Open Educational Resources: initiatives towards culture implementation at a public university

Eniel do Espírito Santo[1*], Ariston Lima Cardoso[1], Karina Zanoti Fonseca[1], Adilson Gomes dos Santos[1] , Raphael Moura Mascarenhas[1] and Leandro Sodré Barreto[2]

[1] Universidade Federal do Recôncavo da Bahia,
Superintendência de Educação Aberta e a Distância, Cruz das Almas, Brazil
enielsanto@gmail.com; {ariston,karinaufrb,adilsongomes}@ufrb.edu.br; mourais_182@hotmail.com
[2] Instituto Federal de Educação, Ciência e Tecnologia da Bahia
Departamento de Ensino, Santo Amaro, Brazil
leosbarreto@gmail.com

Abstract. This paper presents a Brazilian public university experience in Open Educational Resources – OER development. It discusses the OER concept in a contemporary approach, i.e., as open to anyone, under an open license that permits no-cost access and free reuse, continuous improvement and repurposing for educational purposes. It also discusses open education concept and mobile apps in OER context. It presents the results reached at the researched university with open education in MOOC's format and the development of open mobile application for physics education (M-Labs) and another for the blind and visually impaired. From the methodological point of view, this is an exploratory and descriptive research with a qualitative approach and an experience reporting as a data collection procedure. The paper concludes that both MOOCs and the mobile app developed are relevant initiatives in order to introduce an OER culture at the researched university.

Keywords: Open Educational Resources. Open Education. MOOC. Mobile App. Physic Education. Visually impaired.

1 Introduction

Open Educational Resources – OER constitute essential tools especially for public higher education institutions operating in developing countries with increasingly reduced budgets, face with limited available public financial resources.

In this scenario, OER assume a decisive role in implementing an education guided on quality criteria and, above all, effectiveness in its teaching and learning processes. Santana, Rossini & Preto [1] help us to reflect on the genesis of REA stating that "(...) is open because they allow other flights and other productions, is open because it allows remixing and, ultimately, is open because they understand the difference as a value to be commended and not simply accepted or considered"(p.13).

The purpose of this paper is to present the experience of a Brazilian public university in the development of OER culture in open education and mobile app context. First, the article discusses the concept of open educational resources in their contemporary approach and, subsequently, it uses the strategy of the experience report to present the results initially obtained by the introduction of OER in the university.

2 Theoretical Framework

The "2012 Paris OER Declaration" from World Open Educational Resources (OER) Congress Unesco, held in Paris on 20-22 June 2012 [2], has emphasized that the term Open Educational Resources (OER) designates,

> 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 no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work [2].

How has the theoretical OER framework improved since 2012? What are the contemporary concepts? Let us see.

2.1 OER: contemporary concept

Even considering the OER official definition coined at UNESCO on "2012 Paris OER Declaration", there are many concepts about OER although, most of them, keep the chiefly ideas assumed on Paris OER Declaration.

The "Guidelines for Open Educational Resources in Higher Education" [3] clarifies that OER is not the same as online learning, eLearning or even mobile learning. In this way, the guidelines state:

> OER can include full courses or program, course materials, modules, student guides, teaching notes, textbooks, research articles, videos, assessment tools and instruments, interactive materials such as simulations and role plays, databases, software, apps (including mobile apps) and any other educationally useful materials (p. 5).

According to common definitions [4] used both by CERI - Centre for Educational Research and Innovation; William and Flora Hewlett Foundation and UNESCO, it is also possible to define OER "as teaching, learning and research materials that make use of appropriate tools, such as open licensing, to permit their free reuse, continuous improvement and repurposing by others for educational purposes" (p. 17).

Furthermore, Butcher & Moore [5] present the following OER benefits such as education open to anyone; affordable, in other words, ideally free; students can try the course before signing up; flexible study times not bound by weekly timetables or semester calendars. Besides that, students work at their own pace; available from anywhere and not restricted by access to school or college; access to huge amounts of study materials and the intellectual capital is available for reuse.

2.2 Open education

In contemporary society, the conceptual approaches related to open education are varied and, according to Santos conception [6] it is possible to characterize it in terms of their practices, especially in context with the learning system and the historical moment in which they are inserted. The author points out the following main characteristics permeating open education:

- student freedom to decide where to study and may be from home, work or even their own institution and / or learning hubs;
- possibility of studying in modules, credit accumulation or any other means that allow the student to learn in a manner compatible with the necessary rhythm to their lifestyle;
- use of self-instruction with formal or informal validation of learning through optional certification;
- exemption from registration fees, monthly payments and other costs that would be considered a barrier to access to formal education;
- exemption of selecting exams and necessity of presenting previous qualifications, which could constitute a barrier to access formal education;
- accessibility of courses for students with physical disabilities as well as those who have some social disadvantage;
- provision of open educational resources, used both in formal and in non-formal education (p. 72).

