

# THE UNIVERSIA/UPM OPEN COURSE WARE INICIATIVE TO SHARE THE KNOWLEDGE

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## Abstract

This paper shows the most innovative aspects of the Universia/UPM OpenCourseWare (OCW) project referred to globalization of higher education in a Latin-American environment and the sharing of knowledge. The MIT idea of offering, through Internet, the available educational resources in an open way has been spread all over the world and many Universities and Institutions have joint this initiative. Universia, Institution which gathers one of the biggest world universities net, has launched an OCW site, with the technical collaboration of the Technical University of Madrid (UPM) who is working as the main university project promoter. The OCW-Universia site has one of the greatest growth rates at present and is facing new challenges and developments which will allow its expansion as a reference within an international context.

## Keywords

Educational innovation, OpenCourseWare, Open Educational Resources, International Higher Education, Open Knowledge.

## 1. INTRODUCTION

The OpenCourseWare (OCW) project started at the Massachusetts Institute of Technology (MIT), in the year 2001, with the aim of offering pedagogical materials in an open and free of charge basis to society. At present, the MIT provide about 1800 courses freely and universally accessible on the net [1]. The main objective of this proposal is to promote and develop higher education sharing, in a free and consistent way, the teaching resources with: other educators who may re-use them for their teaching work; students; graduates and anyone in general who wants to improve its knowledge [2,3]. This philosophy is being spread to the world main universities creating the OCW Consortium (OCWC), in which more than 200 Universities and Institutions collaborate. Within this context new proposals, both technical and philosophical are arising for the freely disposal of teaching resources.

Universia, the Latin-American Universities network, gather at present about 1070 universities from 11 different countries. Among its goals are: the offer of many quality services to the university community, supporting teaching and scientific research projects, encouraging the use of new technologies and promoting the business – university relationship, in order to encourage a Latin-American site for knowledge. Regarding OCW project, initially Universia promoted the translation of the contents of some MIT subjects into Spanish to start subsequently the creation of an OCW Consortium for Latin-American countries. By means of an agreement with the Technical University of Madrid (UPM), the OCW-Universia site have been developed, translated into 14 languages; counting at present with the participation of 37 Spanish Universities and 27 Latin-Americans and it has published about 300 courses.

The initial conditions to include Higher Educational Institutions in this project regard three different types: educational, technical and legal matters. For the first one, it is demanded the publication of teaching materials orderly structured with at least 10 courses. Within these materials it can be included all kind of resources: presentations, books, videos, simulations programs, etc. always with a common organization and appearances. Regarding technical demands a globally and approachable site via Internet with the right quality must be maintained.

Although it has not been a requirement, most of participants have used the technology of content management based on eduCommons, an Open Source project developed by Utah State University, which include very important normalized, flexible and personalized features. Finally, the legal aspects came from the Creative Commons License that implies to offer and publish copyright cleared materials. The use, re-use and adaptation are allowed, provided the author of material is mentioned; they are not used with commercial purposes and they are offered, at least, within the same sharing conditions.

The following points explain the concept and main objectives of an OCW site and, in particular, that of the OCW-Universia site aims and structure, as an OCW site net for Latin-American universities. Afterwards it is described the net situation at present, indicating the number of participant universities, knowledge areas, courses, type of contents, making a comparison with others OCW sites all over the world.

We will make reference to the UPM's OCW when necessary to emphasize the particular contents and means used for its launching. Statistical data of access and downloading volume are also included. Finally, we analyze the prospects, new ideas and proposals to share knowledge and the needs to maintain and promote the educational resources availability at the Universia OpenCourseWare site.

## 2. OPENCOURSEWARE CONCEPT

An OpenCourseWare site is a web site which contains teaching material developed by Professors for higher education, structured in courses which are offered freely in an open way, globally accessible through Internet. The courses contend not only classroom material, but exercises, examples of real cases and case studies, practices, additional reading and other digital material like videos, simulations..., on an organised way and usually with a course guide. An OCW site does not count, at least at present, with forums, mailing and others teacher-student interactions means, and it does not allow for official recognition of the studies in any way.

