Open Educational Resources: an opportunity for virtual learning institutions

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Abstract

The Universitat Oberta de Catalunya (UOC, Open University of Catalonia) is involved in several research projects and educational activities related to the use of Open Educational Resources (OER). Some of the discussed issues in the concept of OER are research issues which are being tackled in two EC projects (OLCOS and SELF). Besides the research part, the UOC aims at developing a virtual centre for analysing and promoting the concept of OER in Europe in the sector of Higher and Further Education. The objectives are to make information and learning services available to provide university management staff, eLearning support centres, faculty and learners with practical information required to create, share and re-use such interoperable digital content, tools and licensing schemes. In the realisation of these objectives, the main activities are the following: to provide organisational and individual e-learning end-users with orientation; to develop perspectives and useful recommendations in the form of a medium-term Roadmap 2010 for OER in Higher and Further Education in Europe; to offer practical information and support services about how to create, share and re-use open educational content by means of tutorials, guidelines, best practices, and specimen of exemplary open e-learning content; to establish a larger group of committed experts throughout Europe and other continents who not only share their expertise but also steer networking, workshops, and clustering efforts; and to foster and support a community of practice in open e-learning content know-how and experiences.

Keywords: OER, Virtual Learning Environments, eLearning

Introduction

On June 2, 2006, Dr. Imma Tubella, rector of Open University of Catalonia, signed the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities. This declaration defines Open Access "as a comprehensive source of human knowledge and cultural heritage that has been approved by the scientific community" and stimulates the signatory institutions "to promote the Internet as a functional instrument for a global scientific knowledge base and human reflection". This signature was not only an institutional declaration; it was the result of different UOC initiatives, projects and sensibilities intended to promote Open Access inside of the Open University of Catalonia community.

The Berlin Declaration follows in time the Budapest Open Access Initiative (BOAI, 2002), which was the first major statement about open access and continues to be, with Berlin and Bethesda (2003), one of the most central and influential definitions on open access and the OA movement. The BOAI considers open access as the "free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than

those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited".

These declarations and initiative do not directly address educational resources, but cover research production, holders of cultural heritage, publishers, etc., most of the stakeholders of the educational resources. It is clear that with these statements we realize that the process of moving to open access changes the dissemination of knowledge with respect to legal and financial aspects. For instance, "the Berlin Declaration's organizations aim to find solutions that support further development of the existing legal and financial frameworks in order to facilitate optimal use and access. The issue is not anymore "open access or no" but is about the agreement on an economically sustainable model (or models) for Open Access" (Velterop, 2004).

Apart from these declarations there is the need, though, to properly define and contextualize the learning contents, as the characteristics of the learning process in itself determine several aspects related to quality, usage and institutional implication.

In this sense, the UNESCO hosted the *Forum on the Impact of Open Courseware for Higher Education in Developing Countries, in July 2002,* which coined the term Open Educational Resources, defined by the participants at that forum as: "*the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for noncommercial purposes*".

Besides, it is commonly accepted that open access to educational resources should include open courseware and content, open software tools (LMS and LCMS), repositories of learning objects and free educational courses, among others (Hylén 2005), that is, not only all the elements used in the learning process, but also the tools and software that give support to such process and to the creation of educational resources.

As an institution partly funded by public money, UOC has decided it has a responsibility towards society that goes beyond those usually assigned to a university, that is, educating its students and carrying out research activity: it should open its resources so that all society can receive the benefit of its activity. OER presents an opportunity which is perfectly suited to the profile of a virtual university.

It should also be noted that OER should not be considered exclusively as an altruistic initiative without further reward: the current higher learning scenario is an extremely competitive one, in which all institutions should make an effort to achieve a better market position to be able to keep on with their activity. UOC has made a significant effort in the last decade developing high quality pedagogical materials in a wide range of knowledge areas, and now it should be able to profit from an opportunity to showcase that effort.

Distance learning presents a challenge in the production of learning resources, which have to be rich in the use of interactive multimedia solutions, resulting in an expensive and long production process. Being able to benefit from other institutions efforts is an added benefit gained from pertaining to the OER community, thus reducing production and maintenance costs.