The open education idea shows us that education is not limited to the space of the traditional classroom and may occur for lifelong learning in favorable spaces. This continuing education idea is also present in the concept of MOOC, an acronym for Massive Open Online Courses, offered by higher education institutions and which are able to attract a large numbers of people who seek to expand their level of knowledge in a specific subject. With MOOC, all material produced and access to the course is free [7].

Thus, open education constitutes non-formal education in an OER context. However, especially in countries with high educational regulations, the current challenge is validating the studies carried out under open education into the formal education systems. For example, how to validate MOOC certificates into academic credits in formal education? This is an issue that formal educational institutions are actively seeking answers to!

2.3 Mobile App

The OER concept refers to the open licensing idea on order to permit their free reuse, continuous improvement and repurposing by others for educational purposes, including mobile apps [4].

With the explosive increase in the use of smartphones and tablets an education process without those devices has become inconceivable. Especially today, the student, as native or resident digital, has assumed that teaching and OER will be available on their mobile devices [8].

In traditional face-to-face education students need to go to a specific location to use specific labs to learn physics, chemistry, math and others fields. However, especially in schools located in development countries, these important experimentation labs really do not exist. With OER mobile apps and the communication capabilities of mobile technology, students can interact with labs experimentation, learning in their own context without expansive financial investment [9].

3 Method

This experience report is defined in the context of social research with a qualitative approach. Thus, this is an exploratory and descriptive study using a data triangulation strategy, according to the type of research suggested by Gil [10].

The data triangulation technique featured the report of participant observation, analysis of the institution reports and scientific articles published by the institution researchers on the theme. According to Triviños [11] the data triangulation technique allows to expand the description, explanation and understanding of the study subject, since it is understood that it is impossible to conceive the phenomenon isolated from their social and cultural context.

Thus the OER implemented by the public researched university was analyzed, especially in the context of open education (06 MOOC) and mobile app (03), both of them developed in 2015.

• OER at a public university: experience reporting

The researched university started lately its distance education programs as part of Brazil Open University – UAB, a consortium or system of 103 Brazilian public institutes and universities in order to provide formal distance education throughout the country.

Besides the formal education, the researched university had also developed several mobile apps in its laboratory of educational technology. In the context of open education, the university started to offer MOOCs

by mean of distance education department. Both the mobile app and the MOOCs are initiatives in OER context and have contributed to the introduction of a new culture at the researched university.

a. Open education: MOOC

Conscious of the need to improve continuing education, especially in distance education, since 2014 the researched university has conducted several programs with focus on the formation of their teachers and tutors by means of distance education department. However, from 2015 onwards it started to offer MOOCs as an important tool to open education.

They have prepared and offered six new MOOCs during 2015 and all of them were based on a self-learning proposal, through a route of pedagogical learning able to promote the engagement [7] of participants. Among these, two courses are related with continuing teacher education and another four courses were designed in order to attend academic student needs, which presented topics such as reading and academic text production, ABNT style, Prezi basic and Web Conference, as per table 1.

Table 1: MOOCs 2015 – enrolled *versus* approved

MOOC	Enrolled	Approved	Approved (%)
Moodle for Teachers and Tutors	1795	594	33.1%
Planning, Evaluation and Distance Education Framework	1669	598	35.8%
Reading and Academic Text Production	6954	1606	23.1%
ABNT Style	858	417	48.6%
Web Conference	365	22	6%
Prezi Basic	637	21	3.3%
Total	**12,278**	**3,258**	**26.5%**

As recommended by Silva [6], the principal characteristics of the MOOCs offered by the researched university are related to open education concept as OER. In this way, they allow student freedom to decide where and when to study with an intense OER use, such as virtual learning environment in Moodle open source learning platform. There is also a validation of learning through an optional online certification and there are no registration fees or selecting exams.
This initial successful experience had a positive effect on the university professors as many of them felt motivated to use Moodle platform as a support for face-to-face classes as they are also engaged in developing new MOOCs, by supervision of distance education department. In fact, it has begun an OER dissemination culture at this researched university!

