



COMMONWEALTH *of* LEARNING

PERSPECTIVES ON OPEN AND DISTANCE LEARNING

Open Educational Resources: Innovation, Research and Practice

Rory McGreal, Wanjira Kinuthia and Stewart Marshall
Editors



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Managing Editor

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The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to encourage the development and sharing of open learning and distance education knowledge, resources and technologies.



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PERSPECTIVES ON OPEN AND DISTANCE LEARNING: Open Educational Resources: Innovation, Research and Practice

Rory McGreal, Wanjira Kinuthia and Stewart Marshall, Editors
Tim McNamara, Managing Editor

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Foreword

Since the UNESCO Paris Declaration on OER adopted by the global community in June 2012, there have been a number of developments, and the key question is no longer about the “how” of OER development. We are no longer talking about authoring tools or distribution systems. It is more about realising the value to be derived from OER. This involves defining an OER value chain that will help stakeholders identify the various sub-systems in the chain that link the individual teacher’s or learner’s contribution relating to OER use, to bigger initiatives such as good-quality open textbooks or Massive Open Online Courses (MOOCs) which could lead to viable academic qualifications and credentials involving institutions.

The development and exchange of OER continues to be a technologically intensive process. Technological considerations in OER are not limited to authoring or remixing tools. Collaborative production of OER requires well-designed and robust online spaces and infrastructure (Wikiwijs) and repositories. The latter can also be used to combine OER to create lesson plans online (Open Science Education Resources in Europe). Unless OER are consistently and adequately described, they cannot easily be located in online searches. The chapter on GLOBE considers these challenges and offers solutions. COL’s earlier publications on OER offered insights and advice on good institutional practices, business models and policy matters.

However, the social dimension emerges as an important factor from a number of chapters in this book. The study on OpenLearn shows that when OER are taken directly from formal courses, the biggest impact is on the formation of communities of learners around the OER. This is similar to the conclusion of the chapter on OER for Lifelong Learning, both reflecting the experience of the UK’s Open University. The African Virtual University (AVU) chapter reveals the importance of the formation of a consortium of OER producers across institutions and countries. This process requires subtle yet intensive facilitation for its sustenance and is important for the quality assurance of OER. The detailed analysis of the experience of the African Health OER Network also points to the viability of viewing OER as a social practice.

In two different chapters that focus on MOOCs (contributed by the global pioneers of MOOCs), what emerges is that even if the teachers do not use OER, the learners draw upon OER through their own social space and networks. The chapter based on COL’s experience reveals that the existing hierarchies and power relationships in many developing country institutions do not allow for the decentralisation that fosters and encourages the use of OER. The experience of the Open University in the Netherlands reveals the significant role of trust in encouraging the increased use and sharing of OER.

The chapter on OERu identifies more fully all the linkages and sub-systems in the OER value chain. It also shows the importance of how trust-based interactions among institutions can advance the value of OER for a wide range of stakeholders. Thus, it is not just lack of policy that can hold back OER development and re-use, but an inadequate appreciation of the social aspects as well. Chapters on OER in academia (Mexico and South Africa) show the importance of blending bottom-up processes of OER generation and exchange among faculty with top-down policy support. It is significant that this book combines the technology aspects with social values and the impact that these have on the users and creators of OER.

Licensing considerations are inseparable from discussions of OER and are taken up in a separate chapter. This book of research articles about OER is itself an OER, as are the individual chapters, all available under a Creative Commons 3.0 attribution Share-Alike licence. Published by COL, the book is produced as part of the work plan of the UNESCO/COL Chair, which was granted to Athabasca University and is led by Professor Rory McGreal, one of the editors. The other editors, Dr. Wanjira Kinuthia and Emeritus Professor Stewart Marshall, are part of the international group of UNESCO/COL Chair partners.

Contributions in this volume provide insights, experience-based case studies and analyses which will help readers grasp the essential contours of the OER value chain. COL's OER publications in the last two years provide the most comprehensive view of the various sub-systems and linkages in the non-U.S. milieu, and this book is yet another contribution in that direction.

The individual book chapters are included in the OER Knowledge Cloud (oerknowledgecloud.org), which is a Web repository of more than 400 research papers and reports on OER. This Knowledge Cloud provides researchers with free and easy access to the OER research knowledge base, including refereed papers, presentations, dissertations, reports and other OER-related publications. The cloud has been created at Athabasca University as part of the international Chair work plan. The rationale for this is the growing need for a substantial expansion of the OER research base that can provide researchers with the means to explore new knowledge about OER. It is hoped that this book, along with the OER Knowledge Cloud, can provide a solid foundation supporting the introduction and implementation of OER innovations, increasing the research evidence and providing guidance for OER in practice.

Given COL's commitment to implementing the recommendations of the Paris OER Declaration, COL will continue its advocacy efforts, encourage the development of policy, support capacity building and promote OER research. Some of the key global leaders in the OER movement have shared their valuable experiences and insights along all these dimensions in this book, which I most heartily commend to you.



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Introduction: The Need for Open Educational Resources

*Rory McGreal,
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Open Educational Resources (OER) are important learning materials with the potential to facilitate the expansion of learning worldwide. The flexibility, both technological and legal, afforded by openly licensed content is an important precondition for supporting the educational use of content. Open standards support the deployment of learning objects as OER on a wide variety of different devices, whether mobile, on the desktop or in print. The open licence frees instructors and learners from concerns about permissions, as well as about how, when, where and how long the content, video, audio or application can be used.

The UNESCO Paris Declaration on OER (2012) begins with the premise that “everyone has the right to education,” referring to the Universal Declaration of Human Rights and other international recommendations and agreements. The participating countries support the OER movement, encouraging OER development and adaptation, research and, especially, the open licensing of all government-sponsored publications.

This book project was initiated by the UNESCO Chairs in OER in support of these principles.

OER Theory

It is impossible to pin down any one theory that best fits the OER movement other than the principle of openness in education. This includes, at the forefront, the principle of accessibility — opening educational resources so that anyone can access and learn from these resources at no cost. The Cape Town Declaration (2007) states:

“Educators worldwide are developing a vast pool of educational resources on the Internet, open and free for all to use. These educators are creating a world where each and every person on earth can access

and contribute to the sum of all human knowledge. They are also planting the seeds of a new pedagogy where educators and learners create, shape and evolve knowledge together, deepening their skills and understanding as they go.”

The use of OER is not confined to eLearning contexts or distance education. Although they are for the most part born digital, many if not most OER can also be printed out and used in analogue contexts. Most OER are technologically neutral in that they can theoretically be reformatted or refitted for use in any platform or in any learning management system or application. OER can be used online or in traditional classrooms, or in blended or flexible learning contexts. This includes a focus on the importance of interoperability for both learners and instructors, in their free re-use or repurposing of the resource, including mixing and mashing. Interoperability of the resources in different contexts is a pre-condition for useful OER.

There is no single paradigm associated with OER, nor are there any preconceived approaches to learning that limit the generalisability of OER. On the other hand, individual OER can be specifically designed to support particular theories of learning, whether that is behaviourist, constructivist, connectivist or something else. The OER concept can accommodate a wide range of theories. In addition to openness, eclecticism may be the theory most nearly associated with the OER movement. Educators using OER can draw on multiple theories, mixing and mashing them to fit what they feel is reasonable given their particular context. Pragmatism that links practice and theory in order to improve both can also be an important theory associated with OER. Pragmatists consider the practical effects of using OER and base their decisions on these.

Diffusion theory (Rogers 1995) has also been used to describe the rate of adaptation of OER among educators and in informal learning contexts, but it is not all-encompassing. In fact, it is a *bricolage* of many theories bunched together by the researcher (*bricoleur*). Complexity theory also has its place as researchers investigate how OER have been formed through self-organising and emergent methods and interactions (Tim McNamara, unpublished thesis).

So, OER, as freely available learning objects encapsulating learning resources, are pedagogically neutral and, as a concept, can lend themselves to any learning theory. OER proponents in different theoretical “camps” of learning, such as constructivist, connectivist or behaviourist, can design their OER either to support their theories uniquely or to be more generalisable in a wider variety of learning contexts. Likewise, educators can make effective use of OER according to their theoretical approach, which could be easier or more problematic depending on the theoretical perspective that is embedded in the OER. There is no one theoretical camp that can claim ownership of OER from a pedagogical perspective. Independent learning is often connected to OER, but OER are also used in classroom, blended learning and distance education environments. Panke and Seufert (2012) noted that there is “no one-size-fits-all theory that allows us to understand all aspects of the learner’s use of OER.”

Bateman et al. (2012) highlight the need for more than researchers’ anecdotal information, supporting a critical analysis of OER issues. They support the development of OER policies and strategies to: increase access to educational

programmes; build capacity among educators, including appropriate ICT infrastructure; design quality assurance frameworks; and develop cost-effective strategies and business models. The collection of chapters in this book addresses this need through analyses, case studies, theoretical analyses and personal reflections.

OER also aim to be technology neutral and various standards are proposed to support their interoperability (e.g., IMS Common Cartridge, SCORM, IEEE LOM). This represents more of an ideal than the reality, as OER creators continue to create content in a wide variety of formats, many of which do not lend themselves to easy interoperability.

OER Definitions

Open Educational Resources (OER) aim to promote open access to digital educational resources “that are available online for everyone at a global level” (Caswell et al. 2008). The term was introduced by UNESCO (2002), which defined OER as the “technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes.”

The William and Flora Hewlett Foundation (2010), one of the primary donors in the OER movement, supported the use of OER “to equalize access to knowledge for teachers and students around the globe.” They defined OER as “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 repurposing by others” (Hylén 2007). OER can be full courses, course materials, modules, textbooks, streaming videos, tests, software, and other materials or techniques used to support access to knowledge.

Another widely used definition of OER has been provided by Atkins et al. (2007), who defined OER as “full courses, open courseware and content, educational modules, textbooks, streaming videos, tests and assessments, open source software tools, and any other tools and materials used to support teaching or learning.”

Broader definitions have been elaborated, such as this more descriptive characterisation, also from Atkins et al. (2007, p. 4):

“Open Educational Resources (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.”

Downes (2011b) defined OER broadly as “materials used to support education that may be freely accessed, reused, modified and shared by anyone.” Other definitions discussed in the July 2011 worldwide online conversation of members of the OER community were more specific. For example, says Rossini (2011):

“OER are teaching, learning, and research materials in any medium that reside in the public domain or have been released under an

open licence that permits their free use and re-purposing by others. The use of open file formats improves access and re-use potential of OER, which are developed and published digitally. They can include full courses, course materials, modules, textbooks, research articles, videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.”

Wiley (2010) presents a “strengthened and clarified definition of OER.” His definition includes three elements: 1) the concept of “free”; 2) the four Rs permissions (re-use, redistribute, revise, remix); and 3) non-interfering technology and media choices. Wiley argues that free-of-charge access is a necessary feature of OER, but is not sufficient, noting that many resources online are freely accessible whether they be texts, videos, pictures, games and so on. He likens this linkable/viewable but free accessibility as “window shopping,” arguing that if the resources are not openly licensed with permissions for the four Rs, they cannot be OER. OER are needed to ensure that the instructors and/or students have effective control of the content.

I formulated this practical definition for learning object: “any reusable digital resource that is encapsulated in a lesson or assemblage of lessons grouped in units, modules, courses, and even programmes. A lesson can be defined as a piece of instruction, normally including a learning purpose or purposes” (McGreal 2004). So, many OER can also be seen as a subset of learning objects, characterised by their being educationally designed content that is free, modifiable, reusable and shareable.

The free and open sharing of educational resources is essential for promoting the building of ubiquitous learning networks as well as reducing the knowledge divide that separates and partitions societies. Educators worldwide continue to face significant challenges related to providing increased access to high-quality learning while containing or reducing costs. New developments in information technology highlight the shortcomings and challenges for the traditional education community, as well as those of more flexible providers such as open universities. Such developments, including accessible repositories, Internet access, wireless networks and mobile devices, have the potential to increase access and flexibility in education by rendering it ubiquitous. Basic education for all continues to be a goal that challenge — and will continue to challenge — many countries. OER can be used to overcome many of the obstacles faced by both learners and educators.

Critiques of OER

Bates (2011) and others have criticised OER as being elitist and a form of cultural imperialism. In some contexts this could very well be true. However, educated readers understand that *any* content can be elitist and imperialistic. This criticism cannot be reserved for OER alone. Much of the content that is not free and is sold to developing countries by international publishers can be described as elitist and imperialistic. On the other hand, unlike proprietary content, OER can be adapted, amended, abridged, localised and otherwise altered to suit specific cultures, approaches or sensitivities.

Another criticism leveled at supporters of OER is that the content is not really free — that someone has to pay for it. In response, OER advocates have long recognised

that these resources are not “free” (as in, not costing anything). Public education too is not free, although it does not cost parents directly; they pay through their taxes. Critics argue that instructors have to be paid, and who would disagree? However, the argument does not fit the reality. Schools that use proprietary content do not pay their teachers from their earnings from the content. Proprietary content is a cost, not a revenue stream. The same is true when using OER, although the costs are very small in comparison and usually these are labour costs, so they stay local. There are costs in any educational system whether or not OER or proprietary content is used. The difference is that schools or students using proprietary content keep paying for the same content every year, while OER frees them from these payments.

Critics also argue that one has to be clear about what is meant by “content.” They fail to realise that we work in a confusing and unclear world. As a wise woman once commented, “If you are not confused, you don’t understand.” Educational content can be distinct from the format. Nevertheless, the boundaries are seldom clear. With multimedia and educational games, for example, the content and the process can be intertwined and inseparable.