The OpenCourseWare Consortium (OCWC) has been formed [4] with the proposal of expanding the reach and impact of opencourseware by encouraging the adoption and adaptation of open educational materials around the world. This organization is a collaboration of more than 200 higher education institutions from around the world creating a broad and deep body of open educational content using a shared model. Other goals are to advance education and empower people worldwide through opencourseware, ensure the long-term sustainability of opencourseware projects and foster the development of additional projects.

Recently, it has been created the OCWC Board of Directors of which a UPM representative is a member. The OCWC site is shown on figure 1



Figure 1. OpenCourseWare Consortium site

These initiatives can be included within a wider philosophy of sharing any educational resources and knowledge on an open way. The idea of sharing knowledge, specially through the great possibilities Internet offers, has a wide repercussion in the last years. A great part of the Web evolution towards Web 2.0 or "social web" has gone precisely in that direction (e.g. Wikipedia), developing nets which share ideas, situations, images; knowledge, in short, although in a very messy and chaotic way. UNESCO has established some definitions about open knowledge and knowledge-based society [5] and has adopted in 2002 the concept "Open Educational Resources" (OER) to refer to materials and other learning subjects offered openly through the use of information technologies, for consulting, use and adjustment to a users community with no commercial purposes.

## 2.1 Objectives and requirements.

The general objectives of an OCW site can be summarized as follows:

- Provide a free, simple and coherent access to the educational materials for educators, students and self-taught person worldwide.
- Generate spaces of collaboration between universities with respect to the pedagogical material.
- Help narrow the digital breach by providing open access to educational resources, in accordance with the recommendations of the World Summit on the Information Society (WSIS) [6].

Additionally, the provision of open educational content and materials allow a number of benefits such as: promote the approach of the professors to the Information and Communications Technologies (ICT); a stimulus of the innovation and improvement of the educational resources used by the professors; an opportunity to address the intellectual property and recognition of copyright; greater projection of the institution and a attractiveness for both national and foreign students, and finally an advance in knowledge after releasing educational resources.

It is important to note that the implementation of an OCW site not only implies benefits, but it is necessary to have a range of capacities and resources: human, technological, legal, and so on. In order to have all these requirements, as detailed below, and to be able to initiate a site OCW it is necessary to set up an organizational structure counting with people of the right technical and legal knowledge and with the aid of educational personnel to carry out these tasks.

First it is necessary to count on the capacity and disposition of the professors to put the contents of their courses at open. This usually requires the professor to remake his educational material and to develop new materials, or at least reorganize these resources, which should be available in digital format. The professors ready to this effort act voluntarily, waiving to the commercial use of the educational material and without a clear recognition of this activity. So that a site OCW may have sufficient published resources it is necessary to convince the professors of the advantages to publish the contents in open, since they are the main actors of this type of projects, offering all the technical support they may need. In order to achieve optimal results, both in quality and quantity of available resources, it is necessary to involve all sectors of the Institution.

Secondly a series of additional means are also necessary, not only in terms of technological resources: servers to locate the site, Content Management Systems (CMS), these can be "Open Source" and therefore free, but primarily by the need for additional human resources for the maintenance of the site and for supporting teachers and providing new services.

Thirdly, it is necessary to establish a legal procedure and the participation of experts on legal issues, allowing the provision of open educational resources. The Creative Commons license [7] is the most commonly used for the supply of content in open, yields the use, reusability, adaptation and the distribution by others, of a work or certain resources, under the following conditions:

- **Attribution.** You must attribute the work in the manner specified by the author or licensor.
- **Noncommercial.** You may not use this work for commercial purposes.
- **Share Alike.** If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

### 3. UNIVERSIA OPENCOURSEWARE NETWORK

Universia is one of the greater networks of university cooperation, which merges 1,070 universities and higher education institutions in 11 countries of Latin America. The Universia network integrates 75.6% from universities in the countries where it is present, with 10.2 million students and 850,000 professors. Its main objective is to act as a promoter of change and innovation to help the universities to develop shared projects and to generate new opportunities for the university community, responding to the demands of the institutional and business environment, with sustainability criteria.

The OCW Universia project tries, under the cultural and geographic affinity of the Latin American space, to facilitate the presence of higher education institutions of this region in the world-wide OCW consortium and to promote the open publication of its courses and others educational contents in the languages of our community. The OCW Universia site is shown in figure 2.

