Academic Knowledge Mobilisation to Promote Cultural Change Towards Openness in Education

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Introduction

We are living in challenging times as we transition to a new knowledge-based society. Some educational resources are now fully accessible through different media formats via information and communication technologies (ICT) — through Web tools and search engines, including personal websites and those of formal educational institutions, libraries, information centres and civil society organisations (communities, associations, affiliations). There are advances in technology worldwide and hundreds of thousands of new resources published each day on the Internet. Accordingly, the way we see the world has changed dramatically. This also has a significant impact on education, both in the methods of learning and in the methods of teaching.

If knowledge creation and transfer is one of the strategies of wealth and prosperity most promising and challenging in the emergence of a knowledge-based society, then the main objective for an organisation has to be the discovery, instrumentation and operationalisation of a sustainable cycle of "virtuous value creation" as a side effect of capitalising on the flow of information and knowledge in the activities produced by the most valuable asset of the organisation: its human capital.

The capacity for innovation is a recognised indicator of competitive strength and vitality in an organisation, and has become extremely valued in a knowledge-based economy (Carrillo 1998, 2004). In an educational environment this means valuing and using knowledge produced through the academic community, from courses and teaching materials, articles and books, conferences and lectures, research reports, learning resources and other educational materials.

The Internet has proven to be of great potential to facilitate knowledge dissemination from universities, educational institutions, organisations and

governments, as well as to support the design of innovative educational strategies to improve and transform learning environments. UNESCO coined the term "Open Educational Resources" (OER) in 2002 to describe open academic content made available through ICT for reference, use and adaptation for educational purposes. According to UNESCO (2011), the potential use of information technologies in education is crucial in providing educators in a growing information society with the tools needed to creatively impact the teaching-learning process, enabling them to overcome the challenges of a disruptive environment and global progress towards a more demanding knowledge-based society.

To move beyond the OER movement of creating and sharing resources, it is important to recognise and properly document the type of knowledge being generated in educational institutions. Educational institutions aim to provide appropriate mechanisms to encourage knowledge transfer but make a conscious recognition of administrative, technological and legal barriers. It is crucial that policy makers and administrative staff take actions to facilitate knowledge-based strategies, aligned with the mission and vision of organisations, to make possible a real change in the three levels of planning: strategic, tactical and operational. To succeed in building a knowledge-based economy, organisations — including educational institutions — need to recognise their knowledge assets and facilitate a dissemination process through an active local community.

According to the OPAL Report (2011) "Beyond OER: Shifting Focus to Open Educational Practices," five barriers need to be overcome if educational institutions are to encourage use of OER:

1. Lack of institutional support

2. Lack of technological tools

3. Lack of skills and time of users

4. Lack of quality or fitness of OER

5. Personal issues (lack of trust and time)

The report argues for building confidence in the use of OER to enhance actual usage, as well as the creation of open learning frameworks to transform the way institutions see education today.

One of the critical barriers identified is the issue of protecting knowledge assets through mechanisms of intellectual property and copyrights at the moment that the knowledge is generated by the creator. Without the proper legal management of digital objects (like OER), the efforts will be diminished, impacting the further uses of OER. It is estimated that most of the existing educational material available over the Internet is protected by traditional copyright terms and conditions of use, which makes it difficult to share and subsequently make it "open" (Atkins et al. 2007). OER are characterised as open access materials that are available to the public, with no restriction on accessibility and no payment of royalties for educational use.

One challenge of OER use in academia is to recognise the value of existing knowledge as it is shared, assimilated and applied to specific needs by other communities in academia. Effective knowledge application entails the explicit definition of new knowledge that arises through the process of tailoring OER from

their source towards a specific application (re-use or repurposing), facilitating actions that are effective and significant (Bennet and Bennet 2007).

Figure 2.1 shows how knowledge represented by OER is first published on the Internet to the worldwide community. The problem then becomes that OERs are too dispersed on too many websites. This makes it difficult for the users to tell whether educational resources are from reliable sources or unreliable sources (ACRL 2004). Thus, the emergence of "infomediaries" is needed, whose basic goal is to provide a service as aggregators of information, operating as catalogues (Hartman et al. 2000; Skyrme 2001). An infomediary (from the combination of the words "information" and "intermediary") is a website that gathers and organises large amounts of data (metadata) and acts as a go-between among those who need the information and those who supply the information.