Another criticism of OER is that it is the process that is important. There is a “content is king” camp and a process-oriented group called the “content is obsolete” camp. It seems that “never the twain shall meet,” which is too bad because, arguably, both approaches are valid. Students can learn effectively from facts that are shoveled at them (many of today’s educators are survivors of such learning approaches), although there may be better approaches. So, to argue that learning “requires” questioning, testing and feedback is quite simply not in accordance with the facts. People learn many things all the time without “personal reflection, expert feedback and interaction with others.” It is understood that these processes can and do help in learning, improving efficiency, but to say that they are “required” is unsupportable.

OER are also more than a glorified public library as some OER critics have argued. Comparing a public library to the content available on the Internet — the world’s intellectual commons — is like comparing a horse and carriage to a spaceship. Access to knowledge is becoming ubiquitous.

Some people have criticised the MIT (Massachusetts Institute of Technology) OpenCourseWare initiative, arguing that using this content would be like importing content without understanding it. This may or may not be true, depending on the instructor, but the same critique would hold for importing proprietary content — so, it is not a criticism of OER, but rather of using external resources in general, including proprietary content.

The criticisms of OER repositories like Health Sciences Online and Global Uni are premature. The first step in moving forward is often simply putting your materials online as OER. Step 2 would be to make them better. Access to material that is not first-rate is better than no access. In fact much, if not most, of the proprietary content used in traditional university settings is not well designed, but is still used.

A Dean of Medicine once told me that he would not waste his time with instructional design, because his students were the cream of the crop and would learn no matter how the content is presented. Many (if not most) learners do

need the help of really well-designed content and the intervention of instructors. However, some don't. With OER, this minority of learners can learn — try to stop them. This hopefully will build a small cadre of knowledgeable people in needy communities that can help others who are less able. And they might even participate in improving the OER. Note that this is not an argument against creating sound pedagogical OER — of course we should build good OER. It is an argument that even second-rate materials can be and are useful, whether we care to admit it or not.

So, OER do not *need* to be properly designed, as critics contend. It would be great if they were, but is it possible to get all instructional designers to agree on what that would be? OER as they stand are useful, even the PowerPoints. They do not *need* skill and hard work, even though that would be desirable.

On the other hand, it is wrong to assume that there is not a great deal of attention being paid to the quality of OER. MERLOT (Multimedia Educational Resources for Learning and Online Teaching; www.merlot.org) and other organisations like OPAL (Online Portal for Advanced Learning; <http://umanitoba.ca/faculties/medicine/opal/>) are supporting the improvement of the effectiveness of teaching and learning by enhancing the quantity and quality of OER. OER quality relies on the content being clear and concise, demonstrating the concepts to be learned, and integrating, where appropriate, with prerequisites and instructions that are clearly indicated. Other quality measures have been posited. These included the brand or reputation of the OER creator, peer review, user ratings, use indicators, validation and self-evaluation. Other possible quality indicators include shareability, timeliness, reach (number of users), usability (licence restrictions) and accessibility.

A respected institution's prestige, brand name or reputation can be one indicator of quality. Peer review is a time-tested approach to ensuring quality and is used extensively in academia for scholarly publishing. User ratings are another quality measure. These can be formal, informal or both. Formal rating systems include the "five star" system; in more informal systems, comments from users might be made readily available.

Quality can also be improved through the sharing of OER when institutions transfer costs from the course development process to student services and support. Students could benefit by paying less for course materials. OERs can be used to provide more student choice at little additional cost. Is cost to learners and institutions an aspect of quality?

The timely updating of courses can be another benefit of OER. A course could be of the highest quality when it is first created, but unless it is updated regularly and consistently, the quality can decay. OER can be one way of accessing and inserting updated content and other relevant course materials as they become available. Is time an aspect of quality?

Bates (2011) does concede that OER are good for use by students and by instructor groups; that there are innumerable other approaches to using OER that may be more or less effective; and that the value of OER is that they are accessible for use in a variety of ways and, as has been noted above, are more open for such contextualisation than proprietary materials.

Finally, one has to agree that OER are not a panacea — neither is proprietary content, nor is technology, nor constructivism, connectivism nor anything else, but they all could have a place in any of the multiple approaches that we can develop to promote accessible learning.

How This Book Is Organised

This OER book is aimed at practitioners, researchers, students and others interested in creating, using or studying OER. It has been organised to facilitate easy access to OER themes of interest. Each theme is introduced separately, providing a concise overview of the relevant chapters in the theme. The chapters consist of a diverse collection of peer-reviewed papers, written by some of the leading international experts in the field of OER on five continents. In the spirit of openness, rather than prescribing a format for the book, we left it to the authors to come up with the OER subjects and issues that were important to them. All chapters were then blind peer-reviewed to ensure the relevance and the quality of the submissions. In that way, the OER issues emerged and were then organised by the editors into overall themes.

From the diverse selection of papers, four themes emerged:

1. OER in Academia
2. OER in Practice
3. Diffusion of OER
4. Producing, Sharing and Using OER

The OER in Academia theme is important because of the way in which OER are widening the international community of scholars with shared resources. The lead taken by universities in opening up education by releasing their content has been the major driving force in promoting OER. This was led by the Massachusetts Institute of Technology (MIT), with support from the William and Flora Hewlett Foundation, which resulted in the formation of the OpenCourseWare Consortium. Other academic institutions and organisations took up the case from there.

The OER in Practice theme includes case studies and descriptions of specific working OER initiatives on three continents. Their successes are highlighted along with many of the problems encountered, so that others can learn from their example. Issues addressed include the re-use, repurposing, adaptation and localisation of OER to serve the needs of the learners in different environments, touching on the need for continuous updating and improvement of content without proprietary constraints. Raising institution-wide awareness of the location and management of OER has become an important consideration. It represents an important first step in embedding the philosophy and practice of OER internally within the organisation. Collaboration, both internally among different sectors and externally among a variety of institutions, is another feature of effective practice in OER implementations,

The Diffusion of OER theme provides readers with thoughts on how different groups approach releasing their content to the world. One of the ongoing weaknesses in OER has been the “not invented here” syndrome, which, along with other reasons, has hindered the spread of OER. Building communities of

users supporting lifelong learning, combined with ubiquitous access to OER on the Internet using new mobile technologies, will go a long way in overcoming the recalcitrance of learners and educators. Technical standards and specifications to promote interoperability using different devices and applications will also play an important role.

Producing, Sharing and Using OER is a theme that includes design issues related to how OER will be used, whether for formal or informal learning or some combination of the two. This understanding is important when considering the course design and other production issues. In this theme, the authors examine the pedagogical, organisational, personal and technical issues that should be addressed by producing organisations and institutions.

This book is intended as a teaching and research resource as well as an aid for practitioners, and so readers are expected to start by reading those chapters in which they have a special interest, rather than reading from beginning to end. Theme descriptions introduce each section as a way of helping readers focus more easily on chapters of interest or get a quick overview of the theme contents.

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PART

I

OER in Academia

Introduction

The capacity for innovation in production processes is an indicator of strength and vitality. In academia, innovative production can be exhibited through the creation of courses, instructional materials and learning resources, publication of articles and books, and the development of other educational materials as OER. These materials are becoming popularised, along with other ways of mobilising faculty to support the use and re-use of OER.

In this part of the book, different approaches in academia supporting openness are discussed, including the MOOC (Massive Open Online Course) phenomenon, open access publishing, specific university initiatives in the developing and developed world, and the consortium approach linking institutions internationally.

One innovation is that of MOOCs as a means of facilitating the efficient creation, distribution and use of knowledge and information for learning. MOOCs have no prerequisite courses and no formal accreditation — anyone can participate online. Siemens, as one of the founders of the MOOC concept, gives an overview of this emerging phenomenon in Chapter 1, “Massive Open Online Courses: Innovation in Education?” He argues that MOOCs, by taking advantage of freely available online resources such as OER, can be used to support social networking and other forms of “connectivity.” The power of the MOOC is in the active engagement of large numbers of self-organising learners who make connections with one another.

The use of OER to facilitate the efficient creation, distribution and use of knowledge and information is another recent innovation. In Chapter 2, “Academic Knowledge Mobilisation to Promote Cultural Change Towards Openness in Education,” Aguilar and Montoya present several aspects of “educational experiences” involved in mobilising knowledge through OER. These experiences include the adoption, publication and dissemination of OER in the

academic community. This chapter also discusses the remixing of OER in courses, the creation of an institutional repository, and use of OER as learning resources or as content generated or modified by the learner. Finally, the authors discuss initiatives that integrate communities of practice and train faculty in academic settings.

Historically, resources such as books, journals, newspapers, and audio and video recordings have been fairly well curated in university libraries. However, the same cannot be said for teaching and learning materials, unless they have been included in a textbook or study guide. In the past, such materials have typically only been made available to registered students within the confines of the physical or virtual classroom. In the early 2000s, institutions such as MIT (Massachusetts Institute of Technology) and Rice University challenged this convention of locking down teaching and learning resources by opening up access to many of their teaching and learning resources to the rest of the world as OER. In April 2008, the University of Cape Town (UCT) joined the open movement by signing the Cape Town Open Education Declaration, thereby committing itself to making a selection of its teaching and learning materials available as OER.

In Chapter 3, “365 Days of Openness: The Emergence of OER at the University of Cape Town,” Hodgkinson-Williams, Paskevicius, Cox, Shaikh, Czerniewicz and Lee-Pan review the first year of their university’s OER initiative, detailing how it decided on and developed an institutional directory using a customised version of open source software — that is, the content management system software Drupal. The authors describe how the OER team went about soliciting content from academics to populate the UCT OpenContent directory and how it has been sustained beyond the original Shuttleworth Foundation grant.

The assessment and accreditation of learners who informally study using OER over the Internet is the goal of the OER university (OERu) initiative that is described in Chapter 4, “Open Educational Resources University: An Assessment and Credit for Students Initiative,” by McGreal, Mackintosh and Taylor. The OERu aims to provide free learning to all learners worldwide using OER with pathways to gain credible qualifications from recognised educational institutions. The OERu holds the promise of shifting the learning paradigm by creating, adapting and assembling pathways to accreditation using OER supported by the OERu consortium of universities and colleges that agree to assess a candidate’s learning based on mastering the knowledge and skills embedded in the OER that they use. The partner institutions hope to develop cost-effective processes to evaluation, to develop a sustainable learning “ecosystem.”

Massive Open Online Courses: Innovation in Education?

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Introduction

Massive Open Online Courses (MOOCs) have developed into a significant talking point for universities, education reformers and start-up companies. The interest in this format of teaching and learning resulted in the *New York Times* declaring 2012 as “the year of the MOOC” (Pappano 2012).

Writing a chapter such as this can be a fool’s game; by the time the book is published, the hype-driven world of education may well have moved on to newer buzzwords. Currently, though, MOOCs represent and reflect the angst of educators and administrators in attempting to understand the role of the university in the Internet era.

Researchers have extensively chronicled the trends and challenges in higher education (Altbach et al. 2009). MOOCs appear to be as much about the collective grasping of universities’ leaders to bring higher education into the digital age as they are about a particular method of teaching. In this chapter, I won’t spend time commenting on the role of MOOCs in educational transformation or even why attention to this mode of delivering education has received unprecedented hype (rarely has higher education as a system responded as rapidly to a trend as it has responded to open online courses). Instead, this chapter details different MOOC models and the underlying pedagogy of each.

Distance learning — and, more recently, online learning— has a long history of increasing access to education, dating back to 1833 (Simonson et al. 2011, p. 37). Correspondence schools and radio instruction contributed to reducing education barriers. By the late 1960s, the launch of the Open University UK (OU UK, History) resulted in the development of open access universities around the world.

Open universities were initially defined by their goal to reduce entry requirements for higher education. In the distance education model, students received texts and

reading resources via postal service and submitted assignments in return. Today, with millions of students learning at a distance (Simonson et al. 2011, pp. 14–15), research and literature have developed to address teaching practices, learner skills and attributes, as well as governance and leadership of open universities. MOOCs are a continuation of this trend of innovation, experimentation and the use of technology to provide learning opportunities for large numbers of learners.

What Are MOOCs?

Open online courses, sometimes called “massive” (MOOCs) due to their high enrolment numbers (McAuley et al. 2010), offer a middle ground for teaching and learning between the highly organised and structured classroom environment and the chaotic open web of fragmented information. In a traditional classroom or online course, learning designers and educators structure the readings, learning resources, lectures and activities of learners. As a result, learning is directed toward clearly articulated goals and outcomes. The educator provides shape and direction to the learning experience by forming groups and providing assessments, assignment focuses or guidelines.

Connectivism and Connective Knowledge (CCK08) was the first MOOC, offered both as an open course and in the Certificate in Emerging Technologies for Learning (CETL) at the University of Manitoba. CETL was designed as a Masters-level certificate with three core and three elective courses. CCK08 was the initial core course in the programme. The course syllabus was translated into six different languages: Spanish, Portuguese, Italian, Hungarian, Chinese (Simplified Character Version) and German (http://ltc.umanitoba.ca/wiki/Connectivism_2008). The course was first offered from September to November 2008, facilitated by me and Stephen Downes. A total of 24 for-credit students enrolled in the course. The course was then offered as an open online course, drawing over 2,200 additional participants. These additional students did not pay a registration fee or receive feedback on their assignments from course instructors.