The screenshot shows the OCW Universia website. The header is red with the 'uni>ersia' logo and 'OCW' text. Below the header is a navigation bar with language options: Español | Català | Euskara | Galego | Português | Brasileiro | العربية | 中文 | Deutsch | English | Français | Italiano | 日本語 | Русский. The date is 'Miércoles: 24 / 09 / 2008'. The main content area is divided into a left sidebar and a main content area. The sidebar has sections: 'INFORMACIÓN DEL PROYECTO OCW', 'INICIATIVA OCW UNIVERSIA', and 'ACCESO A CONTENIDOS'. The main content area has a 'BIENVENIDOS' section with a welcome message and a link to 'SERVICIOS DE INTERÉS: NOTICIAS | ARTÍCULOS | CALIDAD Y BUENAS PRÁCTICAS'. Below this, there are two sections: 'ACCESO POR CATEGORÍAS' with an image of a hand pointing at a laptop, and 'ACCESO POR INSTITUCIONES INTEGRANTES' with a world map image.

Figure 2. OpenCourseWare Universia.

The OCW-Universia project has been developed in several phases: initially by means of the translation into Spanish of several courses of the MIT-OCW, later with the launching of OCW Universia network through a group of promoting Universities and at the moment it is in a growth process in the number of courses available and extension to other universities. The adhesion process is made by signing a Memorandum of Cooperation, in which the University is committed to setting up a site OCW with at least 10 published courses and promoting the common project.

Within the consortium OCW Universia, although initially involving 37 universities in Spain and 27 Latin American, today only 14 Spanish universities and 2 from Mexico have fulfilled the requirements to publish in open at least 10 courses and therefore have an OCW site accessible. Currently the total number of courses exceeds 300, and the two universities with more published courses are the University of Alicante and the UPM.

To foster the incorporation of new OCW sites in the consorcio, in May 2008 the first Universia-MEC Award has been announced for the best course of the year in OCW-Universia. In this competition a total of 55 subjects grouped in five categories took part in voluntary form: Architecture and Engineering, Art and Humanities, Sciences, Health Sciences and Social and

Legal Sciences. The first prize was given to the course of "Free Software" that belongs to the Technical University of Madrid (UPM). They have also been awarded second prizes to the National University of Distance Education, (UNED) to the University of Alicante and to the Carlos III University.

The universities set up an OCW Technical Office for the management of each OCW site and its relations with OCW Universia. This technical department should provide educational, technical and legal resources. The educational aspect is focused on: to adapt OCW model to the University characteristics within the OCW-Universia framework, to coordinate and to encourage the participation of professors, to provide the information and the necessary advising to them, to catalogue the subjects and to guarantee the quality of content. The technical profile is in charge to maintain and to improve the OCW site and provide assistance to the professors for the publication of the courses and content.

Finally the legal resources available have the function to advise professors on the legal aspects of the Internet publication, assist in cleaning up the intellectual property of content and develop a protocol that provides legal guarantees for the participation of all parts. In the case of UPM, so that the University could publish those contents, the university signs a contract with the professor, by which the participation of teachers in the OpenCourseWare project is regulated. In this contract, the author assumes the intellectual property, yields the rights of use and the copyright is recognized.

The OCW Universia project provides member institutions with technical assistance, through UPM's Technical Office, for setting up the platform management and publication for its subjects which constitutes the OCW site for each University. This assistance consists mainly in the provision, to the technical departments of the universities, of a complete system based on eduCommons [8], an Open Source project built on Pone, developed by "The Center for Open and Sustainable Learning" of Utah State University specifically for the creation of OCW projects.

The main features of the Content Management System are:

- Clear and simple process for creating categories and course in order to add material.
- The inclusion of metadata in the classification process and storage and publication formats.
- The option of flexible content structuring.
- Full HTML editing support.
- Option of adding content by importing a compressed ".zip" file.
- Full metadata management and imports and exports in standard formats. Specification based on the IEEE 1484, Learning Object Metadata Standard (IEEE LOM) and ISO 15836 (Dublin Core).
- Import/Export of courses and material in IMS packages.
- Option of accessing content via RSS sources.
- Full workflow management via role and status.
- Inclusion of intellectual property and user licence management mechanisms.
- Easy implementation and personalisation; specifically, the adaptation to the institutional image of each University.