Finally, UOC acknowledges that an exclusively closed model is very hard to sustain in today's digital world: our educational resources are already in a digital format. As the cultural content industries have shown, it is extremely hard to keep digital assets inside closed walls indefinitely. Any quality content will be copied and distributed eventually, with or without the

knowledge of the owner. Resistance to the change to a new model would prove finally useless. The position that can be achieved when leading change is a much better one than the one an institution would reach while opposing it. That in itself is not a reason to follow the path of OER, but only one more factor to be taken into account.

UOC is already working in the promotion of Open Access and Open Educational Resources. We are participating in two European projects: OLCOS and SELF, which we will describe later. The objective of the Open eLearning Content Observatory Services (OLCOS) is "building an (online) information and observation centre for promoting the concept, production and usage of open educational resources, in particular, open digital educational content (ODEC) in Europe", while the aim of the SELF Project is "to provide a platform for the collaborative sharing and creation of open educational and training materials related to Free Software and Open Standards". Faculty members from Computer Sciences, Information Sciences, Education and other Departments of the UOC are working and doing research in these two projects.

The UOC UNESCO Chair in e-Learning is also working in the Open Educational Resources area. During this past year, the Chair organized, inside of UOC, debates and workshops whose aim was to promote internal shared spaces among faculty, technicians and staff. The UNESCO Chair in e-learning invited Susan d'Antoni to UOC to present and debate with us in a round table format the results of two international virtual forums organized by the IIEP (International Institute for Educational Planning). In November, the Chair is analyzing the OER issues from the institutional point of view, which means taking into account the educational, technological, economical and legal implications of the institutional decision to adopt OER initiatives.

UOC also has a research group dealing with intellectual property rights. This group is analyzing changes in the field of intellectual property resulting from the impact of technology on digital networks. As a result of these studies and research, the UOC Press Area —which is in charge of contracts and the production of our learning materials— is in the process of modifying the final intellectual property rights contract with UOC authors to introduce the possibility of opening the learning materials as OER. That should affect all future contractual activity, but already signed contracts have to be studied to analyze the level of complexity needed to open already created resources susceptible to the process.

These facts are related to other open source and open software projects at UOC. UOC is leading a consortium of universities promoted by the Catalan government in a project to build open source complements for open source learning platforms. To this end, UOC is building a network of academics and technological staff at universities, thus far limited to Catalonia, but which by using the free and open idea of these networks will soon include other developers at European or North American universities.

Consistent with these facts and projects, we have also developed a "free software work place" for people who work at UOC. The aim is to facilitate the exclusive use of open source software in their computers to perform their daily duties, if they so choose.

We have already mentioned that practically all of UOC's educational assets are already in a digital format, as a result of its fully virtual status: education carried out in a virtual campus needs all of the knowledge transmission to take place in a digital medium. UOC has built in the last decade a corpus of more than one thousand complex resources covering all its areas of expertise, and in doing so has developed an efficient workflow. The advantage that fact represents is a big one, and institutions that have a different background will have to review their process in a diligent way to be able to put out resources in an efficient and sustainable manner.

The UOC Virtual Campus

UOC is an exclusively on-line university born off the knowledge society whose mission is the facilitation of continuous learning. To this end it makes intensive use of information and communication technologies to offer education beyond time and space frontiers. Both the date of its foundation, 1994, and the high number of members in its community (about 37,000, including students from Spain and Latin America, professors, managers and other staff), make UOC a pioneer university in the field of higher and continuous education via the Internet.

The UOC educational model places the student as an active agent at the centre of her learning process. Along this process, in each subject the student is assisted by a team of professors (both faculty and consulting professors). Furthermore, a tutor guides and advises the student from the moment she starts her degree until the moment she finishes it. The student is also helped by her partners in the virtual classroom spaces, which are located inside the UOC Virtual Campus.

UOC's Virtual Campus is a highly-developed intranet, developed around the student's learning experience and supporting all academic necessities, for students, faculty and technical and management staff. In the virtual spaces offered, the student can find a complete course syllabus, the course learning materials and other resources (as the Digital Library or academic software). The Virtual Campus also includes an e-mail service, a chat service and some other spaces (newsgroups and distribution lists) conveniently designed to promote interaction among students and among students and professors.