As put forward by McAuley et al. (2010, p. 5):

“A MOOC integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources. Perhaps most importantly, however, a MOOC builds on the active engagement of several hundred to several thousand ‘students’ who self-organise their participation according to learning goals, prior knowledge and skills, and common interests. Although it may share in some of the conventions of an ordinary course, such as a pre-defined timeline and weekly topics for consideration, a MOOC generally carries no fees, no prerequisites other than Internet access and interest.”

Specifically, MOOCs are:

- **Massive**, involving hundreds and thousands of students. The scale of “massive” is somewhat relative. Early MOOCs had in the range of 2,000 students, but offerings by Coursera and Udacity have exceeded 100,000 registrants. An important benefit of large numbers of students is the opportunity for sub-network formation by participants. For example, in CCK08, students formed sub-networks around language, geographical

locations, physical “meet-ups,” technology spaces such as Second Life, and different education segments (primary and secondary, higher education, corporate learning).

While the concept of *massive* raises concerns about isolation and overwhelming student-instructor ratios, at least some students use the size and diversity of networks to personalise their learning through forming sub-networks.

- **Open**, in terms of access. MOOCs, particularly those offered by for-profit firms such as Coursera, are not necessarily openly licensed, but students can access the course content and participate in guest lectures without fees.
- **Online**, exclusively. In some instances, learners arrange physical meet-ups, but most of the learning activity — content and interactions — occurs online.
- **Courses**. MOOCs have a set start and stop time. Even if MOOC archives are made available after the course, social interactions in forums and blogs occur during the set times of the course offering. While there are some areas of overlap and use of open education resources with MOOCs, the content is somewhat structured and sequenced, even when multiple sources of learning content are used.

MOOC Formats

MOOC models are evolving quickly. In their current configuration, they can be classified as xMOOCs, cMOOCs and quasi-MOOCs.

xMOOCs

xMOOCs are offered in a traditional university model such as Stanford (Coursera), MIT (Massachusetts Institute of Technology)/Harvard (edX), and Udacity. This format started in the fall of 2011 with Stanford University’s course in Artificial Intelligence (www.ai-class.com/). Coursera and Udacity are for-profit initiatives. In contrast, edX is not for profit.

Traditional universities, including many elite American institutions, are the driving force behind this model. The pedagogical model that underpins these courses is one of “teacher as expert” and “learner as knowledge consumer.” Learning is primarily a process of the learner duplicating the knowledge structure set by the course designer and the instructor teaching the course. Weekly course topics are addressed through recorded lectures that range from 3 to 30 minutes in length. Udacity, not affiliated with a university, relies on short lectures and interactive activities that rarely exceed five minutes. Coursera, which includes traditional universities as members, offers video lectures that typically range between 15 and 30 minutes.

In order to meet the challenges of large numbers of students, assignments are computer-graded in xMOOCs. Direct instructor feedback is not common, except in discussion forums where teaching assistants and the course instructor respond to student questions. Coursera and Udacity encourage participants to form regional meet-ups to connect with other students. As of late 2012, Coursera lists over 2 million students (or “courserians”) and over 200 courses.

cMOOCs

cMOOCs are based on a connectivist pedagogical model that views knowledge as a networked state and learning as the process of generating those networks and adding and pruning connections. Of particular importance in cMOOCs is the view of knowledge as generative and the importance of artifact creation as a means of sharing personal knowledge for others to connect to and with. In contrast with xMOOCs, cMOOCs are largely open in terms of the activities that learners can pursue related to the theme, with limited structure and weekly themes.

A pre-history of cMOOCs includes smaller open online courses offered by David Wiley and Alec Couros in 2007 and early 2008 (Downes 2012). Since CCK08, numerous courses have been offered in the distributed cMOOC format, as detailed in Table 1.1.

Table 1.1: Early MOOCs

Course	Facilitators	University credit?
CCK08	Siemens, Downes	Yes
CCK09	Siemens, Downes	Yes
Personal Learning Environments and Knowledge 2010 (PLENK)	Siemens, Downes, Cormier, Kop	No
Education Futures 2010	Siemens, Cormier	No
Critical Literacies 2009	Downes, Kop	No
MobiMoc 2010	Inge de Waard	No
Learning Analytics 2011	Siemens, Dron, Cormier, Elias	No
CCK 2011	Siemens, Downes	Yes
eduMOOC, 2011	Schroeder	Yes

cMOOCs are distributed, and they emphasise, the importance of learner autonomy. As a consequence of increased learner control, numerous tools and technologies are used during the delivery of an open course. Each learner selects the technologies that he or she prefers to use. Course facilitators provide: an infrastructure for content and administrative details (in the form of a wiki or a Web page); a schedule for synchronous sessions involving guest speakers or live discussions; a means of communicating with participants and providing course updates (often handled through email and blogs); and starting points for learners to form connections with each other (a learning management system such as Moodle).

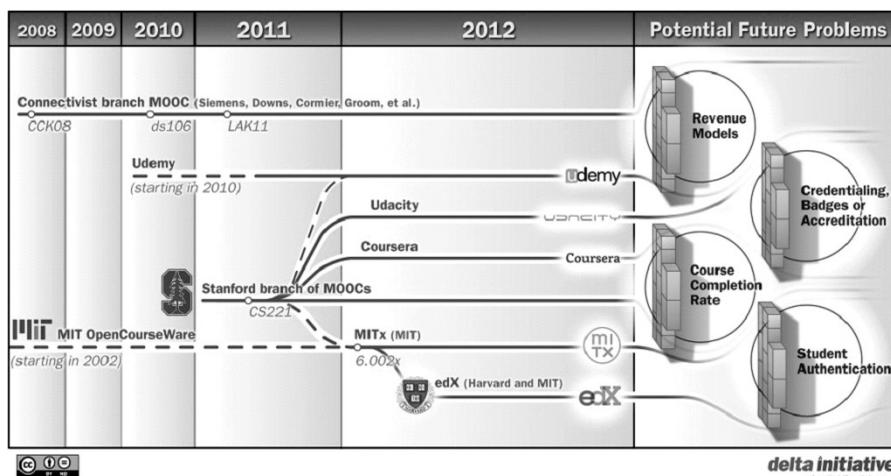
quasi-MOOCs

quasi-MOOCs provide Web-based tutorials as OER, such as those of the Khan Academy and MIT's OpenCourseWare (OCW). These are technically not courses. They consist of OER intended to support learning-specific tasks such as an operation in algebra, or they are treated as asynchronous learning resources that do not offer the social interaction of cMOOCs or the automated grading and tutorial-driven format of xMOOCs. These resources are loosely linked and are not packaged as a course.

The Saylor Foundation (www.saylor.org/) has full courses primarily as OER and available for free use by learners. These courses are being accepted for credit at some educational institutions (Carey 2012) and as an open course format using Google Course Builder (<http://cb-me102.saylor.org/>).

Figure 1.1 provides a timeline representation of MOOC models and early providers (Hill 2012).

Figure 1.1: History of MOOCs (from Hill 2012).



Challenges of MOOCs

Since fall 2011, with the offering of Stanford’s Artificial Intelligence (AI) course, most coverage of MOOCs has focused on the positive aspects: democratising learning; free courses; and economy of scale. Numerous challenges are starting to emerge. In particular, MOOCs have high dropout rates, lack an economic or sustainable model, face challenges of plagiarism, and risk de-skilling the professoriate.

Dropout Rates

MOOCs have poor completion rates in comparison with traditional university courses. Daniel (2012) reports that an MIT course, Circuits and Electronics, only had 7,157 students out of 155,000 complete the course. However, dropouts in MOOCs may be driven by different factors than in traditional courses. Students taking a traditional course have a different level of commitment because of credit seeking, the motivation of paid tuition fees, and the need to take a course to fulfil degree requirements. Together, these factors are a type of “hard commitment” on the part of students. Failure to complete the course has implications for future study.

Learners who take a MOOC may do so for a range of reasons beyond credit. The obligation for continuing a course is not driven by responsibility of completion, but for reasons such as personal interest or motivation. To date, studies have not been conducted on the impact of “soft commitment” in MOOCs. For example, participants may be interested in taking only a few of the weekly topics out of an entire course. It is still possible that students have a sense of personal disappointment in failing to complete a course, but course completion is different

in online courses, even though many of the metrics of success (such as concern over dropout rates) are different from those in regular university courses. (During and following CCK08, I met numerous students at conferences in different countries who expressed a sense of disappointment at not completing the course or being more active.)

Sustainability

MOOCs do not yet have a sustainable revenue model. Developing, delivering and updating online courses is a resource-intensive undertaking. Until a revenue model is established, concerns will exist around the viability of MOOC providers and the MOOC model of learning. Udacity and Coursera are at the early stages of experimenting with business models, including offering career placement services (Young 2012b).

De-skilling the Professoriate

One potential impact of “super professors” from top universities providing recorded lectures to other universities and colleges is the progressive de-skilling of the professoriate (Basu 2012). MOOC providers such as Coursera and Udacity are for-profit organisations backed by venture capital funding. As such, the first mandate of these providers is to their shareholders, not to students or to society.

Cheating and Plagiarism

While MOOCs are often non-credit, cheating and plagiarism is a growing concern for university providers (Young 2012a). These concerns require attention from open course providers in order for MOOCs to be considered for credit or transfer by universities.

The Impact of MOOCs

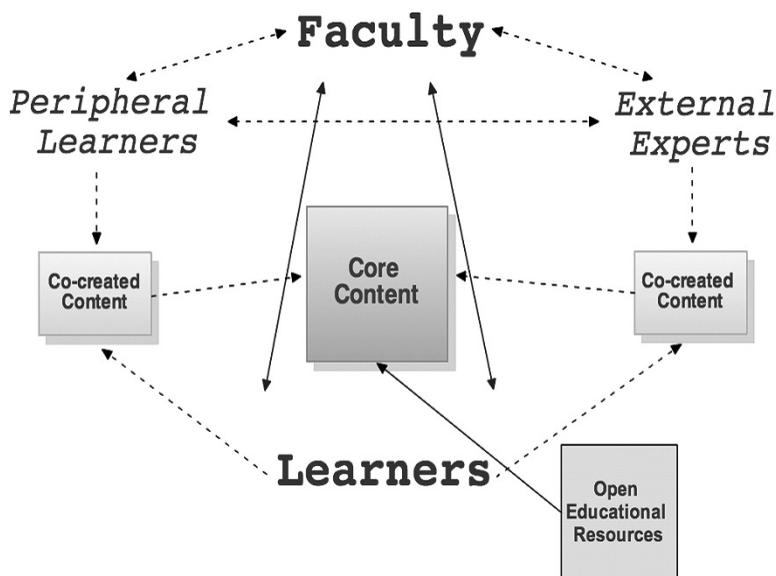
MOOCs may well be a transitory stage for education. The concerns that MOOCs raise need to be addressed before this course format is accepted broadly.

When viewing MOOCs from the perspective of how students interact and how information is created, it becomes apparent that a key aspect of this format is how it mirrors or reflects the structure of the Internet (at least, the cMOOCs). An ecosystem is developing around MOOCs. MOOCs are a platform on which various service offerings are provided. As an example, Twitter’s popularity has resulted in the development of numerous products and services that enrich the experience for users. While Twitter itself was initially a platform for sharing short messages, often from mobile phones, numerous products were developed on the Twitter platform for reading tweets, sharing images and videos, and archiving tweets. This ecosystem improved the value of the Twitter platform. Similarly, MOOCs are today at an early stage, but already there are indications that a similar suite of products and tools will be built on top of existing offerings.

Another impact of open online courses is a power shift toward increased equity between educator and learner. Figure 1.2 details how the traditional faculty–content–learner role is increasingly augmented through OER and external experts.

The emerging educator–learner power shift is also reflected in access to learning content, social media and content creation tools reflective of the participatory nature of the Web.

Figure 1.2: Expanding learner access.



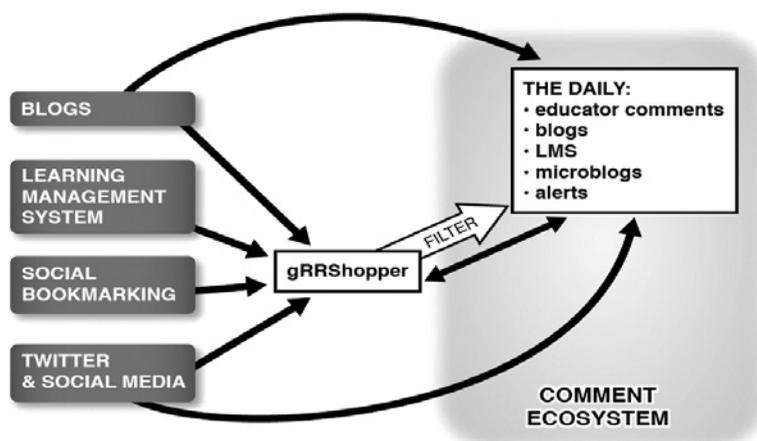
Another important contribution of MOOCs is to increase interest in, and awareness of, online learning. Online learning continues to outpace the enrolment growth of traditional university students (Allen and Seaman 2011). The media interest in open courses has generated much discussion of the opportunities of online education.

Attributes of cMOOCs

The content and discussion in a cMOOC reflect the open, networked and distributed structure of the Internet. While a classroom-type model is evident in open courses through the use of readings and recorded lectures, participants have control and autonomy to move beyond the planned structure of the course through the use of OER, the use of personal blogs, and the formation of sub-networks around areas of personal interest.