Next, there is a dissemination process to different markets. In the case of universities, the faculty is the idoneous community to catalyze change by mobilising knowledge into specific educational practices — for example, by creating new courses, workshops, learning activities, conferences and other teaching activities.

Figure 2.1: Knowledge mobilisation of academic content.
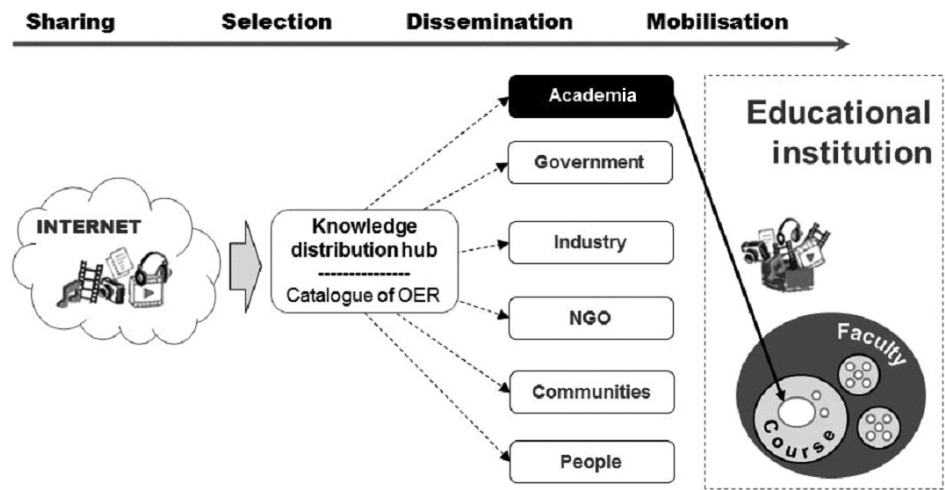
The OPAL Report (2011) shows significant findings, such as the fact that the OER initiatives have focused on the creation and publication of educational materials and resources but neglected the transfer and mobilisation of knowledge into learning and teaching practice. Towards an academic mobilisation of knowledge represented by Open Educational Practices, a definition is needed. The OPAL Report (2011) shows us the following:

> "Open Educational Practices (OEP) are a set of activities around instructional design and implementation of events and processes intended to support learning. They also include the creation, use and repurposing of Open Educational Resources (OER) and their adaptation to the contextual setting. They are documented in a portable format and made openly available."

The full idea with Open Educational Practices is to represent the activities of how institutions, educators and learners are using OER in practice for

teaching, learning or research. A good example is the re-use, revision, remixing, redistribution and production of new OER to promote innovative pedagogical techniques and strategies to empower learners on their lifelong learning path.

Case Study: Mobilising OER to Educational Practices

The case study that is presented in this chapter took place at a Mexican university that has worked since the year 2007 on several open educational projects. These projects were thought to enrich innovative practices and to improve academic achievement. Based on experiences with the use and production of royalty-free course materials, the Tecnológico de Monterrey has identified some key factors for the development of a model of effective knowledge transfer using OER.

The Tecnológico de Monterrey is a private, non-profit academic institution founded in 1943. It is composed of 31 campuses across Mexico. These campuses offer high school programmes, undergraduate and graduate degrees, continuing education, as well as social programmes. Through technology-based distance programmes since 1989, the Tecnológico de Monterrey has been a pioneer in distance education. With more than 20 years of experience through its Virtual University, it currently reaches 29 countries and offers undergraduate, postgraduate, continuing education, and social programmes completely online.

Regarding knowledge mobilisation of academic content, the Tecnológico de Monterrey has been an active participant in each stage of the process by sharing and publishing academic content through the worldwide initiative of the OpenCourseWare Consortium (OCW-ITESM 2008). This has been accomplished by publishing undergraduate and graduate courses, by selecting relevant educational resources through the creation and maintenance of a Web catalogue of indexed OER, and by fostering dissemination of academic content to those who may be interested in its use (academia, government, industry, NGOs, communities, the public). Lastly, it promotes not only the use of OER, but goes far beyond the process of dissemination of knowledge by tailoring it from its source to its application. OER content playlists promote and facilitate remixing of core components of courses and share new ideas for teaching by creating new topics and course subjects. Some examples are: OER as textbook alternatives (anthologies of educational resources); OER as reusable resources; and OER as content generated or modified by a learner (Ramírez and Burgos 2011), fostering a culture of active participation in the creation, use and re-use of educational material.

