustainable development. Only few Nigerian sities have comprehensive online programme content, and those that cannot be considered as standard open data or a courseware initiative 2 sustain overall development through education in the country. Most

Nigerian universities for educational purposes, but for increasing their online and not even for educational purposes, concludes that universities in Nigeria need to presence. The study, therefore, concludes that universities in Nigeria need to develop courseware for their academic programmes that meet the standards of open data in order to drive sustainable development in the country.

Keywords: Courseware, E-learning, open data, sustainable development, universities.

Introduction

Open data is being recognised more and more as a driver of accountability and good governance, as a tool for inclusiveness, and is likely to be key as the world looks beyond the Millennium Development Goals (MDGs) which is concluding in 2015 (Open Data Initiative, 2012). Campbell and MacNeill (2010) define open data as a philosophy and practice requiring that certain data are freely available to everyone, without restrictions from copyright, patents and other mechanism of control. On the other hand, the Open Data Initiative (2012) defines open data as a freely available online service for the creation and dissemination of data for public consumption. It is, however, recognised that "various types of data are apt to be more or less open, and the reasons for the degree of openness may vary from one situation to another; that is type of data, by country, by type of institution, etc." (Cole, 2012).

The introduction of open data has energized political power, information and rights issues in developed countries. Improvement of services and contribution to economic growth have been made possible by making information about services and education data, amongst other information, publicly available on the web (Institute of European and International Affairs, 2011). It is generally agreed that data is 'open data' when it is complete, primary, timely, accessible, machine process-able i.e. data is structured for automatic processing, non-discriminatory i.e. available to anyone, no registration requirement, and license-free (Baur & Kaltenbuck, n.d.).

In the context of curriculum delivery, courseware can be described as a data source. Courseware is an educational material bundled with the various course plans, lessons, assignments, tests, and other materials needed for learning. When this content is open to the public, it is often referred to as

open digital publication of high quality college and university-level educational materials which are organized as courses, and often include course planning materials and evaluation tools as well as thematic content (Open Source", n.d.). Writing about the open courseware of the Massachusetts Institute of Technology (MIT), Long and Sussex (2011), note that open courseware is an example of open policies and practices that have enhanced the recognition of MIT's intellectual contributions and increased its competitive edge.

properly harnessed, open data in courseware which is necessary for e-learning, can be a driver for sustainable development. E-learning comprises forms of electronically supported learning and teaching, the aim being to transfer skills and knowledge. Different phrases referring to the same concept but with slightly different meanings include 'virtual classroom', 'b-based learning', 'online learning', 'distance learning' and 'blended learning'. Kistow (2009), states that e-learning is the next generation of learning because of its flexibility. The term is used to reference out-of-classroom and in-classroom educational experiences via technology which can be self-paced or instructor-led, these include media in the form of: text, image, animation, streaming video and audio and content is delivered via: Internet, intranet/extranet, audio or video tape, satellite television and compact disc (Rouse, 2009). These open resources that support learning are collectively referred to as open educational resources (OERs). Open in courseware is at the core of an OER which, according to Johnstone (2015), not only promotes academic collaboration but leads to "economic development" (p.15).

Behinde-Williams (2011) in providing a schematic representation of the relationship among academic integrity, educational development and sustainable development, shows that curriculum initiatives have a direct impact on sustainable national development by impacting directly on sustainable national development in terms of planning, process and product quality. The connection of curriculum to sustainable national development may also explain why the skills gap that exists amongst graduates from Nigerian universities has a direct impact on the economy (Kayode, 2009). This gap resulted in many organisations setting up graduate trainee schemes, including the World Bank which trained 1000 Nigerian graduates for the engineering industry in 2012 because they recognised that skills gap was a barrier to job creation (World Bank, 2012). Kayode (2009, p.3), stated that

required to perform on a job is so wide that a high percentage of young graduates are said to be unemployable for lack of needed skills that would make them profitable for any employer. This state of affairs has existed in Nigeria for so long that there is urgent need for serious actions to stem the tide and correct the malaise that is robbing the nation of progress in many fields of endeavour (Kayode, 2009, p.3).