UOC's compromise with society is not new, and it has some initiatives designed to give added value to society, among which @teneu is of special interest. @teneu's goals are to make UOC's knowledge *and* pedagogical model available to anyone, with independence of their educational background and accreditation. @teneu offers access to more than 350 subjects in every field of knowledge offered by the University, from Information and Communication Sciences to Computer Science or Law. Students enrolling in one of @teneu's subjects share the same virtual classrooms offered to students enrolled in a degree. While not involving free access, it is a significant first step towards opening UOC's educational resources.

Institutional challenges

The technology behind an OER effort, finally, should also be studied with special attention. Dealing with a complex process potentially involving hundreds or thousands of collaborators and resources is a task that can only be accomplished with the help of well deployed technology, used proficiently. It is obvious that quality content creation is the first step and, so, basic to the process, but one should not forget that without the proper labelling and distribution the best resource will not be discovered and used. Thus, an awareness of content management platforms and the final user strategies to locate knowledge on the internet are crucial to a successful OER strategy.

Coherence is a value that defines the idea we want to explain in this reflection. Let us mention an interesting example. Grigori Perelman, Fields Medal recipient at the International Congress of Mathematicians 2006, solves in the affirmative the famous Poincaré conjecture, posed in 1904 and regarded as one of the most important and difficult open problems in

mathematics. He decided to publish this solution in ArXiv Journal, an archive for electronic preprints of scientific papers in the fields of physics, mathematics, computer science and biology, which can be openly accessed via the Internet. Perelman's initiative shows us the important changes brought about by the Internet in the dissemination of knowledge. We can learn from this initiative and reflect on why we are paying twice for knowledge creation, once to produce it and again to access it.

In keeping with this value of coherence, UOC is developing initiatives, as we have mentioned, to make the principles of OER a reality. Toward this end, we are thinking about and working on how we want our learning resources to be. We are talking with our students, with faculty, instructional designers, etc, about this objective and are working on both the theory and the reality of the facts and concept of quality when using OER. In addition, we are working to build sustainable Open Educational Resources in this new world of conditions pertaining to property rights and open knowledge. We believe that the only way to achieve a sustainable situation using OER is by producing sharing networks. We have to learn, in this sense, from the open source networks.

We cannot accept, as professors, researchers, or as higher education institutions, the privatization of knowledge in the information society. An important revolution took place in the area of education during the 19th century. Many western countries began to understand that education was a public good, and as result of this idea, governments decided that basic education must be free for all citizens. That concept has been included, not only in the UN Humans Rights Declaration, but also in the First Laws or Constitutions of many countries. Perhaps we are now in a similar situation due to the impact of Internet on our society. Internet means access to knowledge. Maybe now is the moment to say that Internet can also mean free access to knowledge. This should again cause a great educational revolution, not just for higher education institutions, but also for people in a continuous process of learning, companies, public administrations, etc.

There is yet another revolution, smaller but important for open and distance higher education institutions. When the UK Open University came into being, they defined the word "open", as related to universities, as "universal access to knowledge" because this new generation of universities allows everyone access to higher education studies without the academic or legal barriers that have encumbered traditional universities. We should remember that UK Prime Minister Harold Wilson referred to this university as a "University of the Air" because they were using radio and television to deliver educational courses. Now we are again in the process of defining the "open" concept for open universities such as ours. We believe that now, in the Internet era, "open" means, open access and free access to knowledge. This is now another way to understand this concept, and, in this sense, the Open University of Catalonia is working to make this a reality.

UOC's open access projects

As part of several internal projects, UOC is concerned about the design of a standards-based e-learning platform that permits the design of customizable user training itineraries, using reusable learning objects as the basic building blocks of the system (Mor and Minguillón, 2004). As regards customizable training itineraries, the basic idea is to convert any current teaching plan (which is usually a completely linear document, static and isolated), into the skeleton of a dynamic and variable process which involves aspects of Instructional Design for personalization centred on the user (i.e. the student) and it is related to all the learning objectives which appear throughout an academic period (materials, resources, activities, teaching calendar, etc.), giving rise to what is called a learning itinerary.