Some innovative educational experiences that have promoted knowledge mobilisation through OER at the Tecnológico de Monterrey towards an educational open practice include:

a) the adoption of open digital materials from OpenCourseWare universities for formal academic programmes in our institution (Contreras 2008)

b) publication of academic content through the OpenCourseWare initiative (OCW-ITESM 2008)

c) digital knowledge dissemination through the initiative called "Knowledge Hub" (currently named TEMOA: www.temoa.info) that provides a public and multilingual catalogue of OER, aiming to help the educational community find the resources that meet their particular needs for teaching

and learning through a specialised and collaborative search systems and social tools (Burgos 2008, 2010)

d)   integration of OER with eLearning in graduate courses to create anthologies equivalent to textbooks (Ramírez 2010b); and integration of OER with traditional education systems in the context of the work of students (Burgos and Ramírez 2010). Examples include:

(d1)   development by the university of an institutional repository of OER and mobile learning resources on educational research which is available through a website (http://catedra.ruv.itesm.mx), where these resources are open, free and licensed for use, re-use and distribution (DAR 2010)

(d2)   use of OER as an anthology of selected resources (content playlist) by the instructor of the course, providing a suitable alternative to a textbook for the course (Ramírez 2010c)

(d3)   creation of an open textbook (Ramírez and Burgos 2010), resulting from case studies and investigations where 120 graduate students implemented OER in their learning environments and documented the impact on their learning

(d4)   creation of OER by the graduate students who designed educational cases for K–12, high school and higher education, as well as open objectives for the formation of teachers in a knowledge-based society (Ramírez and Valenzuela 2010)

(d5)   use of the platform of TEMOA by learners to generate or modify content (The service "Topics & Courses" allows registered users to create courses, topics and learning activities through the definition of annotated lists with OER, and search queries produced by the user at the catalogue (TEMOA 2011a). The lists may be shared as they are published for free use, or can be copied and reorganised by combining specific elements to create new lists and adapting them to meet needs of teaching or learning, all while retaining references of attribution to the original sources.)

(d6)   production of OER, aimed at the development of educational researchers in a collaborative process with six other Mexican institutions (Ramírez 2010c)

(d7)   training by the university of its own faculty and undergraduate and graduate students, as well as of faculty from other educational institutions (K–12 to university level), on the effective use of OER in their own classroom environments

Finally, the Tecnológico de Monterrey has conducted research on all these experiences, such as: use of technology; legal issues relating to open educational materials; training for using and producing OER; and sharing best practices (www.temoa.info/research). Figure 2.2 shows a practical application by mapping the different experiences that have taken place at the Tecnológico de Monterrey to encourage and promote academic knowledge mobilisation into Open Educational Practices.