In a blog post on education, Wale Micaiah states:

It has been said severally and in different quarters that Nigerian graduates are unemployable. That they lack the prerequisite skills such as problem solving, communication, interpersonal, teamwork, required to function in the workplace. While it is logical in some sense to lay the blame at the doorsteps of our students, it is also proper to peep into their curriculum and their primary source of knowledge – their lecturers. Of a truth, there is a serious gap between what we were taught in school and what is obtainable in the marketplace (Micaiah, 2012, paragraph. 1).

Micaiah, continues:

I once had a lecturer who pride (sic) in teaching us in the 90's with a lecture note he prepared in the early 80's, to him nothing has changed meanwhile we were being loaded with artefacts instead of the present day facts. I am not sure things have changed much today for many students. Now you expect someone under such tutelage for 4 or 5 years to graduate and magically fit into the marketplace. (Micaiah, 2012, para. 3)

The skills gap problem, as it affects sustainable development, may be compounded by poor education indicators nationwide, according to the United States Embassy in Nigeria publication, Nigeria Education Fact Sheet. In the fact sheet, it is suggested that the already poor national education indicators are lower still in "the predominantly Muslim north" (Nigeria Education Fact Sheet, 2012). So, the skills gap may be even worse in graduates from the northern parts of the country.

The chosen course of investigation for this research is based on the premise that if universities in Nigeria publish their courseware online, this will bring about quality curricular initiatives driven by the resultant competition for quality faculty, students and prestige, which in turn impact directly on

the development. Such courseware, targeted to skill acquisition, and into the open domain, would also aid the 90% of school leavers who are unable to gain admission into Nigerian universities every year (Nick, 2009).

My objective, therefore, is to examine the websites of universities in order to determine the quantity and quality of open data in any published courseware as a way of assessing the preparedness of the universities to expose details of the academic curricula to public scrutiny. My specific objectives are to:

- Determine the extent to which Nigerian universities are publishing their courseware online.
- Identify the open data components in any published courseware by the Nigerian universities.
- Relate the presence or otherwise of open data in courseware to the geographical zones to which the Universities belong.

1.1 Introduction and Sustainable Development

Sustainable development can be interpreted in many ways. However, its concept is an approach to development that looks to balance different and competing needs against an awareness of the environmental, social and economic limitations faced as a society (Ciegis, Ramanauskienė & Jusas, 2009). Sustainable development has been defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own need (World Commission on Environment and Development, 1987). Furthermore, it has been defined as a development paradigm (Drexhage & Murphy, 2010). Hence, sustainable development is about equity, defined as equality of opportunities for all-being, as well as about comprehensiveness of objectives (Sustainable Development, 2004). Sustainable development provides a way of accessing a situation, setting goals that will produce better results and making the choices about the direction to be taken (Strange & Bayley, 2008).

Indicators of sustainability are different from traditional indicators of economic, social, and environmental progress in recognising that the three segments are very tightly interconnected (*What is an indicator of sustainability?* n.d.), as shown in Figure 1. The impact of education on sustainable development can be seen by its interaction with other factors like profits and jobs.