### **3.1 Accesses to the contents**

The access to the content of each one of the Universities can be made either directly to OCW sites, or through OCW-Universia. From here, can be accessed by category, by institutions or through a search engine (figure 3), besides to have information in different languages, referring to the news, articles, etc. In each one of the universities OCW sites that form it, the number of contents and courses is very different, for example in the OCW-UPM, that was the first to launch the site, now 45 courses (other 18 are in creation process) are published, corresponding to 20 areas of knowledge or categories. Each one with a large number of educational resources, from 30 in the lower part, to more than 1000 and with an average around 100 resources. The formats are very varied: text files, slides, graphics, spreadsheets, videos, simulations in flash, java, etc. and with a quality similar to best sites OCW of the world.



Figure 3. Access to the contents by categories, institutions or by means of a finder.

Next some of the formats and structures of sites belonging to the consortium OCW- Universia are shown. Although these contents and resources can be grouped in different ways, within the Universia context and in general in the OCWC, the available materials are organized by courses, which normally correspond with subjects of official training, and these are grouped into categories or areas of knowledge. Figure 4 shows the home page of the OCW-UPM and the one of Alicante University.



Figure 4. OCW sites of UPM and Alicante University

Each one of the courses includes general information about pages that describe it: the title, a presentation of the subject located in its context and a representative and most visual possible picture, the program of the subject and the teaching staff.

The pages that link to resources and materials, although there is a certain freedom for modification and adaptation to the characteristics of each course, follow a uniform structure that can include: class material, obligatory or recommended readings, exercises, projects and/or cases, practices in the case that exist and assessment tests. Examples of these pages, for OCW-UPM courses are shown in figure 5.

The screenshot shows the OCW-UPM interface for the course 'Helicópteros'. The main content area includes the course title, author information (Miguel Bercala, Ángel A. Rodríguez, and Sevellano), and a list of resources such as 'Ejercicios, Proyectos y casos', 'Prácticas', and 'Otros recursos'. A sidebar on the left contains a navigation menu with options like 'Programa', 'Bibliografía', and 'Ejercicios, Proyectos y casos'. On the right, there is a section titled 'Ejercicios, proyectos y casos' with a list of specific exercises (EP-F-000 to EP-F-003) and projects (EP-F-004 to EP-F-006), each with a brief description and a link to the resource.

Figure 5. Descriptive pages and link to resources of courses OCW-UPM.

One of innovative educational elements that are included is a learning guide; an example of one of them appears in the figure 6. This guide provides a chronological sequence of learning and offers the teacher overview of all materials and resources used in each one of the themes of the course.

The screenshot shows the 'Guía de aprendizaje' (Learning Guide) for the course 'Topografía'. It features a table with the following columns: 'Bloques temáticos', 'Tiempo previsto de aprendizaje (h=horas)', 'Materiales de estudio y lectura básicos', 'Materiales de estudio y lectura complementarios', 'Actividades de refuerzo al aprendizaje', and 'Trabajos a entregar al profesor'. The table lists five thematic blocks (Tema 1 to Tema 5) with their respective learning times and associated resources (LO-F, De EP-F, PE-E, PE-A, PR-F).

Bloques temáticos	Tiempo previsto de aprendizaje (h=horas)	Materiales de estudio y lectura básicos	Materiales de estudio y lectura complementarios	Actividades de refuerzo al aprendizaje	Trabajos a entregar al profesor
Tema 1: Observaciones Topográficas	3 h Actividades Docentes + 5 h Trabajo Individual del Alumno	<a href="#">LO-F-001</a>	<a href="#">De EP-F-001 a EP-F-006</a>	<a href="#">PE-E-001</a>	<a href="#">PR-F-001</a>
Tema 2: Incertidumbres y errores	3 h Actividades Docentes + 6 h Trabajo Individual del Alumno	<a href="#">LO-F-002</a>			
Tema 3: Nivelación Trigonométrica	6 h Actividades Docentes + 12 h Trabajo Individual del Alumno	<a href="#">LO-F-003</a>	<a href="#">De EP-F-007 a EP-F-017</a>	<a href="#">PE-A-001, PE-E-002, PE-A-002 y PE-E-003</a>	
Tema 4: Nivelación Geométrica	6 h Actividades Docentes + 12 h Trabajo Individual del Alumno	<a href="#">LO-F-004</a>	<a href="#">De EP-F-018 a EP-F-029</a>	<a href="#">PE-A-003, PE-E-004, PE-E-005 y PE-A-004</a>	<a href="#">PR-F-005</a>
Tema 5: Nivelación por	6 h Actividades Docentes + 18 h	<a href="#">LO-F-005</a>	<a href="#">De EP-F-030 a EP-F-040</a>	<a href="#">PE-E-006, PE-A-005 y</a>	<a href="#">PR-F-006</a>