Figure 2.2: Knowledge mobilisation of academic content at the Tecnológico de Monterrey.
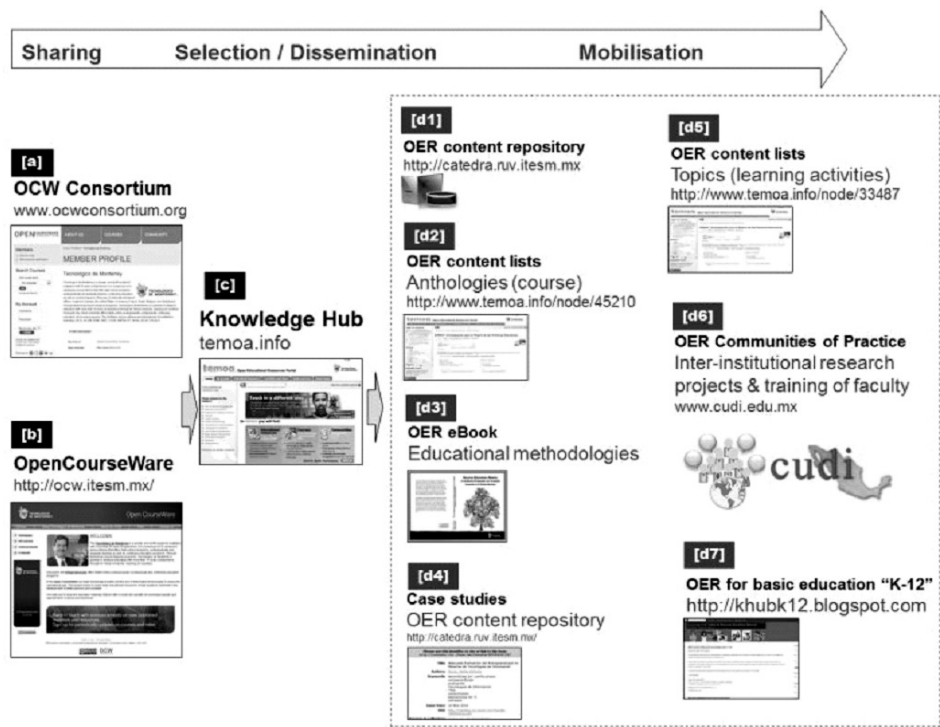
Sharing: Publication of Academic Content Through OER

The first documented phase for the Tecnológico de Monterrey in knowledge mobilisation is the educational experience of sharing and publishing academic content through the initiative of OpenCourseWare Consortium (OCW-ITESM 2008; www.ocwconsortium.org). The Consortium brings together over 250 educational institutions and organisations to create a pool of open educational content, fostering the development of courseware materials from its members to facilitate knowledge transfer through open academic content, and by promoting its adoption to propitiate tailoring of educational materials to satisfy specific educational needs (see Figure 2.3).

The process of adoption of open academic content started in 2007 at the Tecnológico de Monterrey with the analysis of several courses from international universities of higher education — for example, MIT (Massachusetts Institute of Technology) (MIT-OCW 2011), Carnegie Mellon University (2011; www.cmu.edu/oli) and Yale University (2011; http://oyc.yale.edu). The professors searched for matches between the syllabuses of their courses and others published in open initiatives. The next step was to select specific content and learning activities from these courses. The content and activities were incorporated into undergraduate courses delivered during that fall 2007 academic period.

The implementation of these materials was smooth and successful (Mortera 2011). The contents and activities from OCWC courses provided an international perspective which made the recipient courses richer and more interesting for both professors and students. The main obstacles identified in this process occurred during the selection and design stage. The topics included and the depth of the

content of open courses varied significantly from local courses, which made finding suitable matches between courses a difficult task.

To study the adoption process, the Graduate School of Education of the Tecnológico de Monterrey conducted two follow-up case studies on the subject of knowledge transference and the adoption process of open academic content: "Knowledge transference of digital resources from the OpenCourseWare initiative for face-to-face instruction" (Contreras 2008); and the "Transference of open educational resources from global universities" (González 2008; González et al. 2008).