Learning objects, structured and labelled using standards, are combined according to pedagogical criteria, the know-how of the teaching team, and the recommendations derived from observational studies realized previously with the users in the virtual classrooms, creating different possible formative itineraries. The itineraries form a non-linear graph structure which permits the expression of the whole richness of the learning process (obligatory and optional activities, repetition of activities, etc.). Therefore, there is a strong necessity to define a comprehensive set of metadata for learning objects.

In this way, learning objects, structured and labelled using ontological representation of e-learning standards (LOM / Dublin Core / MPEG-7, SCORM, IMS LD), are combined according to (1) pedagogical criteria, (2) the know-how of the teaching team, and (3) the indications and knowledge derived from observational studies carried out previously with the users of the virtual classrooms (students principally, but also tutors and teachers), creating different possible learning itineraries. The main user model characteristics used are thus (1) a representation of the current competencies of each learner, (2) a record of his/her interactions with the virtual environment, and (3) a continuously updated model of the learning style of the learner.

Itineraries form essentially a non-linear graph structure of nodes of different types which allows the representation of the whole richness of the learning process (mandatory and optional activities, repetition of activities, interactions of a diverse kind, reminders, etc.). The data collected during the interaction of users and learning resources will serve as a basis for elaborating a method for the conversion of traditional educational programs into adaptable itineraries, and it will also serve as a basis to produce a guide of best practices in the recognition of learning styles, necessary metadata and the subsequent personalization of the learning-object based itineraries.

The integration of the learning resources as part of a digital library, and the digital library in itself as part of the learning process, is a key issue for the success of a rich, personalized virtual learning environment (Ferran et al., 2005). The learning process becomes an open path where producers and consumers of knowledge interact with the e-learning environment. This usage can be analyzed for improving the quality of the metadata, following the collaborative filtering approach.

Therefore, it is important to establish a common framework for defining both formal and non-formal learning in virtual environments, with the support of an intelligent tutoring system which will help learners to select the best and most appropriate resources, even if these resources are not part of the repository available at the institution, but have been located by the learner itself. Localizing and reusing educational resources becomes an important issue for ensuring a high degree of flexibility, but there are several issues regarding technological, methodological, legal and economic aspects that must be analyzed with enough detail.

OLCOS: Open eLearning Content Observatory Services

In this sense, OLCOS is funded under the European Union's eLearning Programme and aims at building an (online) information and observation centre for promoting the concept, production and usage of open educational resources, in particular, open digital educational content (ODEC) in Europe.

Presently the benefits and characteristics of open source software in education is apparent and widely acknowledged, this is not the case with respect to the concept of digital open content that may particularly benefit flexible and open learning models (e.g. collaborative

knowledge and skills building) in schools, higher educational institutions and vocational training.

Partners working together in the OLCOS project are:

- Salzburg Research Forschungsgesellschaft (Austria, project-coordinator) [http://www.salzburgresearch.at],
- FernUniversität in Hagen (Germany) [http://www.fernuni-hagen.de],
- Open University of Catalonia (Spain),
- Mediamaisteri Group (Finland) [http://www.mediamaisteri.com],
- ecmc - European Centre for Media Competence (Germany) [http://www.ecmc.de]and
- EDEN - The European Distance and E-Learning Network (UK/Hungary) [http://www.eden-online.org].

The main objectives of the projects are:

- to provide organisational and individual e-learning end-users in Europe with orientation, perspective, and useful recommendations (Roadmap),
- to provide to the end-users easy, but intelligent access to practical information and support services in the creation, sharing, and re-use of open e-learning content, and
- to establish a larger group of committed experts throughout Europe who not only share their expertise with the project consortium, but also steer networking and clustering efforts and, finally
- to foster and support a community of practice in open e-learning content know-how and experiences.