The relationships among the various technological components of a cMOOC are detailed in Figure 1.3. Blog and Moodle forum posts, as well as tweets, were aggregated through gRSShopper, an application developed by Stephen Downes. If a post or tweet contains the course hashtag (such as CCK08), it is automatically pulled into the database for inclusion in the next edition of *The Daily*, an email sent (not surprisingly) every day. gRSShopper and *The Daily* have commenting features available to course participants, but comments are most often made directly on the blogs of participants or in the Moodle forum, as indicated by the *comment ecosystem* in Figure 1.3.

Figure 1.3: Technology elements in a cMOOC.



These cMOOCs are informed by connectivist views of learning — namely, that knowledge is distributed and learning is the process of navigating, growing and pruning connections. Interactions in CCK08 started in Moodle, but learners interacted in Facebook (www.facebook.com/group.php?gid=31924181180), Second Life (<http://chilbo.wikispaces.com/Connectivism+Course+in+Chilbo>), blogs, wikis and other spaces. Fini (2009, Section 3) details the following toolset used in his research of CCK08: “Moodle, blogs, Facebook, LinkedIn, Twine, Twitter, Ning, Elluminate, Ustream, Pageflakes, *The Daily*, Second Life, RSS, conceptual maps, social bookmarking, and Flickr.”

CCK08 was among the first courses that adopted the model of distributed content and interactions that have since come to define cMOOCs. Fini (2009) provides an indication of the range of tools and processes, including how some of the tools were selected and proposed by the facilitators, and others were suggested by the participants. Even though the course assignments required only the use of a personal blog and a tool to build concept maps, during the course more than 12 different tools and technological environments were used, from learning management systems (e.g., Moodle) to 3D environments (e.g., Second Life).

Tool sets differ for each MOOC, with prominent or “fashionable” tools gaining significant attention. For example, during CCK08, a group was formed in Second Life (which was, at the time, gaining attention with educators) for individuals to meet and discuss course topics. In subsequent courses, different technologies were used that reflected the new tools gaining prominence during the time frame of the course. CCK09 resulted in significant Twitter traffic and PLENK10 produced numerous Facebook groups.

- *Knowledge is generative* – xMOOCs adopt a traditional view of knowledge and learning. Instead of distributed knowledge networks, xMOOCs are based on a hub-and-spoke model: the faculty/knowledge at the centre and the learners as replicators or duplicators of knowledge. Each week in a cMOOC starts with readings and resources that reflect the current understanding of experts in the field. Learners are asked, however, to go beyond the declarations of knowledge and to reflect on how different contexts impact the structure (even relevance) of that knowledge. Broadly, however, generative vs. declarative knowledge captures the epistemological

distinctions between cMOOCs and the Coursera/edX MOOCs. Learners are encouraged to create and share digital artifacts — blogs, articles, images and videos.

- *Coherence is learner formed and instructor guided* – This attribute is closely related to the point above. In traditional courses, instructors create knowledge coherence by bounding the domain of knowledge that the learners will explore — that is, this is the course text, here are the readings and the quizzes and tests that validate what the student has learned. In cMOOCs, the coherence between course concepts is less structured, as learners are expected to form these connections through the process of learning. Learners are asked to explore, deepen and extend the ideas presented in weekly readings and resources. Coherence is something that the learners form as they make sense of and find their way through the messy knowledge elements that make up the many dimensions of a field.
- *Interactions are distributed and multi-spaced* – CCK08 started by being primarily centred in a Moodle discussion forum. As the course progressed, interactions occurred with many tools and technologies, including Second Life, PageFlakes, Google Groups, Twitter, Facebook, Plurk, blogs, wikis, YouTube and dozens of others.
- *Solutions are innovation and impact focused* – It is now a cliché to state that the world is complex and that knowledge is continually evolving. However, just because it is a cliché does not mean it is not true. Society faces complex challenges. Solutions to these global challenges will likely be found in distributed and networked approaches. The challenges are too big to be addressed in traditional sub-clustered empirical knowledge models. Integrative and holistic knowledge approaches, distributed across global networks can help (e.g., the way the virus that causes SARS in 2003 was identified). With cMOOCs, attempts are made to emulate connective and integrative knowledge: a tug on one part of the knowledge network impacts other parts.
- *Autonomous and self-regulated learners are fostered* – cMOOCs revolve around a power question: What can learners do for themselves with digital tools and networks? cMOOCs foster not only a particular type of knowledge in a particular area of inquiry; they also foster a self-regulated, motivated and autonomous learner. When an instructor does for learners what learners should do for themselves, the learning experience is incomplete. Developing capacity for learning and the mindsets needed to be successful learners is a central attribute of cMOOCs. The goal is not only the epistemological development of learners (knowing things), but also their ontological development (becoming a certain type of person).

Curriculum and Learning Outcomes

Participative pedagogical models are particularly appropriate for use with OER. The learning content or curriculum, when it consists of OER or other free content on the Internet, plays a different role than they do in traditional courses. Traditional courses are generally designed with some learning target (outcomes) and sequenced content intended to direct the learner to achieving planned outcomes.

On the surface, this model is useful for managing the education experience, as the intent of courses are clearly mapped to specific course, programme or degree outcomes. The reality of the learning experience is more complex than is indicated by structured curriculum. Learners approach courses with varying levels of expertise and knowledge, gained through formal courses and life experiences. A group of 30 students will consist of diverse learners having different knowledge profiles. In a participative pedagogical model, learners are able to select and interact around new knowledge and avoid duplication. The educator continues to play a role in ensuring that all learners meet the needs of each course. However, where a course cannot be personalised for each student, due to teacher-learner ratios, learners can self-organise and self-regulate to personalise the learning process. Instead of creating a rigid course structure in advance of learner engagement with curriculum, a cMOOC defines learning outcomes, but gives students freedom in exploring and accessing the course content.

Finally, structure in cMOOCs is a by-product of the interactions that occur between learners and content, learners and the educator, and learners with other learners. The experience of student interaction is then “stitched together” as learners move through the course through analytics (Hawksey 2012). Analytics reveal the coherence developed through interaction for different students, rather than the structure that is formed in advance of the course starting.

Conclusion

The OER movement faces an important challenge in responding to MOOCs. While the hype pendulum has swung strongly in the direction of open online courses, as educators start to face the challenges and shortcomings of MOOCs, it is reasonable to expect that attention will turn to concerns about access to educational content and effective pedagogical models.

One challenge that OER advocates need to consider is the broader appeal of ease of use and access than just openly licensed content. For example, learners who take Coursera courses have, to date, not demonstrated a significant interest in OER or any content and course licensing. The main interest is “free as in access” not “free as in remixing/re-use.”

Additionally, how do small colleges and universities participate in open online courses? Companies such as Coursera are partnering with elite universities. The prominent xMOOC model has not yet provided an opportunity for less elite systems to teach courses on their platforms.

The future of MOOCs is unclear, considering the rapid development of MOOCs from obscurity in late 2011 to mainstream attention in 2012. The OER movement is quickly evolving, as are software, content and platform providers. Media attention proclaims disruption for education. Regardless of what the future holds for open online courses, a critical need exists for learners from around the world to be able to access quality learning content and learning experiences. As the MOOC hype subsides, it is important for the OER movement to continue to advocate for openness, access and learner-focus.

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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.

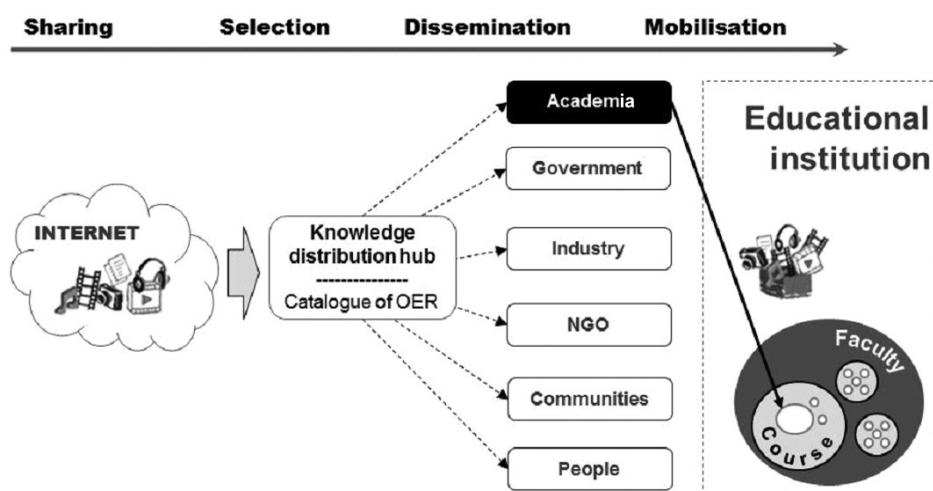
One challenge of OER use in academia is to recognise the value of existing knowledge as it is shared, assimilated and applied to specific needs by other communities in academia. Effective knowledge application entails the explicit definition of new knowledge that arises through the process of tailoring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

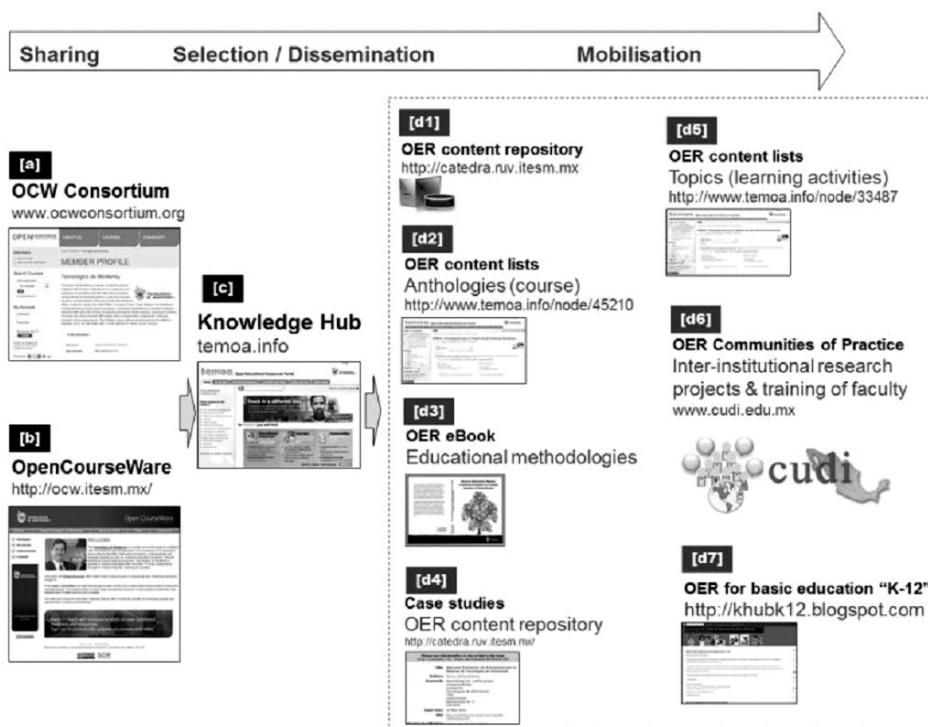
- a) the adoption of open digital materials from OpenCourseWare universities for formal academic programmes in our institution (Contreras 2008)
- b) publication of academic content through the OpenCourseWare initiative (OCW-ITESM 2008)
- c) digital knowledge dissemination through the initiative called “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).

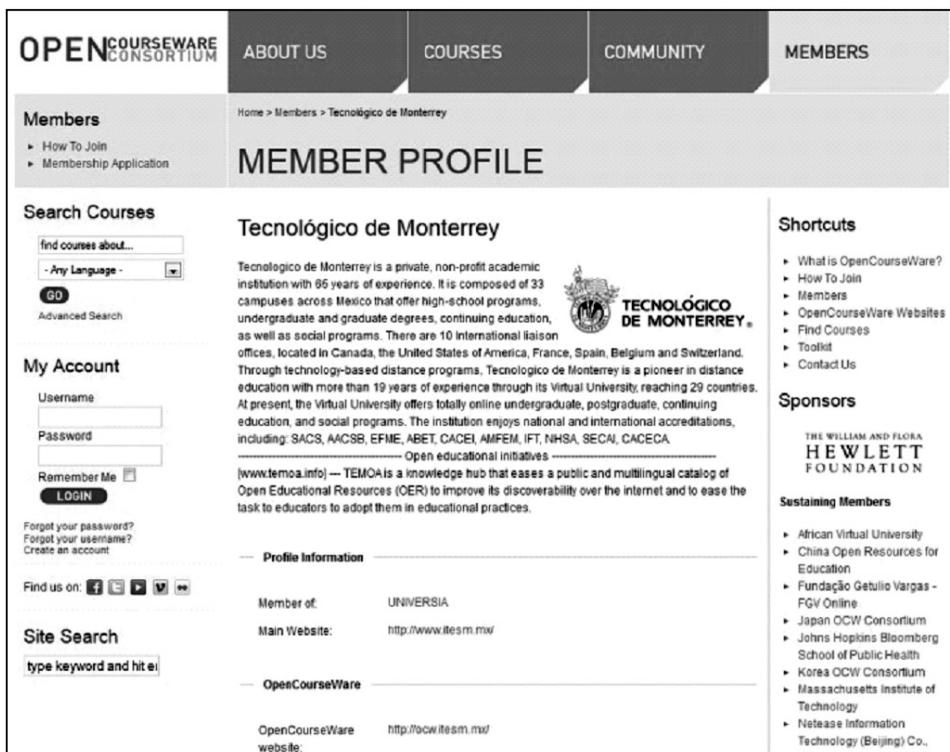
The process of adoption of open academic content started in 2007 at the Tecnológico de Monterrey with the analysis of several courses from international universities of higher education — for example, MIT (Massachusetts Institute of Technology) (MIT-OCW 2011), Carnegie Mellon University (2011; www.cmu.edu/oli) 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 screenshot displays the TEMOA Open Educational Resources Portal interface. At the top, there are navigation links for 'Home', 'Log in/Create account', 'Educational Resources', 'Contribute and Share', 'Guides and docs', and 'About us'. The main header includes the TEMOA logo and the text 'Open Educational Resources Portal', along with the logo for 'SISTEMA TECNOLÓGICO DE MONTERREY'. A search bar is located at the top right.