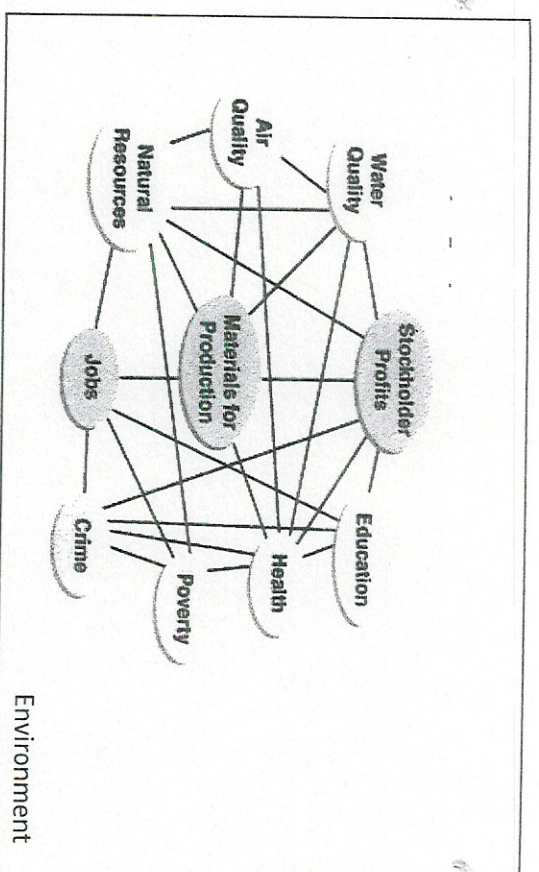


Figure 1 Indicators of a sustainable community

Source: *What is an indicator of sustainability?* (n.d.). Retrieved August 29, 2014, from <http://www.sustainablemeasures.com/node/89>

The United Nations (2007) provides sustainable development indicators for education based on: gross intake rate into last year of primary education, net enrolment rate in primary education, adult secondary (tertiary) schooling attainment level, life-long learning, and adult literacy rates. Of these, the last three stand to benefit from well-developed university curricula. The details of the indicator for adult secondary (tertiary) schooling attainment level, is of particular interest to this study. It is stated as:

Brief definition: Adult Secondary Schooling Attainment Level is defined as the proportion of the population of working age (25-64 years) which has completed at least (upper) secondary education. Adult Tertiary Schooling Attainment Level is defined as the proportion of the population of working age (25-64 years) which has completed at least the first stage tertiary education.

Description: These indicators provide measures of the quality of the human capital stock within the adult population of approximately working age. For instance, those who have completed upper secondary education can be expected either to have an adequate set of skills relevant to the labour market or to have demonstrated the ability to acquire such skills. (United Nations, 2007, p.56)

inent Goals, has a Goal 4, which is to ensure inclusive and le quality education and promote life-long learning opportunities for der this goal, is the target which says, "by 2030 ensure equal access women and men to affordable quality technical, vocational and education, including university" (United Nations Department of ic and Social Affairs, n.d).

education resources (OERs), according to Wiley, Green, and Soares hold some of the answers to maintaining the quality of learning l while significantly reducing the cost of education. Johnstone (2005) that "OER ... represents those resources needed most to achieve on for All ... It is time for those of us creating high-quality online onal resources for local use to open them to our fellows around the (Johnstone, 2005, p.18).

assachusetts Institute of Technology (MIT) was the pioneer of ss as a principle of institutional learning practice, when in 2001, it nost of its teaching materials free, publicly accessible, reusable and le via a Creative Commons licence, through its Open Course Ware project (Long & Sussex, 2011). Other popular initiatives in the of OERs are that by the Khan Academy and Washington's Open Library (Wiley, Green & Soares, 2012). Others are the onwealth of Learning (COL), WikiEducator and a number of the , leading universities such as Carnegie Mellon University, Harvard niversity of Oxford, and the Africa Virtual University in Kenya i, 2013). In Nigeria, courseware projects have been reported by the il Open University of Nigeria (NOUN) and the University of Ilorin, (Mejabi, 2013).

ing to Okonkwo (2012), the major aim of developing courseware for is to address the differences in instruction between NOUN and tional universities in the mode of instruction used, since NOUN s are instructed by open and distance learning methods within an arning environment. So it can be deduced that the motivation for ing the courseware which commenced in 2011 is from the lum delivery point of view and to meet its mission, which is to make on available to as many people as are able, willing, and ready to from it.