Results of the project include:

- the ODEC Roadmap 2012 which explores the possible pathways towards a higher level of production, sharing and usage of Open Educational Digital Content. The Roadmap will provide an orientation as well as recommendations on possible measures and actions to support decision making at the level of educational policy and institutions (in print);
- a set of online tutorials that provide information and guidance on how to practically work with Open Educational Digital Content. These tutorials will be freely accessible on the web in several languages (available at http://www.wikieducator.org/Open_Educational_Content);
- several awareness raising workshops in the European eLearning community designed to foster the take-up of the concept of Open Educational Digital Content, and how to develop the required infrastructures, legally sound practices, educational policies and organisational strategies (second project year).

In recent years, significant conceptual and technical progress (standards, tools, systems) has been made with respect to interoperable, accessible and re-usable learning objects. However, the growth in volume of well produced, managed and exchanged high-value e-learning content in Europe is considerably below the state-of-play in leading countries such as the USA and Canada. In fact, while there the domain of open e-learning content is flourishing due to massive and sustained efforts (e.g. repositories such as Connexions, MERLOT or SOFIA), a comparison must come to the conclusion that in Europe the Open Content model is stagnating. Many efforts in creating open digital libraries and archives as well as open source tools have been funded, but these smaller projects show little impact on the level of end-users. In particular, community strengthening approaches are missing.

Hence, the expectations placed in these efforts in terms of educational, social inclusive and economic terms have not materialised to a sufficient degree. In fact, in order to achieve a dynamic growth in open content creation, sharing and use it is necessary to provide the organisational and individual end-users with the required information and support (Ferran et al., 2006). Further, it is important to emphasize that "open content" is not primarily about licensing schemes, but about innovative collaborative pedagogical and didactical approaches, open learning practices, and adding value through providing guidelines, use cases, and lessons learnt derived from these practices. With respect to the roadmapping work, it should be mentioned that previous research in the broad field of open educational resources has been valuable, but rather narrow and fragmented (i.e. from the perspective of technical experts, not educational practitioners).

SELF: Science, Education and Learning in Freedom

SELF (http://www.selfproject.eu) is an international project aiming to provide a platform (the SELF platform, http://www.selfplatoform.eu) for the collaborative sharing and creation of free educational and training materials on Free Software and Open Standards.

The SELF Platform is initiated by an international consortium of seven partners in Europe, Asia and Latin America:

- Universitat Oberta de Catalunya (Spain),
- University of Gothenburg (Sweden),
- Homi Bhabha Centre for Science Education (India),
- The Internet Society (Netherlands),
- Free Software Foundation Europe (in all European countries),
- The Internet Society (Bulgaria),
- Fundación Vía Libre (Argentina).

These partners work closely together to facilitate communities as well as to raise awareness and to contribute to the building of a critical mass for the use of Free Software and Open Standards.

The European Commission supports the SELF project for the initial set up of the platform and the first educational and training materials. Additional funding is expected from national and local governments for localisation, dissemination and specific activities. Once established, participating members from target groups will benefit from the platform and exploit its results freely. The aim is to produce a snow ball effect starting with public funding.

The aim of the SELF Platform is twofold:

1. To become a repository with free educational and training materials on Free Software and Open Standards.
2. To be an environment for the collaborative creation of new materials.

Inspired by Wikipedia (http://www.wikipedia.org) the SELF Platform provides the materials in different languages and forms. The SELF Platform is also an instrument for evaluation, adaptation, creation and translation of these materials. Most importantly, the SELF Platform is a tool to unite community and professional efforts for public benefit.

The SELF Platform is based on two main concepts: Free Software and Open Standards.

In contrast to proprietary software, *Free Software* (http://www.fsf.org/licensing/essays/free-sw.html) can be freely used, copied, studied, modified and redistributed. Free Software offers the freedom to learn and to teach without any proprietary barriers – the basic requirement for the self-enabled human in the information society. Open Standards and the ability to exchange data and to share information and knowledge have become essential for cost-effective, flexible and transparent support of government and business processes.

Free Software applications are available in all fields and can be obtained from many websites. However, to use them you must first know of their existence and practical value. In addition, the lack of technical support has been called upon as a reason to failure or delay for the adoption of Free Software applications. The real and long term technological change from private to Free Software can only come by investing in education and training. The SELF Platform creates awareness on the advantages of the use of Free Software and provides educational and training materials to learn how to use Free Software applications.