The page content is organized into several sections:

- Table of contents:** Lists four topics related to educational practices and digital literacy.
- Actions:** Provides options to view, cite, subscribe to updates, or search results.
- Share this:** Includes social media sharing icons.
- Copyright notice:** States that all content is under a Creative Commons Attribution-Non-commercial-Sharealike license.
- Course details:**
 - Course:** Ed5047. Investigación para la Mejora de las Prácticas Educativas
 - Submitted by:** soiramirez on October 15, 2010.
 - Subject general:** Social Sciences > Education > Education (General)
 - General objective:** El participante del curso investigará una práctica educativa, como una actividad intencional, humana y social, a la luz del conocimiento de diversas ciencias de la educación, ... more>>
 - Popular tags:** None
 - Course identifier:** ed5047
- Basic Information:**
 - CP code:** 53 : HIGH SCHOOL/SECONDARY DIPLOMAS AND CERTIFICATES.
 - Audience education level:** Academic: Graduate
 - Study hours per week:** 12hrs
 - Number of sub-items:** 22 topics, 29 educational resources
 - Total calculated time of included activities:** 0
 - Subject keywords:** Investigación, Mejoras educativas

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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365 Days of Openness: The Emergence of OER at the University of Cape Town

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Introduction

Historically, resources such as books, journals, newspapers, audio and video recordings have been fairly well curated in university libraries. However, the same cannot be said for teaching and learning materials, unless they have been included in a textbook or study guide. With the growth in digital media, libraries have been extending their curation of scholarly resources to include electronic journals, digital books and reference guides, broadening access to these beyond the physical walls of the library.

While the growth in digital technology has prompted academics to create their own customised and contextually specific digital media for use in their teaching in the form of PowerPoint presentations, manuals, handbooks, guides, media resources and websites, these resources are most often stored on personal hard drives, on departmental servers or within password-protected institutional learning management systems. Access to these digital materials is usually limited to registered students undertaking specific courses within specific institutions and usually only disseminated by individual academics or departments.

In the early 2000s, institutions such as MIT (Massachusetts Institute of Technology) and Rice University challenged this convention of locking down teaching and learning resources, within institutions or departments or by individuals, by opening access to many of their resources to the rest of the world as Open Educational Resources (OER) (Abelson and Long 2008; Baraniuk 2008). While the move to opening education resources globally was inspiring, UCT had specific local drivers. Not only are university textbooks in South Africa extremely expensive — one study shows that they can cost as much as a third of a student's tuition (Prabhala 2005) — but they usually lack local content, context and case studies. The imperative to make relevant teaching resources available has also

extended beyond the country, given the broader African continental need for appropriate and available teaching resources. In April 2008, UCT joined the open movement by signing the Cape Town Open Education Declaration (www.capetowndeclaration.org/), thereby committing itself to making a selection of its teaching and learning materials available as OER.

In this chapter, we review the first year of UCT's OER initiative, detailing how it came into existence through the financial support of the South African based Shuttleworth Foundation for a university-wide research project, which helped identify existing materials that could be shared as OER. We then recount how the Centre for Educational Technology (CET) developed an institutional directory using a customised version of the open source software Drupal, after conducting an analysis of potentially suitable software. We describe the metadata standard selection process and endeavour to position the UCT OpenContent directory within the OER landscape. We explain the current policy environment at UCT that influences the sharing of OER and how the OER team from CET went about soliciting content from academics to populate the UCT OpenContent directory; and elaborate on how the project developed with sustainability principles in mind and how it has been sustained beyond the original Shuttleworth Foundation grant. Finally, we highlight the signs of change in the UCT landscape and explain how UCT is extending its open footprint through a more encompassing Open UCT initiative, which includes open research (e.g., journal articles and e-books) and "grey" materials (e.g., research project reports, briefing papers for government, conference presentations, posters).

The Emergence of OER at UCT

In 2007, the Shuttleworth Foundation funded an 18-month-long research project, called Opening Scholarship, to explore the opportunities that digital media and open dissemination models could offer for enhanced communication and more effective knowledge sharing at UCT. A part of this project was a review of the current status of OER in South Africa and at UCT, as well as of policy, organisational, technological, legal and financial issues that would need to be addressed to maximise the fragmented approach to sharing teaching and learning resources by individual academics at UCT (Hodgkinson-Williams 2009).

Subsequent to this research project, the Shuttleworth Foundation funded a year-long project in 2009 to implement OER at UCT. The project undertook to:

- develop a central UCT-branded searchable directory of OER created by UCT staff and senior students;
- provide process and infrastructure support to UCT staff to facilitate the sharing of open and potentially open teaching resources as OER, published under appropriate licences (such as Creative Commons); and
- promote the visibility of UCT-published OER on appropriate search engines, on OER aggregators and amongst appropriate target communities.

For the equivalent of about USD 100,000, the OER UCT Project (hosted in the Centre for Educational Technology) agreed to, and delivered on, producing:

- an audit of existing OER at UCT
- a central UCT-branded directory of OER

- a set of online support resources for UCT staff on publishing OER
- five exemplar OER publications
- the transfer of skills from OER specialists contracted during the project period to institutional support staff
- a launch event for the UCT OER directory with follow-up workshops and seminars
- a documented case study of an institutional OER process.

Also in 2009, the Faculty of Health Sciences at UCT was one of eight institutions involved in the formation of the African Health OER Network (www.oerafrica.org/healthoer/Home/tabid/1858/Default.aspx). It was co-facilitated by OER Africa (an initiative of the South African Institute for Distance Education) and the University of Michigan, and funded by the William and Flora Hewlett Foundation. The Network provided support and funding for the conversion of materials to OER in the Health Faculty at UCT and contributed some of the initial materials to the UCT OpenContent directory.

Many invaluable lessons were learned along the way. These are highlighted in this chapter for those considering launching an OER initiative at their institution or who are grappling with how to institutionalise OER initiatives embryonically.

The OER Project Experience at UCT

Bringing Resources from “Below the Radar” and Into View at UCT

The OER team consisted of: a Project Director from CET who spent about 20 per cent of her time on the project; a part-time Project Manager paid by the OER project; a Technical Director from CET who spent about 10 per cent of his time on the project; and two part-time graduate assistants also paid by the OER project.

The initial task for the team was to locate potential OER from existing materials and then to encourage the creation of OER. The former process was quite challenging, as many of the resources that were already being shared in some way were often difficult to find because they were buried deep within departmental websites, within the institutional learning management systems or on public social media sites. However, this process revealed many resources already being shared on the Internet by academics at UCT. The problem of lack of visibility was due to the absence of metadata — a necessary component that attaches descriptive information to a resource. It could be said that these resources were being “shared below the radar,” as it was the intent of the creators that they be shared, but the lack of metadata meant materials were not easily discoverable. In addition to the lack of metadata, the presence of copyrighted images embedded in some materials limited their re-use. Many academics were under the impression that referencing of graphics such as photographs, illustrations and cartoons in their materials meant they could be used and distributed for teaching and learning purposes. Furthermore, most of the materials did not stipulate any usage conditions, making it unclear as to what the author was prepared to share and under what conditions.

What was needed was awareness-raising to shed light on options that would enable the inclusion of legally shareable images, the required metadata that would

make them more discoverable, and the Creative Commons licence that explained the conditions under which these materials could be shared.

Developing the OER Directory: UCT OpenContent

Having explored the range of resources already being shared at UCT, the OER team was aware of the wide variety of resources and associated formats that would need to be accommodated in the planned directory. Many of the educational resources ranged from individual images, audio podcasts, videos and PowerPoint presentations to sets of interconnected Web pages. In order to provide the layer of discovery for these materials, the OER team explored a number of strategies that could provide the functionality of an OER directory.

Deciding on a Directory

Starting with the key issues of discoverability, the team gradually built up a list of specifications including a series of “use-cases” — scenarios of potential contributors and potential users. The key decision emerging out of this process was to create a directory that allowed academics the functionality to add materials to the directory independently. Unlike institutions such as MIT, where they had a group of educational technologists and instructional designers to help academics rework material and upload it to MIT OpenCourseWare, UCT did not have that infrastructure or capacity in place.

Hosting Resources

The OER team decided that the type of resource should dictate the most suitable hosting space. For instance, images could be best hosted on websites in the cloud such as Flickr to take advantage of tagging, linking and geo-tagging facilities. It was decided from the outset that the planned directory should operate as a portal for accessing content rather than hosting content, as initial investigations showed that most teaching materials at UCT were already online. Many were being hosted in the local open source Sakai learning management systems, “Vula” (which means “open” in a number of South African languages), on departmental websites, or on public social media sites. All of these could be easily linked to the directory.

Choosing a Platform

A scan of the OER projects located at other institutions in mid-2009 indicated the use of the popular EduCommons platform, a customisation of the Plone content management system. The OER team tested Plone (Version 3.3) quite thoroughly and found it slightly rigid for the needs of the OER project. Many of the advanced content protection tools were unnecessary for the planned UCT OER directory, as the OER team intended the directory to be open and accessible to encourage willing academics to upload and later revise their materials themselves.

The popular blogging platform WordPress (Version 2.9) was also tested for use as an OER directory. WordPress is recognised as a powerful blogging platform that may also be used to set up a quick standard website. However, the team found WordPress unsuitable for the OER project despite its extensive functionalities.

While WordPress is a powerful system for creating websites and blogs, our analysis showed it was less dynamic when dealing with custom content types and associated metadata.

Finally, the OER team tested Drupal (Version 6.15), a popular content management system which the team found to be highly adaptable and customisable through the various modules that could be added on to the core package. Modules are customisable packages which alter and extend Drupal’s core capabilities, adding new features or customising Drupal’s behaviour and appearance. The OER team was also able to obtain excellent support from the Drupal user community, and in many instances was able to pose questions directly to the programmers who had written the source code for the modules. The immediacy and specificity of the support proved to be essential as the OER team customised the Drupal software to create the UCT OpenContent directory (Figure 3.1). Apart from employing a Drupal consulting company to undertake the specialist programming of key features of the UCT OpenContent design, all the functional customisation was undertaken by the technical team in CET.

Figure 3.1: UCT OpenContent directory (www.opencontent.uct.ac.za).



Choosing Metadata Standards

In order to make the materials on UCT OpenContent globally discoverable, it was essential to choose an internationally acceptable metadata standard used in the OER landscape. In mid-2009, OER Commons was a widely used international OER portal and the team decided to adopt that metadata framework to ensure that OER Commons could easily harvest data from the UCT OpenContent site. The OER Commons metadata framework was based on the Dublin Core standard and included a few additional fields particular to OER.

The OER team added a field called “teaching and learning context” to the OER Commons framework to enable contributors to specify how the resource may be used in an educational context. A further field to credit a funder, if applicable, was also added to the metadata (Table 3.1). The metadata attached to resources added on the UCT OpenContent site are therefore more comprehensive and more

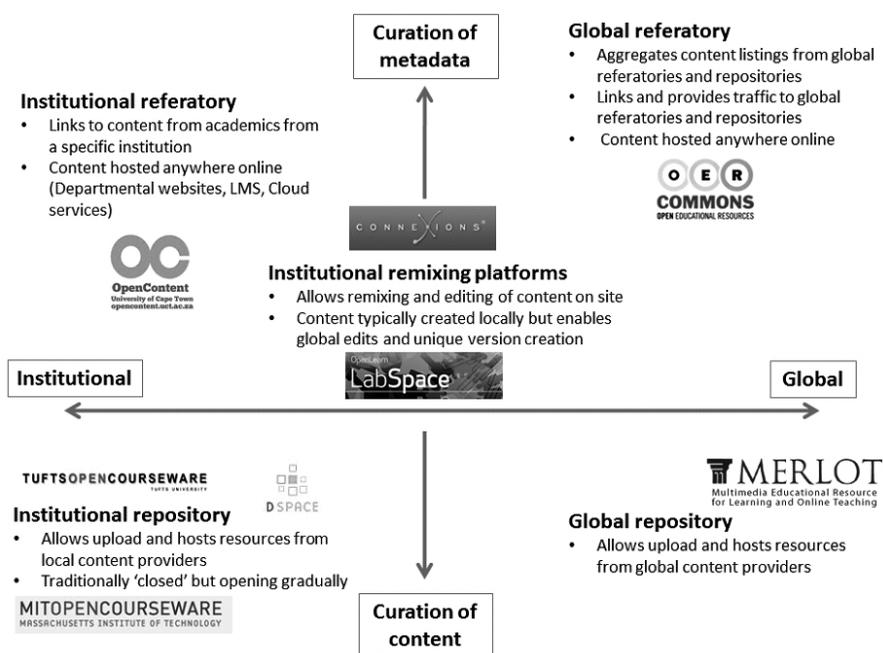
specific to OER than the metadata added to individual items hosted elsewhere (e.g., Flickr). So, in addition to providing basic metadata about the digital media, the OpenContent metadata schema aims to contextualise how the resource may be useful in teaching and learning.