courseware open was to increase the university's webometric ranking by having a preponderance of rich text files on the website – one of the indices measured by Webometrics. This strategy seemed to work because along with upload of academic publications to the website, the Webometric ranking of the University rose from 77 in Africa in July 2009, when upload of the courseware commenced, to the 31st position in July 2010 (Mejabi & Raji, 2010). However, in a study by Olasina (2012) it was found that faculty at the University of Ilorin developed courseware for the University's Open Courseware initiative for easy access to course materials for students and others and because it will enlarge the readership of the materials allowing other scholars to access materials they could not otherwise use. Thus, although increased webometric ranking was a motivation, benefits to university faculty is also a major motivator. Similarly, in surveys of MIT staff, many of whom were initially sceptical of the open courseware experiment, many expressed belief that MIT's OCW has not only been beneficial to the institution, students and other faculty members and learners around the world, "but has also raised their own – already very elevated – standing in their field" (Long & Sussex, 2011, para. 8). The MIT Open Courseware remains one of the most comprehensive open courseware projects known, since the coureware site was launched in 2002 (Johansen & Wiley, 2010).

Methodology

The 129 universities in Nigeria formed the population for the study. The University of Ibadan (for being the first university in Nigeria) and the National Open University of Nigeria (for being the only Open University in the country) were automatically included as part of the sample. The remaining 127 universities were clustered by type of university (federal, state or private) and by the six geo-political zones. The six geo-political zones of Nigeria and the states under them are:

1. North-Central: Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and the Federal Capital Territory, Abuja.
2. North-East: damawa, Bauchi, Borno, Gombe, Taraba and Yobe.
3. North-West: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara.
4. South-East: Abia, Anambra, Ebonyi, Enugu, and Imo.
5. South-South: Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers.

resulted in 16 clusters and two universities were randomly picked, using the of random numbers, from each cluster. However, the websites of the universities drawn could not be accessed at the time of the data collection. Thus, the final study sample comprised 30 universities: Federal universities – 14; State universities – 9; and Private universities – 7. The lists of the website of the National Universities Commission (NUC) were used for the sampling.

The sample comprised the following: The National Open University of Nigeria (NOUN), Lagos, was classified as “National” because of its national status. The universities sampled are listed in Table 1. The number of universities sampled within each geo-political zone is presented in Table 2, and the National Open University of Nigeria which was categorised as “National”. Furthermore, the number of universities by type is shown in Table 3.

The first step in the online analysis involved extracting relevant content from the website(s) of the universities in the sample and this was done in July 2016. This was done by accessing the website of each university using the email address on the website of NUC after which a Google search for the university was done in order to identify any other existing official website of the university. The websites were then scanned for any components of the website or OERs. This involved first doing a search of the website in a particular manner, using the key phrases: “courseware”, “academic programme”, “course code”, “course titles”, “course content” – terms synonymous with academic programmes in Nigerian universities; and “modules”, “lesson plans”, “study exercise”, “reading list”, “resources” – terms expected to fetch any embedded educational resources on the website. The website search was complemented with clicking on each of the items and scanning the linked page, to be sure that the data being collected had not been missed. The content extracted from this process was listed in a table that included the web link information.

S/No	University	Geo-political Zone	Type
1.	National Open University of Nigeria, Lagos	National	Federal
2.	Federal University of Technology, Minna	North Central	Federal
3.	University of Ilorin	North Central	Federal
4.	Al-Hikmah University, Ilorin	North Central	Private
5.	Ibrahim Badamasi Babangida University, Lapai	North Central	State
6.	Abubakar Tafawa Bewlewa University, Bauchi	North East	Federal
7.	Federal University, Wukari, Taraba State	North East	Federal
8.	American University of Nigeria, Yola	North East	Private
9.	Adamawa State University	North East	State
10.	Gombe State University	North East	State
11.	Bayero University, Kano	North West	Federal
12.	Usman Danfodio University, Sokoto	North West	Federal
13.	Katsina University, Katsina	North West	Private
14.	Kaduna State University	North West	State
15.	Federal University of Technology, Owerri	South East	Federal
16.	Michael Okpara University of Agriculture, Umudike, Abia State	South East	Federal
17.	Madonna University, Okija, Anambra State	South East	Private
18.	Ebonyi State University	South East	State
19.	Imo State University	South East	State
20.	University of Benin	South South	Federal
21.	University of Uyo	South South	Federal
22.	Igbinedion University, Okada, Edo State	South South	Private
23.	Rivers State University of Science and Technology, Port-Harcourt	South South	State
24.	Federal University of Technology, Akure	South West	Federal
25.	Federal University, Oye-Ekiti	South West	Federal
26.	University of Ibadan	South West	Federal
27.	Bowen University, Iwo	South West	Private
28.	Redeemer's University, Ibafo, Ogun State	South West	Private
29.	Adekunle Ajasin University, Akungba, Ondo State	South West	State
30.	Ekiti State University	South West	State