Open Standards (Greve, 2004) are formats defined verifying some conditions which ensure that any software producer has enough information to implement them and, thus, guaranteeing the persistence of information. There are various definitions for what should or should not be considered an Open Standard. For example, as stated in the European Interoperability Framework for Pan-European eGovernment Services (European Interoperability Framework, 2004), the following are the minimal characteristics that a specification and its attendant documents must have in order to be considered an open standard:

- The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (e.g. consensus or majority decision).
- The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.
- The intellectual property – i.e. patents possibly present – of (parts of) the standard is made irrevocably available on a royalty-free basis.
- There are no constraints on the re-use of the standard.

Learning Standards. Apart from the use of open standards for the "individual" SELF contents (or Learning Objects, LO), all the documents in the SELF platform must be organised according to a complex structure. Contents will be provided in different languages, different educational levels, different objectives, and so on. Because of this, the organisation of the contents will be performed using some didactic or learning standard. SELF will store the so-called "metadata", which is a set of complimentary information associated with each particular content. Three alternatives may be used as open standards for the internal representation of the LO in the SELF repository, namely, the Learning Object Meta-data Standard (LOM) (IEEE, 2002), the Shareable Content Object Reference Model (SCORM) and IMS Learning Design (IMS LD) (IMS, 2003).

The SELF Community. The SELF Platform aims to be a community of all interested parties associated with educational and training materials about Free Software and Open Standards. The SELF Platform specifically embraces universities, schools, training centres, Free Software communities, software companies, publishers and government bodies. All users are encouraged to participate in the production process and the exploitation of results.

Those who participate in the platform can improve their own contents collaboratively while gaining expertise, prestige and recognition within the community. Simultaneously their participation helps to improve the SELF materials enhancing the SELF community. As a

result the community model of the SELF Platform assures a prevailing situation for those who provide efforts to the platform and those who use it.

Unesco Chair in e-Learning

Finally, the UNESCO chair in e-learning held at UOC is the opportunity for establishing a common framework for all the ongoing e-learning projects at the institution, and also for becoming a place for sharing valuable experiences and promoting new trends in teaching and learning using virtual environments, such as the use of open educational resources in lifelong learning scenarios, providing new opportunities for people outside the classical educational context.

The main barrier for such purpose is, usually, the lack of information that all the stakeholders in a educational institution need to know in order to engage in new methodologies, policies and strategic decisions for adopting a completely different point of view. Therefore, the UNESCO chair is changing its focus in order to promote a strong information workflow between all the stakeholders (authors, publishers, teachers, instructional designers, technologists, and so) with the aim of combining all individual efforts (OLCOS, SELF and other OER and e-learning related projects at UOC) in a strong current that will change the institution itself, making it to adopt (or at least, to seriously consider) the opportunities that arise from the new trends and demands in the educational sector.

Therefore, in the following years, OER will be an important issue to be discussed under the UNESCO chair in e-learning, by means of seminars, roundtables, technical reports and publications, with the participation of experts and project leaders, following the recommendations provided by the outcomes of the ongoing projects and the related expert meetings.

Conclusions

We have stated in this paper that OER are gaining importance and are going to be a prominent field of work in education in the following years. On one hand, institutions are putting their weight behind the effort, adhering to declarations like the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities or the Budapest Open Access Initiative. On the other hand, all institutions, and specifically UOC, are realizing the benefits of an OER effort in a mid term, once all methodological, technological, legal and economical aspects have been taken into account.

In this paper we have presented the institutional framework for OER at UOC, exemplified on the OLCOS and SELF European projects and the work of the Unesco Chair in e-Learning, and our intention to move forward in the OER direction.

Given the current scenario, it is easy to predict more institutions and individuals are going to adopt the OER model and contribute part of their existing and future intellectual property for open access. It is important that in such an scenario a coordinated effort is made to limit the duplication of efforts, the availability of a quality infrastructure and methods to warrant findability and easy public access for all. It is because of that reason that we deem it very important to progress towards the use of standards in the process of OER creation and dissemination.

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