Table 3.1: Metadata terms selected for the OER Commons metadata framework

Field	Required	Description
Title	Yes	Give your resource a descriptive title.
Authors	Yes	Enter the author(s)/creator(s) of the resource.
URL	Yes	Provide the Web address where your resource is stored (e.g., Vula, departmental server). Note: This page does not allow you to upload your resource. The URL you provide gives the direct link to where the resource is located.
Abstract	Yes	Describe the content of the resource in as much detail as possible.
Teaching and Learning Context	No	Describe the recommended learning context or prerequisites for the appropriate use of the teaching and learning tool. This can be as simple as sharing a story of how the material has been used in your own teaching.
Funded by	No	In the case of a resource being an outcome of a funded project, please specify the funding institution.
OER Image	No	You are encouraged to attach an image which represents the resource. This may be an image from within the material, a screenshot of the cover, or a relevant graphic which represents the contents. If you do not provide an image, a suitable one will be selected for you on moderation.
Creative Commons Licence	Yes	Submitting a resource to the UCT OpenContent directory implies the desire to share your educational resource with the world. OER UCT recommends the Creative Commons licence because it protects the attribution rights of the creator while allowing others to make free use of the material.
Faculty	Yes	Select the faculty in which the material was created or the faculty the material most cohesively represents.
Department	Yes	Select the department in which the material was created or the department the material most cohesively represents.
Media Types	Yes	Select the item which best describes the document type of your resource.
Material Type	Yes	Select the item which best describes the material type of your resource.
Language	Yes	Select the language in your resource is written.
Level	Yes	Select the recommended student level for which your resource is intended.
Tags	Yes	Please add tags which describe your resource in more detail. For instance, if you selected the Faculty of Science and the Department of Physics, you might want to tag this resource with something like “Newton’s Laws” if the material is specifically about that topic.

Another specification that emerged from this process was to include Google Analytics within the planned directory so that the OER team could track users, what they were searching for and which resources were accessed most frequently. Figure 3.2 illustrates the type of directory (sometimes also called a “referatory”) that the UCT OER team created in relation to those created by other institutional or global OER entities curating OER content and metadata.

Figure 3.2: The OER curating landscape in the UCT project.



Working Without a Formal Policy

Although the OER team had, in principle, the support of UCT’s senior management to undertake the project, there was no formal policy, mandate or set of procedures in place obliging academics to share their teaching and learning materials outside their classroom. There is no regulation forbidding academics to publish a selection of their materials as OER at UCT. Fortunately, the OER team found many cases where academics were already sharing materials. The team referred to these academics as “institutional champions of openness.”

For example, academics in the Physics Department had been publicly sharing their teaching materials and laboratory practicals via their departmental website for years before the term “Open Educational Resources” was coined by UNESCO in 2002 (UNESCO 2002) or the alternative intellectual property licensing system, Creative Commons, was developed. Likewise academics in the faculties of Health Science had been sharing complete modules in Occupational Health on a fairly limited basis, but wanted to extend the reach of these materials. An academic in Microbiology had already been sharing materials on Molecular Virology on the Internet, while another academic from Information Systems had been producing online textbooks to offer his students more locally relevant and less costly textbooks.

For these academics, “open” was their default strategy for most of their scholarly activities. However, for the OER team, the concept of “open” includes the specification of a Creative Commons licence chosen by the academic to suit the type of materials being shared. For example, many of the Physics materials are now being reworked and include a Share-Alike licence, while some of the materials from Health Science are more restrictive and include a No-Derivatives licence.

Working without a set institutional Creative Commons policy allows creators to select the licence they feel comfortable with. The OER team recommends the Creative Commons Attribution Share-Alike licence (CC BY-SA), as it allows for attribution but also ensures the continued openness of the resource due to the share-alike provision. This provision requires users of a resource to apply the same licence provisions to their newly created resource. In advising academics on which licence to choose, the team would ask about the purpose of sharing their resource, whether the users envisaged at any point making money from the publication of the resource, and how they felt about others changing any aspect of their materials. Furthermore, the team would assess the resources used within the academics' materials to ensure licence compatibility, which would affect the choice of licence.

Soliciting Content from Academics and Populating the Directory

While the directory was being developed, the first challenge of the OER team was to encourage academics to create materials that were planned to be open from the inception. Although it is taking some time for these “Born Open” materials to be developed, the OER team has been able to encourage development through awarding small development grants from both the Shuttleworth Foundation and through the African Health OER Network. With relatively small grants of about USD 1,000, academics adapted existing materials or created new materials as OER. The process of adapting existing materials was usually undertaken by senior students within the same department as the lecturers or by graduate assistants employed by CET or the Faculty of Health Science. Some graphic-intensive materials required the services of the CET graphic artist or a CET intern to create illustrations to replace copyrighted images, particularly cartoons, which had been used without permission in some materials. In many cases, problematic images or diagrams within resources were replaced with images licensed under Creative Commons, sourced via sites such as Flickr.

The next challenges were: getting the academics to ensure that they either held the copyright of the materials or were given permission to use and distribute the materials; identifying a Creative Commons licence that matched the conditions under which they wanted to share their materials; and adding the relevant metadata, along with the materials, on UCT OpenContent in order to make their materials easily discoverable.

The UCT OpenContent directory was launched on 12 February 2010 with 21 learning resources — 16 more than originally agreed on. Eighteen months later, the success of the project is manifest in the growth of UCT OpenContent to 148 learning resources consisting of over 1,000 individually accessible resources. Learning resources consist of comprehensive units, teaching modules, e-books and sets of lectures where a number of materials are combined to meet an educational outcome. The individual resources are the total number of separate individual materials or chunks of content (e.g., graphics) that can be re-used in different contexts.

Sustaining the OER Initiative

The challenge for UCT OpenContent and other institutions actively supporting OER is that “OER initiatives are in danger of running aground” as they suffer from

“incompatibilities with existing institutional cultures and priorities” (Friesen 2009, p. 1). Like other institutions, research outputs are often deemed more “valuable” than teaching materials at UCT and the sharing of teaching materials not part of the institutional culture. As the UCT OpenContent project only had one year of donor funding and no direct institutional funding, thoughts about sustaining the project were considered from the inception of the project.

Although the OER project formed part of permanent CET staff portfolios, the majority of the costs of the project were covered by the grant from the Shuttleworth Foundation that supported the UCT OER project, and from the William and Flora Hewlett Foundation that supported the African Health OER Network. When UCT decided to embark on an OER initiative in 2009, these plans were informed: by the sustainability strategies mentioned in the literature (Downes 2007; Wiley 2007); through reflection on the recommendations from the OpeningScholarship project undertaken at UCT in 2007/2008; through personal communication with members of other OER initiatives (such as the University of Michigan’s Open.Michigan project); and through an in-house workshop at UCT to deliberate the future strategy for the sustainability of OER at UCT (Hodgkinson-Williams and Donnelly 2010, p. 2).

Through iterations of deliberation, the OER team settled on the following key principles for ensuring the sustainability of the UCT OpenContent initiative:

- The OER initiative would be resource-based and not course-based (i.e., based on individual learning resources such as e-books, manuals, lectures captured on podcasts or webcasts, lecture notes or presentations), so that materials from the current collection held by academics could be made available after undergoing a moderation process where potential third-party copyright issues are investigated. This moderation process might range from the quite simple to quite complex, depending on the nature of the materials.
- A “moderation” process by the OER team would only include checking for copyright compliance and not include an institutional quality assurance process, so the responsibility of the accuracy of the resource was taken by the academic author, following the “pride-of-authorship” model.
- UCT OpenContent would generally not host resources, but rather act as a directory, referring to where the resources are already hosted (on the institutional learning management system, on departmental websites, on the Cloud, etc.) in order to reduce duplication and to maximise the use of existing infrastructure.
- The software selection would favour open source software to reduce costs, and would need to be integrated with the UCT login system. A single sign-on service would be provided so that there was no additional username and login required for academics to contribute their resources.
- The software would need to allow individual academics to upload and maintain their resources directly so that the process of making materials available would not need intermediary technical personnel.
- The management of the OER initiative would be built into the portfolio of the Curriculum Development Officer in CET, as this person already deals with supporting the development of digital resources for teaching and learning.

- The maintenance of the UCT OpenContent directory would be included in the portfolio of the CET's Learning Technologies team.
- The OER initiative would be seen as part of a more ambitious OpenUCT project that included making research and community engagement resources available to the general public, and would need to work collaboratively with these “open” initiatives and any other OER initiative such as the Health OER project in the Faculty of Health Sciences (Hodgkinson-Williams and Donnelly 2010, pp. 3–4).

To date, UCT OpenContent has been sustained through the operationalising of these principles and through optimising synergies with other departments and other institutions. Emerging activities have enabled the OER team to extend their “open footprint,” especially in terms of advocacy for OER. Examples included:

- convening a cross-institutional short course on using ICTs [information and communication technologies] in Education for a group of academics from all four of the higher education institutions in the Western Cape (University of Cape Town, University of the Western Cape, University of Stellenbosch and Cape Peninsula University of Technology) as part of the Cape Higher Education Consortium (CHEC); and
- combining forces with another department in the university to co-host a Teaching and Learning Conference, during which OER issues were discussed and OER materials distributed to about 170 UCT academics.

Signs of a Change in the UCT Landscape

In addition to the presence of the UCT OpenContent directory, there have been simultaneous positive changes in the UCT landscape that bode well for the continued development of openness.

The first is the recently revised university intellectual property policy which supports open licensing such as Creative Commons, and has adopted open source as the default for teaching and research related to software development. Also, the premise of access to knowledge that underpins the OER activities is echoed in another new institution-wide project, the Knowledge Co-op (www.knowledgeco-op.uct.ac.za/). This gives external constituencies access to the knowledge, skills, resources and professional expertise within the university around problems they experience. It also provides a framework for research and student training and learning that is grounded in an engagement with society.

At the same time discussions have been taking place about managing participation, contributing local knowledge into global conversations, broadening notions of impact, increasing visibility and harnessing the Internet to further enable UCT's scholarship for innovation and for development. In an unusual approach, UCT is planning to expand the UCT OpenContent directory beyond the resources of teaching and learning to include all scholarly resources. The OpenUCT initiative will optimise the benefits of making a selection of UCT's scholarly resources in the widest sense — teaching, learning *and* research — more readily available to the broader university community as well as to the public.

The greatest long-term sustainability vision is a culture change at UCT, as at other universities, where “open” becomes the default for teaching and learning

materials, for research outputs in all forms, and possibly also for research data. Pressure for this change will come from the call for publicly funded higher education to benefit the public at large — a point especially germane in a society as divided as South Africa. Also relevant is the broader social shift to life lived increasingly online, with the mechanism of access to the Internet often being mobile based.

It is our contention that OER alone will not change the entrenched culture of limiting access to scholarly materials, even while it is an important wedge in the door. We believe that the value of sharing teaching and learning resources will need to be monitored and proved. Some of this will happen through the pedagogical value provided to students within the specific courses for whom the materials were originally created. In a context where throughput rates are a matter of serious concern, access to appropriate resources is critical. Some of the value will result from the access to resources beyond the course to the broader institutional community, with application both for generic competencies as well as contributions to cross-disciplinary understandings. Some of the value will be through cost savings: the availability materials that might otherwise have been too expensive to print and distribute by the usual channels finding a ready platform. And some value may accrue from recruitment of students and cross-institutional collaborative course development, but the UCT OpenContent initiative is still too new to have sufficient evidence of these potential OER benefits, so ongoing institutional research is essential.

The danger is that without some evidence of the benefit of making a selection of teaching and research materials available publicly, the OER initiative will be short-lived, as philanthropic as it may be.

Open Questions and Directions for Further Research

Through our experience of establishing UCT OpenContent, a number of unanswered questions still remain. Key among these:

- Why do academics choose to share a selection of their teaching and learning materials as OER when there is no institutional requirement or incentive to do so?
- Is their choice to share materials on UCT OpenContent or any other platform linked to their “digital identity”?
- What are the key constraints that inhibit academics from sharing a selection of their teaching and learning materials as OER on UCT OpenContent or any other platform?
- How exactly are students, self-learners, other academics and members of the public using the resources on UCT OpenContent?
- Who are the unexpected readers and what are the unanticipated uses of UCT OpenContent resources?
- Which resources would students, self-learners, other academics and members of the public like to have available on UCT OpenContent?
- How does an institutional “directory” compare with a repository model?

- How can educational analytics help to map the OER terrain more accurately and immediately and identify direct or indirect return on investment?
- How does the existence of OER change the ecology of learning resources access, availability and adequacy?
- How does OER challenge, extend or improve the status quo of dissemination of scholarly materials at universities?
- How can OER be made more “discoverable” and most appropriately targeted?
- How can the creation and use of OERs improve teaching, learning and pedagogy?

Conclusion

Although a number of universities around the world, including UCT, have joined the open movement and made a selection of their materials available as OER, this process remains “counter-culture” and disruptive. The UCT OER initiative, like other such initiatives around the world, was launched with funding from donor agencies and has subsequently had to find ways of institutionalising the management of OER.

Some of the key strategies included: using the customisable open source software, Drupal, to create the UCT OpenContent directory; soliciting content from willing academics; capitalising on the fact that academics could host their resources on a range of institutional and public sites; encouraging academics to add resources to the directory themselves; absorbing the UCT OpenContent directory management into an existing portfolio; and extending the open footprint through the more encompassing OpenUCT initiative that includes open scholarly resources.