Figure 6. Guide of learning of a course OCW-UPM.

The previous figures correspond to what is shown to users once the course is published, whereas the professor or support staff will have to deal with the edition of pages, and upload the contents, including their description. The inclusion of Metadata, information to characterize and to classify resources and pages is one of the important aspects of an OCW site. Between the descriptive elements of the resources we can include: title, description, keywords, type of format and language; and others relating to the intellectual property of these materials: authors, collaborator, copyrights and the license of use (Creative Commons in Universia).

### 3.2 Statistics of use.

From the month of July statistics are available for access to the OCW-Universia site. In table 1 are some of these data for the months of July and August and the 25 first days of September of this year. It should be noted that more than half of visits and pages views belong to the site of the OCW-UPM.

Metrics. by month	July	August	01-24-Sept.
Page Views	87,139	114,994	120,969
Unique browsers	12,478	23,697	23,409
Visits	14,043	25,894	25,852
Frequency	1.13	1.09	1.10
Daily Page Views average	3,112.11	3,709.48	5,259.52
Unique browsers average	473.86	800.45	1,072.39
Visits average	501.54	835.29	1,124.00
Pages/Visit average	6.21	4.44	4.68
Page duration average	00:31	00:33	00:32
Visit duration average	03:15	2:26	02:30

Table 1. Statistical results of visits to OCW-Universia.

The average number of daily pages visited in the OCW-Universia site can be observed in the figure 7. In this chart it is possible to estimate the important growth of accesses along the analyzed period and the decreases that take place in the weekends.

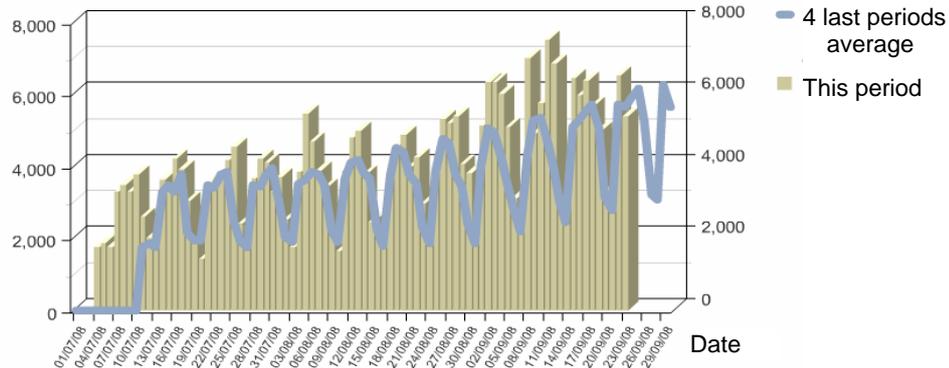


Figure 7. Number of daily visits to OCW-Universia since July 2008.

Finally, in Figure 8, we include the percentage of visits by geographic location for the same dates. Highlights the visits from Mexico with 28.95% and from Spain with a 24.56%. However, in the number of visited pages Spain represents 46.32 %

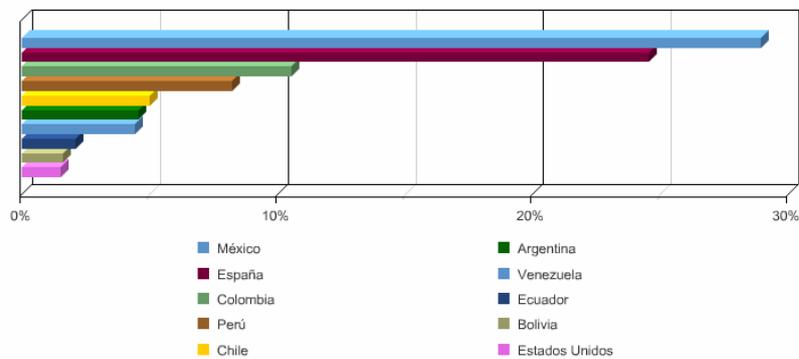


Figure 8. Visits by geographic location to the OCW-Universia site.