b. M-labs

By means of its laboratory of educational technology, the researched university has also developed the M-labs, which aim to introduce various internal and external sensors (integrated to the tablets and smartphones) for experimental measurements in physics education [12].
M-Lab is an experimentation platform in physics phenomena with tablet and smartphone devices developed with an interface that performs data acquisition of sensors embarked in mobile devices such as accelerometers and magnetometers, which enable the measurement and perception of many physical phenomena related to several areas of physics such as mechanics, dynamics fluids, electromagnetism etc.
These M-labs are designed within a pedagogical proposal that encompasses theoretical grounds, production of experimental measurement plans to begin and motivate students in performing measurements, interactive games,

videos for use in the measurement process and future measurements are listed that the experimenter can perform at any location or context in which the experimenter is inserted [12].
Another relevant point is that M-labs' accurate values are not usually found in current didactical laboratories used in physics education. In this way, M-labs present statistical tools, such as linearizing data and least squares methods, since this allows a real time data processing, optimizing both the interpretation and the assimilation of contents.
In this way, physics education is taken to a new level, since the M-Labs offer a portable laboratory, including plotting graphs and data processing, in which the student and the teacher have free experimentation possibility, at any time and place, from a simple perception occurrence of a physical phenomenon.
According to "Guidelines for Open Educational Resources in Higher Education" [3] mobile apps such as M-Labs are included in OER context. Further, professors and students can interact with lab experimentation, learning in their own context without expansive financial investment [9].

c. "Quick Voice" app

Mobile devices open new fields for the inclusion of people with disabilities and, fortunately, new researches with mobile technology have been increasing lately in order to include these people

The researched university, by means of its laboratory of educational technology, created a mobile app named "Quick Voice" with the purpose of maximizing the inclusion of the users with visual impairment. This mobile app was especially designed for the blind and visually impaired, helping them to convert bi-dimensional code (QR Code) into text files, either in writing or in audio, assisting mainly people with visual impairment [13].

Without any high-cost equipment and difficulty to use, any person can access a site or software for the creation of tickets in QR Code and transform a text into a ticket, which can be printed in a common printer. From this material another person has the possibility of transcribing the ticket into audio, which would permit the reading of the complete text [13].

"Quick Voice" app is relatively simple to operate, using the camera of the device to capture the QR images and a decoder, which transforms the images generated into text strings, which are read and converted into audio [13]. Thus, "Quick Voice" could be used in many segments, such as magazines, books, didactic material etc., as per Fig. 1.

Fig. 1: Quick Voice App

As part of OER field, 'Quick Voice" app is an educationally useful material designed for the visually impaired [5]. An open education characteristic is the accessibility tool for students with physical disabilities as well as those with some social disadvantage [6], as is the purpose of "Quick Voice".

The open mobile application development in the researched university has contributed to the dissemination of an OER culture among professors and student who are motivated to participate in the expansion of such projects.

4 Conclusions

Open Educational Resources - OER permits free reuse and improvement for educational purposes and includes courses, course materials, videos, assessment tools and instruments, interactive materials such as mobile apps and any other educationally useful materials.

In the OER field, the researched public university started open education courses in MOOC's format and designed several mobile apps such as MLabs and "Quick Voice" to be used as educational tools.

The six MOOCs offered by the researched university reached 12,278 enrollments in 2015 and all of them allow the student freedom to decide when to start, where and when to study. These MOOCs present an intense OER tool, such as virtual learning environment in Moodle open source learning platform. There are no registration fees and the validation of learning is obtained through a free optional evaluation for online certification. This successful experience motivated many professors to use Moodle open platform in their face-to-face classes and they are also engaged in developing new MOOCs, disseminating OER culture through the university!

The researched university has also designed interesting mobile apps as OER tools. For instance, M-Labs is an experimentation platform in physics education with tablet and smartphone devices, in which the student and the professor have the free portable experimentation in physics phenomena, at any time and place, without expansive financial investment in face-to-face laboratories.

"Quick Voice" mobile app was another OER tool designed by the researched university. Especially projected for the blind and visually impaired, "Quick Voice" app is a strong tool to help them to convert bi-dimensional code (QR Code) into text files, either in writing or in audio. M-labs and "Quick Voice" apps have promoted an OER culture among professors and students, motivating them to participate in new OER projects.

The development of Open Educational Resources is quite challenging and requires a multidisciplinary team committed with the results. However, faced with increasingly reduced budgets the public universities need to strengthen the OER culture in order to take account of emerging contemporary educational demands, especially in developing and poor countries.

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