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Open Educational Resources University: An Assessment and Credit for Students Initiative

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Introduction

The OER university (OERu) is a consortium of 20 post-secondary institutions and organisations (as of September 2012) collaborating in the development of OER pathways for learning. A list is provided at the end of this chapter. These pathways lead to formal post-secondary assessments and credits for learners who study informally online and who desire formal recognition of their efforts from recognised public institutions. The OERu members are committed to identifying these pathways using OER.

The concept of *open education* encapsulates a simple but powerful idea: that the world's knowledge is a public good and that the open Web provides an extraordinary opportunity for everyone to share, use and re-use knowledge. This represents a significant opportunity for universities to return to the core values of the academy — namely, to share knowledge for the benefit of society.

Educators have a natural propensity to collaborate (Chow 2010). The nature of the academy requires sharing knowledge and building upon the ideas of others. An experienced researcher knows that a thorough literature review of existing knowledge is the starting point in resolving a research question. In research, universities have no issue with sharing and building on the ideas of others, yet in teaching there is a perception that we must lock our teaching materials behind restrictive copyright regimes that minimise sharing at the expense of learning. OER provide a unique opportunity to expand and integrate research traditions associated with the notion of building on the ideas of others into our teaching practice. In this way, universities can leverage the potential of the Internet and open education for research-led teaching and learning.

Universities are one of a handful of organisations that survived the Industrial Revolution. It is plausible that history will repeat itself in the digital age. The traditions of rational and reflective practice of the academy will contribute to building sustainable futures for the university and the institution's rightful place in society as we move forward in the OER world. Brown and Duguid (1995) have alluded to the risks that, in a digital age, blind adoption of technology-mediated degrees without due understanding of the institutional character and culture of the university could impact on the value society attributes to post-secondary credentials. Digital learning and OER, for instance, could lead to a new form of elitism where the perception associated with online degrees using OER would not command the same respect as campus-based alternatives. In this regard, the awarding of credentials by the university is an important determinant for credibility and quality because this function depends on the value that a community of scholars actively engaged in research can provide.

Universities can be actively engaged in designing appropriate futures for credible assessment in the OER world. Processes appropriate for the assessment of digital learning using OER hosted on the Web need to be properly researched and implemented with the academic rigour required. Tapscott and Williams (2010) suggest that universities may be losing their grip on higher learning because changing models of pedagogy and knowledge production may necessitate changes in how we credentialise. The OERu project provides a contribution to building what Brown and Adler (2008) have called an “open participatory learning ecosystem” — an ecosystem in which formal education institutions have an important role to play by augmenting opportunities for open learning, assessment and credentialisation.

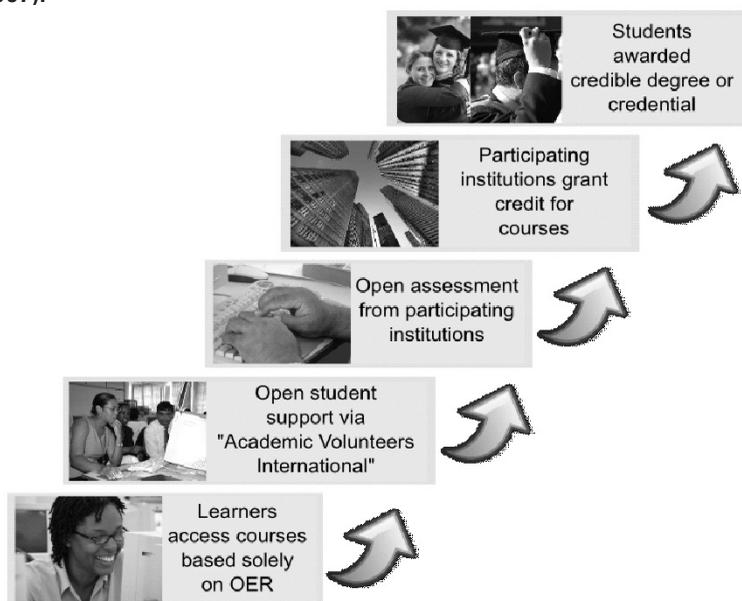
Individuals are free to learn from OER and other digital learning materials hosted on the Internet. The problem is that learners who access these digital learning materials on the Web and acquire knowledge and skills either formally or informally, alone or in groups, cannot readily have their learning assessed nor can they subsequently receive appropriate academic recognition for their efforts.

Proposed Solution

The knowledge, research and experience of the large-scale open distance learning institutions in providing assessment services at a distance, combined with refinements to existing protocols for Prior Learning Assessment and Recognition (PLAR), could open pathways for student assessment and credit services where traditional delivery models are unable to respond to the growing need for post-secondary education worldwide.

The OERu has been established to provide affordable access to post-secondary education for the estimated increase of more than 100 million learners in the world who will be qualified for a seat in tertiary education over the next 15 years who, because of funding issues or lack of tertiary education provision, will not be able to gain credible qualifications (Daniel 1996). The core mission of the university is to contribute to society as a community of scholars through the pursuit of education, learning and research. The OERu can support such a mass community, as shown in Figure 4.1.

Figure 4.1: Concept for an OER for assessment and credit initiative (adapted from Taylor 2007).



With OER, it is possible to learn globally but accredit locally. While it is possible for individual universities to provide academic credit through PLAR methodologies, the Internet provides unprecedented opportunities for universities to collaborate on the development of a sustainable and scalable OER ecosystem whereby students can achieve credible qualifications using open access materials from around the world. In addition, the complexities of credit transfer and course articulation across geographical boundaries call for a collaborative networked solution for addressing transnational online learning and credentialisation.

The OERu has been modelled on the university equivalent of industry's co-competition model. That's when companies work together for selected parts of their business where they do not believe they have competitive advantage, and consequently agree to collaborate in areas where they can share common costs. Consider, for example, the collaboration between Toyota, Peugeot and Citroen who share design, component parts and a jointly owned manufacturing plant to produce competing "city cars." Similarly, universities can collaborate on components of the OER ecosystem to achieve cost advantage, while retaining autonomy over core credential services.

More than a decade ago, Gibbons (1998) highlighted the imperative for universities to form alliances and partnerships in response to the interplay among the massification of higher education, fundamental shifts in the modalities of knowledge production and technology interchange.

The imperative for collaboration and alliances has now increased as a result of the changing dynamics associated with the ownership of ideas through open content licensing in a digital age. It will become increasingly difficult for universities to forge and sustain competitive advantage in the higher education system through closed teaching resources, as emerging partnerships are formed in the OER arena and foster collaboration.

The appearance of edX, a partnership of three of the world’s leading universities (MIT, Harvard and the University of California, Berkeley), is an example of the need for collaboration and alliances in the OER arena. Likewise, the private sector Coursera initiative, partnering with “elite” universities in the USA, Canada, Europe and Asia, is another example of these types of open emerging partnerships. Non-university initiatives like Udacity are also offering courses with certificates that are beginning to be accepted by some employers. There are also start-ups in Latin America and the UK, called WeduboX and FutureLearn, respectively.

Context

Open access technologies, combined with contemporary shifts in the ownership of ideas in a digital age, may change the way universities view their place in the higher education market by refocusing strategic approaches to course development and collaboration. Five significant trends and factors point to the potential for disruptive innovation (Christensen et al. 2006) in online learning provision — that is, where new services take root in simple applications at the bottom of a market and then eventually displace established market propositions:

1. Unsatisfied global demand for post-secondary education
2. Growing inventory of open access learning materials on the Internet
3. The burgeoning phenomenon of institutions providing access to free-tuition learning
4. The potential for shifts in the organisational cost structures for the design, development and provision of asynchronous learning
5. The potential for reconfiguring existing protocols for assessment and accreditation of OER learning

Unsatisfied Global Demand for Post-Secondary Education

According to UNESCO (2009), there were almost 153 million post-secondary students worldwide in 2007, a 53 per cent increase since the year 2000 and a five-fold increase in less than 40 years. The demand for higher education is predicted to expand from 97 million students in 2000 to over 262 million students by 2025.

Daniel (1996) reported that a major new university would need to be created each week to address the anticipated demand. Usher (2007) of the Educational Policy Institute predicted that the number of students in post-secondary education will more than double in the next decade. Daniel et al. (2007) report that “India alone would need nearly 2400 additional universities in the next 25 years — or roughly two new universities per week.”

This level of demand exceeds the capacity of the existing system to deliver, and suggests it is not economically viable to continue to build new universities. The magnitude of unsatisfied demand for post-secondary provision provides a solid economic imperative for an OER for assessment and credit for students’ projects.

Growing Inventory of Open Access Learning Materials

Thousands of course modules are currently available online, both commercial and free from respected institutions. There are also millions of websites that can be used to support a wide variety of learning outcomes. Consider the following open access examples:

- The OpenCourseWare Consortium has indexed more than 4,000 high-quality university-level courses (Heller 2010)
- The OpenLearn website hosted by the Open University UK provides free access to over 8,000 hours of learning materials
- More than 6,000 journals are listed in the Directory of Open Access Journals (Directory of Open Access Journals 2011)
- AU Press, hosted by Athabasca University, Canada's first open access scholarly press, hosts more than 180 scholarly works, including several textbooks, and augments access to scholarly publications (AU Press 2013: www.aupress.ca).

The Burgeoning Phenomenon of Free-Tuition Courses

Growth in the Internet and social media are contributing to an increased number of free-tuition courses being offered online.

Presently, more than 4 billion people have reasonable access to the Internet. More than 1.3 billion of those do so using mobile devices like cell phones, tablets, e-books and notebooks (Chapman 2010; International Telecommunications Union 2010). Corresponding with increased access to the Internet, post-secondary institutions need to consider the impact of social media technologies. Social media encompasses a range of contemporary Web-based technologies that facilitate scalable and interactive communication around the creation and exchange of user-generated content. Half of the top ten most-visited websites of the world are social media websites (e.g., Facebook, YouTube, Blogger, Wikipedia, Twitter) and it is estimated that social media accounts for 22 per cent of all time spent online in the U.S. (Nielson Company 2010).

Coursera, edX and Udacity are mentioned in Chapter 1, but also consider the following examples of courses offered at no cost to the learner:

- The FlexiLearn website at Indira Gandhi National Open University (IGNOU) provides free and open access to a wide number of degree course materials at the university, and the government is sponsoring tuition services (IGNOU 2009).
- The OpenLearn initiative of the Open University UK reported that over 10,000 students accessing free courses have converted to being fully enrolled students (McAndrew and Lane 2010).
- Otago Polytechnic in New Zealand has adopted a default Creative Commons Attribution intellectual property policy, thus facilitating the potential shift to free access to all courses offered by the institution (WikiEducator 2011).
- The connectivist-based Massive Open Online Courses (MOOCs) (see, for example: Fini 2009; Parry 2010), which use the open Web and social media

to offer courses to large cohorts of both for-credit and free non-credit students in the same course, frequently register more than 1,000 learners.

- The University of the People, a non-profit institution headquartered in Pasadena, California, provides universal access to free-tuition courses and has accepted students from 110 different countries. At present, the university is not an accredited institution, but is preparing to apply for accreditation in the U.S. (University of the People 2011).
- The Saylor Foundation, launched by Michael Saylor, an American entrepreneur with a pledge of USD 100 million, now hosts more than 60 free university courses (Saylor Foundation 2012).

The Potential for Shifts in the Cost Structures for the Design, Development and Provision of Asynchronous Learning

There are two fundamental changes in the potential cost structures afforded by digital technologies and open content licensing:

- The marginal cost of replicating digital knowledge is near zero. Therefore, with open content licensing, there are significant opportunities to reduce the costs associated with reproducing and maintaining online courses.
- Through networked collaboration, the design and development costs for producing high-quality OER can be shared among multiple institutions while still allowing individual institutions the freedom to brand course materials and adapt them for local contexts.

The Potential for Reconfiguring Existing Protocols for Accreditation of OER Learning

Providing assessment at a distance and developing mechanisms for assessing prior learning are not new. Both approaches lend themselves to being refined and adapted for use in OER courses designed for independent study by the OERu consortium.

Research and experience from technology-mediated learning in higher education, most notably that derived from the provision of open distance learning, will enable institutions to design appropriate and scalable solutions for formative and summative assessment at a distance for OER learners.

While the disaggregation of teaching services from credentialing services may not be common practice at most universities, this has been done successfully in the past. One hundred and fifty years ago, the University of London commenced with its external degree programme “on the radical principle that it didn’t care how you acquired the knowledge provided you could pass the exam” (Daniel 2011a). So, for example, the University of London proctored its first international examinations at a distance in 1865. The University of London’s external degree programme has produced five Nobel laureates.

Prior Learning Assessment and Recognition (PLAR) potentially provides opportunities for the transfer of approaches, methodologies and policy protocols (assessment and credentialising policies, etc.) for the OERu network. PLAR is a recognised process used by many post-secondary institutions to evaluate

learning outside the classroom for non-traditional learners (those who study independently usually not for credit) to gain academic credit (Zucker et al. 1998; CLFDB 1999; Bowman et al. 2003).

There are, however, unresolved challenges. PLAR methodologies are currently very labour intensive and unlikely to scale well for large numbers of learners. Approaches and models for national assessment and accreditation vary considerably around the world (COL and SAQA 2008, p. 7).