Figure 2.3: Sharing of open academic content through OCWC (OCW-ITESM 2008).
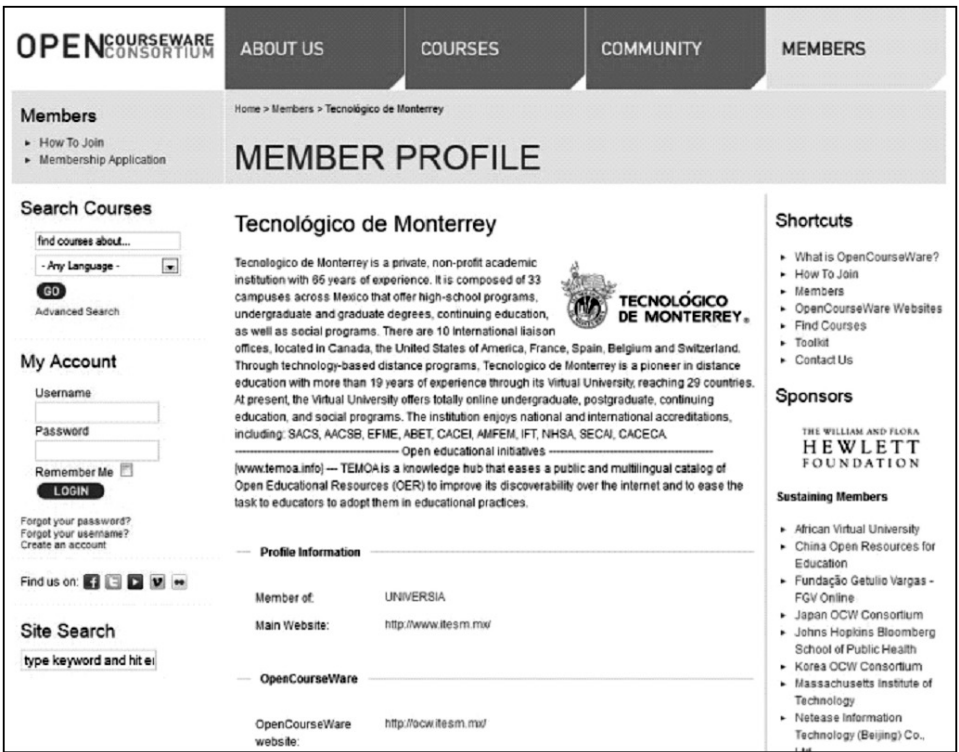
Selection: Documentation and Evaluation of Academic Content

The selection criteria of open academic content are based on the meaning of the term "Open Educational Resources" as defined by Smith and Casserly (2006):

> "OER are teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge."

For practical purposes, the definition needs to be studied in parts for one to fully understand its educational impact for instrumentation and further interpretation for operationalisation. For example, OER are any type of teaching, learning and research resources available over the Internet, narrowing the selection criteria

from collections to OER available in digital format only. Additionally, we are talking about materials available in the public domain or released under an intellectual property licence to assure the respect of authorship, leaving aside all educational material that doesn't explicitly declare respect for copyright in a website or in a catalogue. In the past, there have been some studies to identify OER content providers that comply with the selection criteria and to fully understand the copyright boundaries (Bissell and Park 2008; AU-SOC 2009; Hofman 2009).

Once the OER is available on the Internet, there are several challenges to be faced, like the accessibility of open academic content (Haßler 2009) and its discoverability in a sea of information. To improve the discoverability process of OER over the Internet and ease the task to educators to adopt these resources in educational practices, the Tecnológico de Monterrey proposed the creation of an educational initiative it named "Knowledge Hub" (Burgos 2008). This proposal was raised at the World Economic Forum in Davos, Switzerland, in January 2008, during a Global Universities Leaders Forum session (Galán 2008).

Knowledge Hub was later named TEMOA (2010), representing the words "to seek, investigate, inquire" in the Náhuatl language. It is a free-use catalogue that supports a multilingual search engine which allows the user to discover selected OER using enriched metadata created by an academic community and enhanced by librarians using Web 2.0 such as faceted search and social networking tools. The catalogue classifies educational resources in different areas of knowledge, according to the scheme of reference of the "Hierarchical Interface to Library of Congress Classification (HILCC) proposed by Columbia University (Davis 2006; HILCC 2008).

The portal website of TEMOA (see Figure 2.4) provides public access through the Internet for educators, students and self-learners of all educational levels, from graduate to K–12. It was created to assist educators in the challenging task of introducing classroom innovations to improve the teaching-learning process and, by consequence, improve student retention, motivation and attention. TEMOA is a Mexican distance education initiative of the Tecnológico de Monterrey (ITESM), which is globally available, conceived by the faculty's need to find instructional materials for teaching and learning with the certainty that the resources found respect the intellectual property and legal rights of the original authors.