Table 2: Number of Universities per Geo-political Zone

Zone	Frequency	Percent
National	1	3.3
North Central	4	13.3
North East	5	16.7
North West	4	13.3
South East	5	16.7
South South	4	13.3
South West	7	23.3
Total	30	100.0

Table 3: Number of Universities by Type

Type of University	Frequency	Percent
Federal	14	46.7
Private	7	23.3
State	9	30.0
Total	30	100.0

The second step involved a manual content analysis of the extracted information and categorisation and coding was done under the following variables and values:

- Information on Programmes offered: this was used to categorise a listing on the university website of the academic programmes offered in the university such as B.Sc. Mathematics, B.A. English, etc. – No/Partially/Yes
- Courseware: describes the full complement of aspects required for self-learning or e-learning – Available and Open/Available but Closed/No
- Course Codes e.g. MAT 101, ENG 324 – No/Yes
- Course Titles e.g. Introduction to Algebra – No/Partially/Yes
- Course Content: a brief overview of what the course entails – No/Yes
- Lecture Topics/Modules/Lesson Plan: a more detailed breakdown of what the course entails over the period for the course – No/Yes
- Lesson Notes: the actual material with which the learner engages in order to learn – No/Yes

- Study Exercises – No/Yes
- Reading list – No/Yes
- Study aids e.g. Videos – No/Yes
- Links to external resources e.g. external courseware or OERs – No/Yes

The coded data was analysed using frequency counts.

Results and Discussion

From the online analysis of the university websites, the distribution of universities according to the findings on whether information on programmes offered was available on the websites is presented in Table 4 and reveals that one university (Ahmadu Bello University) does not have information about the academic programmes they run, online; another (University of Ibadan) has the information for only some departments in the university. The other 28 universities have this information on their websites.

Table 4: Information on Programmes Offered

Information on programmes	Frequency	Percent
No	1	3.3
Partially	1	3.3
Yes	28	93.4
Total	30	100.0

Of the 30 universities sampled, two were found to have open courseware available online as presented in Table 5. These were the University of Ilorin and the National Open University of Nigeria. Two other universities were identified as having courseware but which was available only to pre-registered users and so was closed. Others did not have any courseware although Bayero University had a link labeled "open courseware" on their website but this was a dead link. Also, news on the website of Federal University, Oye-Ekiti, promises the development of courseware.

Table 5: Courseware Availability Online

Courseware availability	Frequency	Percent
Available and Open	2	6.7
Available but Closed	2	6.7
No	26	86.7
Total	30	100.0

ough 26 universities were found not to have any courseware, several of had components of courseware such as Course Codes with accompanying Course Titles in some cases, and some with Course Contents, presented in Table 6.

Table 6: Course Code, Title and Content Availability Online

Item	Available online			Total
	No	Partially	Yes	
Course code online	22 (73.3%)	-	8 (26.7%)	30 (100%)
Course title online	22 (73.3%)	1 (3.3%)	7 (23.3%)	30 (100%)
Course content online	26 (86.7%)	-	4 (13.3%)	30 (100%)

as the two universities with open courseware (NOUN and the University Iorin) that had the Topics, Modules, or Lesson Plans available online, as wn in Table 7. The National Open University of Nigeria was the only versity with Lesson Notes available online. Unlike the MIT Open rseware, which does not have lesson notes for all its listed topics, all rses on the NOUN website have links to detailed course lesson notes in F format.