#### 4. CONCLUSIONS AND FUTURE STRATEGIES

Some of the major challenges to improve and to extend the availability of open educational resources in general, have been analyzed in the UNESCO report [9]. Based on this analysis and other sources we can indicate those aspects that can foster and develop, both a OER system, and especially a OCW site, or a OCW network:

First, for OCW sites with a highly structured and centralized management, a strong support from the institution is essential. This requires enough investment and also a diffusion, visibility and ease of use by users (accessibility and usability). This also has relation with the impulse and promotion among teachers, and between university and high school students. This would suppose more publicity and attractive to these universities.

On the other hand it is necessary to establish a general framework and to guarantee that available resources meet quality standards, which differs from the rest of content that can be found on the network. For this, it is imperative to have a quality assurance system and the utilization of standards and procedures for conversion and reuse of these contents. It should be established clear criteria in terms of intellectual property and the availability of resources and content and provide tools and assistance, both technical and human, for creating or adapting content of courses with problems of intellectual property

Besides, it is necessary to form a strong group of support and technological development, capable of managing and maintaining the content and resources management systems (CMS), provide technical assistance to the authors, analyze, and even to take part in the design of new tools, applications and solutions. The studies and developments of this group should be made public for the rest of the community. In order that the project could survive and grow it is essential to ensure the technical and economic sustainability.

To consider future lines of work and development on OCW, related to the availability of open educational resources, or with respect to the dissemination of knowledge in general, it is necessary to think that such movements are related to Internet evolution and by specific Web applications. Therefore, it is very possible that the evolution of these resources follows the evolution of the Web itself. The current situation of Web applications in Internet, with the emergence of new services, multimedia capabilities and especially with the possibilities of interaction and participation by users, supposes a radical change with respect to the stage in the year 2000, when most of the contents were completely static, not frequently updated, and especially not allowing the inclusion of content by users.

The present state of the Web have been named Web 2.0, also known as social Web, provided that some of its greatest successes are based on users' communities and interactive services such as: blogs, wikis, on-line communities that share interests and activities (MySpace, Facebook, Bebo, ...); the cooperative classification by means of etiquettes ("folksonomia"); feed syndication (RSS); and so on In the future evolution of the Web and its utilities (Web 3.0, or semantic web) appears the establishment of automatic systems of evaluation and use of information, together with a wide utilization of a three dimensional vision (3D), applicable, for example, to the virtual laboratories [10].

This concept of participation and interaction in Internet can be applied, by means of the use of Information and Communication Technologies, in the educational area in general and especially to the university education. Thus, in an environment of open educational resources (or courses), as in the OCW initiative, it is necessary the existence of elements and applications for education and collaborative learning. It is possible to think about use of lists, blogs or forums related to the OCW site, or also with the courses, building some type of open social network and to establish relations between the authors of similar matters or among the users of the courses. The constitution of consortia of OCW sites is also an opportunity to create a social network of universities, with technical, academic, juridical relations, etc., as it is UNIVERSIA.

Some of these ideas are already being implemented by several universities. Rice University has been promoting a different model for free, shared information that could be used by faculty members and students anywhere in the world. The Rice project, "Connexions", assembling

material from professors from anywhere and it is trying to reshape the way academe uses both peer review and publishing to evaluate the quality of resources. It is offering also free software tools in addition to course materials and it is used as repository of educational programs developed by third parties under the condition of open source [11]. Open.Michigan is a University of Michigan initiative to create and share knowledge, resources, and research with the global learning community. It includes the diverse collection of Open initiatives on campus - from open access publishing and open archives to open source software and open standards. They also hope build an Open Community, inviting people to participate on their "blog", "wiki", "Twitter" and joining their "facebook" group.

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