Figure 2.4: The temoa.info Open Educational Resources portal (TEMOA 2010).
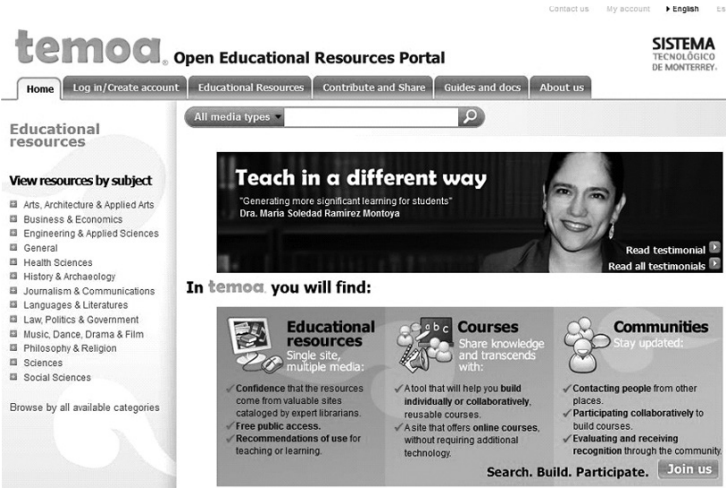
TEMOA provides its main service of a Web catalogue of OER on a free-use basis (guest profile), but other secondary services are reserved for its community on a membership basis (collaborator profile).

- *Guest profile* – offered to those users who may be interested in the catalogue for self-use or reference. This status is for users of the catalogue who do not have a login account on the system, but who can still use the search engine and the catalogue itself.

- *Collaborator profile* – offered to those users who want not only to use the catalogue, but also to share time, experience and knowledge in a subject area of expertise by creating new educational resources or by evaluating and rating educational resources. This status is for users of the catalogue who have a login account on the system.

One of the services reserved for "Collaborators" is the possibility to create new knowledge from the base of existing knowledge in the catalogue. The service offers the potential to create courses, topics and learning activities through the definition of annotated lists with OER, and search queries produced by the user at the catalogue. The lists may be shared, as they are published for free use, or could be copied and reorganised by combining specific elements to create new lists and adapt them to meet needs of teaching or learning, all while retaining references of attribution to the original sources.

At the TEMOA initiative there are selection criteria and documentation and evaluation processes for academic content (2011b, 2011c). This is through a process called "Lifecycle of an Open Educational Resource," in which potential OER content is first evaluated by an expert librarian using the selection criteria and then each accepted resource goes through a number of different filters. This procedure provides a quality assurance process (see Figure 2.5).

Figure 2.5: OER lifecycle for quality assurance (TEMOA 2011c).

Dissemination: Communication and Reference of Academic Content

Academic content as OER may be studied as a "digital object" that provides information. But it can also be seen as a "digital learning object" that is defined as "an entity [of] digital information developed for the generation of knowledge, and development of skills and attitudes, which makes sense according to the needs of the person and corresponds to a concrete reality" (Ramírez 2007, pp. 356–357). From this broad perspective, an OER may contain a specific subject, a content unit, an objective and several descriptors to promote its re-use, and to support interoperability, accessibility and continuity of use over time.

An OER as a digital object may be recursive in itself. This means that it can consist of one or more (sub) digital objects. In this sense, for effective instrumentation, it is necessary to define the granularity of the digital object to facilitate its communication properly, since the level of granularity is required to define a particular schema of metadata. The granularity is the scope of the digital object. For educational purposes, an OER can refer to the definition of a concept, a subject, a module (a group of subjects) or even a full course.

To ease the diffusion and dissemination of digital objects, it is important to document and accurately describe each OER with defined metadata (descriptors to give context). Metadata is simple data that describes other data and which together are used to describe and represent a digital object for potential use. A set of metadata can include descriptive data about the context, quality, conditions or specific characteristics of the OER. Metadata is more extensively used for query refinement in databases through specialised search engines, supported with information technology to optimise the searchable process.

The initiative of TEMOA facilitates a process of digital dissemination of OER by validating and filtering knowledge available on the Internet, considering the need to ensure a specific selection of OER and a proper documentation with basic metadata (Ávila and Sanabria 2008). It also covers the need to filter information that is available in a massive and exponential way over the Internet, reducing the problem of suspicions and questions about its authenticity, validity and reliability (ACRL 2004).

Mobilisation: Transference of Academic Content

There is a necessity to deal with uncertainty and provide an effective way to provoke knowledge transfer and to satisfy particular needs of development. It is not enough to share and publish a magnitude of information and it is also not enough to simply facilitate the digital dissemination of knowledge. There is a more demanding need to ease and facilitate the learning and sharing of knowledge through a conscious development of connections, relationships and the flow of information through communities of people (Bennet and Bennet 2007). Knowledge mobilisation is about bringing people and actions together to create value and meaning to satisfy particular needs based on assimilation and application of focused knowledge.