Table 7: Topics/Modules/Lesson Plan and Lesson Note Availability Online

Item	Available online			Total
	No	Yes		
Lesson plan online	28 (93.3%)	2 (6.7%)		30 (100%)
Lesson notes online	29 (96.7%)	1 (3.3%)		30 (100%)

As shown in Table 8, only the two universities with online courseware had study exercises and reading lists available online. However, none of them had study aids such as videos or other dynamic objects for the MIT open websites in contrast to the many lecture videos available on the MIT open courseware site. In the case of the two universities with courseware, perhaps the reason for this absence is the single file, PDF format, used to present the courseware. Only one university had links to external courseware, as shown in Table 8 and that was the University of Iorin. However, under the "Resources" tab on the website of Usman Danfodio University there is a link labeled "MIT Open Courseware" but the link does not lead anywhere (that is, it is a dead link).

Table 8: Availability Online of Study Exercises, Reading Lists, Study Aids

Links to External OERs

Item	Available online			Total
	No	Yes		
Study exercises online	28 (93.3%)	2 (6.7%)		30 (100%)
Reading list online	28 (93.3%)	2 (6.7%)		30 (100%)
Links to external courseware	29 (96.7%)	1 (3.3%)		30 (100%)

From the foregoing, it can be deduced that nearly all the universities across all geo-political zones of Nigeria, have information about the programmes they offer, online. On other variables of analysis, items that showed online presence other than for the two universities with open courseware, were: course code, course title and course content. These items were analysed to identify the geo-political zones to which the universities with such presence belonged and the finding is presented in Table 9.

Item	Geo-political zones in Nigeria					
	North East	North Central	North West	South East	South South	South West
Course code	Yes	-	Yes	Yes	-	Yes
Course title	Yes	-	Yes	Yes	-	Yes
Course content	-	-	-	-	-	Yes

pattern displayed in Table 9 cannot be said to support the assertion that already poor national education indicators are lower still in northern part Nigeria (*Nigeria Education Fact Sheet*, 2012). This is because although South West zone has shown greater activity in support of on data in courseware, the North West and South East zones display similar patterns, as do the North Central and South South zones. Perhaps, this is an indicator and validity of the inclusiveness provided by the Internet.

Inclusion

findings reveal that although many of the universities publish information about their programmes along with the course codes and titles in cases, the move to open courseware publication is being imbibed at a slow pace. It can also be concluded that universities in Nigeria are yet to embrace the role of open courseware in enhancing the quality of their academic programmes which not only impact on existing the programmes but also on the quality of faculty and students that desire recruitment. The study also reveals that the inclusiveness which the Internet provides has been reflected in findings in which the geo-political zones to which the universities have had little influence.

above conclusions have an impact on sustainable development. The link between education and sustainable development has earlier been established. The study included a presentation of the skills gap amongst graduates from Nigerian universities and the connection to out-dated curricula and learning materials that do not foster skill acquisition. The argument has been made in the paper that courseware is very important for both onsite and offsite

learning components of the courseware to stakeholder scrutiny would result in improved quality of the curriculum and pedagogy, and consequently on the education indicators as well as other economic contributors to sustainable development.

Recommendations

The study, therefore, recommends that the universities with open courseware should see the strategic advantages in providing courseware that is rich, up-to-date, and relevant to local and global audiences, with the incorporation of various data types such as images and video. It is also recommended that in the short run, universities in Nigeria should publish the course codes, titles and course contents for all programmes offered, not to push for higher webometric rankings, but as a motivation for development of curricular that would lead to quality graduates towards sustainable national development. For further research, it is recommended that all universities in Nigeria be analysed in order to determine the exact extent of open data in courseware within the Nigerian university system with qualitative aspects to determine any causal effects.

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