The Tecnológico de Monterrey initiated a process of creating value through the creation, assimilation, leveraging, sharing and application of focused open

academic content in specific scenarios. In the case of the graduate course for the Master of Education titled "Research for the Improvement of Educational Practices" offered in the Graduate School of Education at the Tecnológico de Monterrey, OER was used in specific learning activities. The OER were incorporated as an anthology of resources, providing a suitable alternative of textbook (Ramírez 2010b) in a distance education modality. Then, given the main goal of the course to "prepare students in the research field, from the philosophical aspects of science and education, to the everyday practice of educational actors," the study of OER was made the main research subject line through the development of a final research project focused on the study of the incorporation and use of OER in real educational practices — wherein, the researchers looked at ways to deliver innovative and more personalised approaches to teaching and learning.

Figure 2.6 shows the use of OER as an anthology of selected resources (content playlist) by the instructor of the course, providing a suitable alternative to the textbook for the course (Ramírez 2010a). The table of contents shows 22 subjects and 30 educational resources selected for each subject. Each of the resources comes from different sources (content providers) previously audited and reviewed by an expert team of librarians with the function of publishing them in the catalogue of TEMOA at the OER providers' directory. The system enables each resource and each subject, including the anthology itself, to be reviewed and rated by the academic community on a scale of one to five diamonds ("poor" to "awesome") to give feedback to the instructor about the perceived quality of the selected resources.

Figure 2.6: OER content playlist as an anthology of educational resources (Ramírez 2010a).

The first educational experience was the creation of one anthology of OER for the course and the re-use of existing base knowledge to fulfil the learning goals of the subjects. However, the most demanding educational experience was to think "outside the box" of simply using the knowledge in learning activities and

to go farther to create knowledge about educational practices by tailoring existing knowledge to concrete educational needs in real scenarios.

The second educational experience was the design of a final research project, focused on OER in real educational practices, to study the impact on real teaching-learning scenarios from basic education to higher education levels. The project consisted of the development of a case study considering a rigorous research methodology, referring to a real situation taken in context. The situation was analysed to see the evolution of the phenomena the researcher was interested in. Case studies provide an opportunity for individuals to identify or discover processes.

This case study itself was treated as an integrated system of components, which did not necessarily have to work well together or even seem to be logically connected. The aforementioned reflections were important to allow an understanding of the object of study. One of the advantages of the case study was to allow the researchers to observe information brought together with a large number of factors that were interacting. In this way, the complexity and richness of social situations could be appreciated.

The case study investigation was done by teams working to study the integration of OER into diverse learning environments using technology. Thus, the investigation of educational practices was presented in a practical and innovative way, where OER were incorporated, trying to identify similar and different elements in them. This culminated in a series of proposals to improve the educational practices being studied.

As a result of the course, students presented the documentation of 30 case studies of use of OER in several contexts, disciplines and educational levels, which were integrated in an electronic book publication as an OER itself (Ramírez and Burgos 2010). The front cover of the book is shown in Figure 2.7.

Figure 2.7: Open textbook with 30 case studies of use of OER (Ramírez and Burgos 2010).

Lessons Learned and Conclusions

A learning environment enriched with technology allows instructors to offer new ways of teaching and reflecting on their teaching practice, empowering students in the development of essential skills in the use of such technology to stimulate the learning process. The OER as they can be found in a natural state in digital format and available through electronic media like the Internet facilitates their incorporation into the classroom using ICT to encourage an active role in the teaching-learning process.

The following recommendations might assist decision makers in fostering new learning environments to prepare educators in a knowledge-based society:

- Promote a new culture and educational practice to acquire the skills required to fully exploit the use of OER — skills such as digital literacy and information literacy.

- Promote a community-based system of open sharing of educational best practices, with the intention of facilitating the effective re-use of OER and learning of significant experiences in the use of OER in teaching and learning activities.

- Establish monitoring and recognition mechanisms that support educational practice, to share experiences on the use of OER through intellectual and scientific evidence.

- Clarify and define licensing schemes and mechanisms for the protection of copyright and intellectual property to foster the production and re-use of OER.

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