In a digitally connected world, the harmonisation of qualification articulation across legal boundaries could contribute to significant savings and reductions in duplication of effort. Consequently, there is growing interest in the area of standardisation and articulation of qualification frameworks among international agencies (COL and SAQA 2008, p. 7). The pioneering work led by the Commonwealth of Learning to develop a Transnational Qualifications Framework for the Virtual University for Small States of the Commonwealth provides useful insights into resolving these issues (COL and SAQA 2008).

The OERu has the following core components:

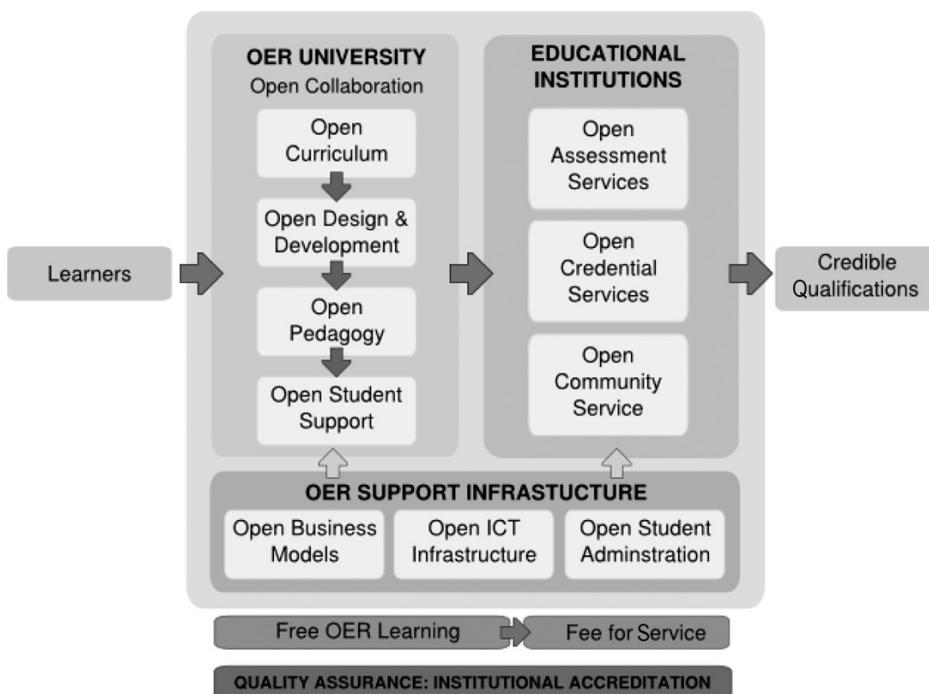
- **OER collaboration network** – covers those activities where cross-institutional collaboration is more effective than institution-based service provision
- **Educational institution services** – refer to the fee-for-service initiatives that will be provided by participating post-secondary institutions on a cost-recovery basis
- **OER support infrastructure** – incorporates the cross-cutting infrastructure needed to support a scalable network for OER, including ICT and a business model

Each component can be subdivided into a number of initiatives that together constitute a logic model for the planning and implementation of the OERu concept. The OERu logic model distinguishes between free learning and assessment services that are provided on a fee-for-service basis (Figure 4.2)

Learners may choose to enrol at formal education institutions in the traditional way or to learn from OER freely available on the Internet or using OER courses assembled by the OERu partners. The OERu project aims to design and implement appropriate solutions by establishing a collaboration network whereby assessment and credentialing services can be provided by participating institutions on a cost-recovery basis or funded through scholarships or grants from their respective ministries of education or other sources.

The project aims to facilitate pathways for OER learners to gain credible credentials from participating institutions that are formally accredited/officially recognised in their national jurisdictions. Quality assurance and institutional accreditation is the foundation on which this parallel learning universe is based. The OERu must ensure equivalence and parity of esteem for qualifications gained through this OER network. Resources and systems used to support the OER project will be available for re-use and repurposing in the formal sector, thus contributing to improved efficiencies and greater return on investment for participating institutions.

Figure 4.2: Logic model for the OERu, providing a systemic perspective of main initiatives for building a sustainable OER ecosystem.



The outputs of the OERu initiative will also add value to existing tertiary education systems worldwide, because OERu courses and support systems can be integrated into the mainstream model.

Intended Impact

The overall aim of the OERu project is to:

- develop and implement a sustainable and scalable ecosystem that can support open learning opportunities for all students worldwide using OER; and
- provide pathways for OER learners to obtain credible certification and qualifications from accredited institutions within national education systems inputs.

A number of important building blocks already exist for input into the OERu project:

- **OER assets:** There is a rapidly growing inventory of existing international educational resources, which can be integrated into the open pedagogy model envisaged by the project. These include open access content, open access journals, open textbooks, and open applications.
- **Existing expertise:** There is a wealth of transferable experience from distance education and open and distance learning to support the design and development of the project. In addition, participants in the free software movement have gained extensive experience in open models and approaches to building sustainable open systems. As an OER initiative,

the project would be committed to transparent and open planning, thus enabling wide participation by OER thought-leaders and practitioners from around the world.

- **Financial resources:** Financial resources (including contributions in time) from participating institutions and external donor funding for strategic elements will be needed to address gaps in available OERs and the design of new components of the OER for student assessment and credit project.
- **Participating institutions:** The project requires a critical mass of participating institutions for awarding formal academic credit for OER university courses. The network has achieved this milestone. Thirteen accredited institutions from Africa, Asia, Oceania and North America convened for the inaugural meeting of OERu founding anchor partners in November 2011. Membership of the network continues to grow at a steady pace. These OERu partners have agreed to award credit for the OERu courses. As an open project, all post-secondary institutions that care about sharing knowledge as a core value of education will be free to contribute to the planning of the project and subsequent implementation of more sustainable education futures.
- **ICT infrastructure:** Reliable and scalable open source software systems exist for implementing the OER networked collaboration.

Initiatives

To facilitate planning and co-ordination across national boundaries, the project is sub-divided into a number of initiatives, including Open Curriculum, Open Design and Development, Open Pedagogy, Open Student Support, Open Assessment Services, Open Credential Services, Open Community Service, Open Business Models, Open ICT Infrastructure, and Open Student Administration. Each initiative includes a number of activities (with corresponding inputs, outputs, milestones, key performance indicators and outcomes), ultimately contributing to the implementation of the OERu project.

The logic model aims to be sufficiently robust to accommodate the requirements for credible certification within the formal education sector, so learners and society will have confidence in the qualifications but also be flexible enough to leverage the potential that OER offers for re-use and repurposing for local learning contexts.

From Logic Model to Plan for Action

Sir John Daniel (2011b) confirms that the “OER university” and the OER for assessment and credit for students concept have the potential to reduce the cost of higher education dramatically, and supports the “examination-only” concept. He has commended anchor partners for engaging in the movement as part of its community service mission. The OERu has reached the following development milestones:

- 20 anchor partners now form a critical mass and foundation for the future development of the OERu; and

- the partners are on five continents and consist of 14 universities, four colleges and two non-teaching organisations.

Anchor partners have now identified the Bachelor of General studies as an achievable goal and the first prototype courses in this degree will be delivered in the near future along with viable assessments at several of the partner universities and colleges.

OERu partners have identified champions for supporting the development of the various activities. This planning has been (and will continue to be) conducted openly and transparently so that multiple organisations can participate, thus avoiding duplication of effort.

The OERu partners will officially launch the OERu in 2013, drawing on the experience from the prototyping phase.

List of OERu anchor partners:

Universities:

- Athabasca University (Canada)
- Dr Babasaheb Ambedkar Open University (India)
- Empire State College – SUNY (USA)
- Excelsior College (USA)
- Kwantlen Polytechnic University
- Southern New Hampshire University (USA)
- Thomas Edison State College (USA)
- Thompson Rivers University (Canada)
- Universitat Oberta de Catalunya
- University of Glamorgan (UK)
- University of Canterbury (New Zealand)
- University of South Africa
- University of the South Pacific
- University of Southern Queensland (Australia)
- University of Wollongong (Australia)

Community colleges, institutes of technology and polytechnics:

- Nelson-Marlborough Institute of Technology (New Zealand)
- NorthTec (NZ)
- Open Polytechnic (NZ)
- Otago Polytechnic (NZ)
- Unitec Institute of Technology (NZ)
- WinTec (NZ)

Organisations:

- BCcampus (Canada)
- OER Foundation (International)

Note: This chapter has been adapted and updated from the report “OERu: Towards a Logic Model and Plan of Action,” available at http://wikieducator.org/images/c/c2/Report_OERU-Final-version.pdf

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PART

II

OER in Practice

Introduction

OER have the potential to open up access to educational resources and quality education while reducing cost for formal and informal learning. But in order for this potential to become a reality, several practical considerations have to be addressed. This section comprises chapters that describe how some of these issues have been tackled in practice.

OER are generally free of direct cost to the end user and, in most cases, are openly accessible online. This makes them attractive for expanding formal education and supporting informal learning. In Chapter 5, “Open Education Research: From the Practical to the Theoretical,” McAndrew and Farrow describe the role of OER in OpenLearn, an initiative of the Open University UK. In OpenLearn, an integrated approach to OER was developed and delivered as a service to staff and students. Courses with a formal base from mainstream Open University released through OpenLearn are currently being adopted at scale as the basis for informal learning. Users can take advantage of the ability to follow their own path by picking aspects from within structures or by using the content as the trigger for social learning around the content in informal learning groups. The social element also comes to the fore in the case of OpenStudy, which focuses on solving one problem: Where can learners talk to other learners about topics raised by OER? OpenStudy offers other sites the opportunity to embed or link in to a unified place for discussion. For learners, it gives the critical mass of enough other people talking about the subject in which they are interested. In this model, attention moves from the resources themselves to the structures and social connections around the content, with the questions that people are asked to solve becoming the driver.

The term “openness” can be understood in a wide variety of ways. In the context of open software and content in particular, openness has been characterised as being able to “copy,” “distribute” and “improve” software, and to be able to “exchange the changes with others.” One frequently referenced set of criteria

for the area of content is referred to as the “4Rs Framework”: re-use, revise, remix and redistribute. The key is that OER are made available under licensing that is different from conventional copyright guidelines and regulations. In addition, it should not be encumbered by digital rights management or other mechanisms for enforcing licensing restrictions. Friesen, in Chapter 6, “Realising the Open in Open Educational Resources: Practical Concerns and Solutions,” provides an overview of the licensing conditions under which OER are typically made available. Unbeknown to many users, although these licences are considered “open,” they often do come with restrictions on the use of the material. Creative Commons licences, for example, often restrict how an institution may or may not be permitted to combine different resources, and how this content may be subsequently made available. The chapter by Friesen identifies and discusses a number of practical concerns related to the use, distribution and, particularly, remixing and redistribution of materials with differing OER licences.

In Chapter 7, “Approaches to the Production and Use of OERs: The African Virtual University Experience,” Diallo, Wangeci Thuo (Kariuki) and Wright focus on the development, processes, implementation, challenges and lessons learned during the African Virtual University (AVU) Multinational Project. This project involved the collaborative development and implementation of OER with 12 universities from ten African countries, the consortium model through which OER were used to deliver accredited programmes, and the potential of using OER to increase access to education in Africa through the delivery of accredited and non-accredited programmes. This chapter contributes to an understanding of how OER can be developed and used in the African context — an understanding that can clearly also be applied in other similar contexts.

OER have gained increased attention for their potential to support open access, sharing and re-use of digital educational resources in various education settings. For example, in the field of technology-enhanced science education, where the development of new digital science education resources is a costly process, the sharing and re-use of resources is very attractive. Thus, over the past several years, a large amount of digital science education resources has become available worldwide through Web-based open access repositories. These resources have the potential to support technology-enhanced science education by facilitating the work of science teachers in their day-to-day science teaching. It has also been noted that science teachers could benefit from participation in communities of best science teaching practices by sharing not only OER, but also their educational practices. As a result, there is an increased interest for the development of Web-based repositories that facilitate open access to both educational resources and educational practices. The chapter “Sharing of Open Science Education Resources and Educational Practices in Europe” by Sampson, Zervas and Sotiriou provides an overview of three European initiatives that aim to support and facilitate open access to both educational resources and educational practices in the field of Science Education — namely, the OpenScienceResources Repository, the COSMOS Repository and the PATHWAY Coordination and Support Action.

Open Education Research: From the Practical to the Theoretical

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The Distinctiveness of Open Educational Resources

Open Educational Resources (OER) remove restrictions for learners and educators by their nature. OER are free of direct cost to the end user and, in most cases, are openly accessible online. The recent growth in interest in OER has several drivers, ideological, political and economic, none of which in itself explains how learning will be supported or help us to develop effective models and learning design. Looking at existing approaches that are taking OER from resources into practice and at some of the theories for learning that have been proposed in recent times, we can see that OER offer attractive affordances for the expansion of formal education and for the support of informal learning.

The potential impact of OER can be illustrated by an example. In the Bridge to Success project (Lascu 2011), OER release of content from the Open University UK is being re-used within U.S. community colleges. Even though full pilots have yet to complete, it is already possible to determine interesting patterns in the enthusiastic commitment to the content by more than 20 colleges. The OER nature of the content is helping bridge a variety of gaps in the formal provision, such as the pause between registration and start-up inherent in cohort-based courses and the need to break the cycle of failure and retake in assessment-focused courses. This shows that OER can support the adoption of *less* formal approaches into formal structures.

There is also evidence of the reverse in action. Courses with a formal base from mainstream Open University courses released through OpenLearn are being adopted at scale as the basis for informal learning. Users take advantage of the ability to follow their own path by picking aspects from within structures or by using the content as the trigger for social learning around the content within informal learning groups that sit alongside the attraction of the

content base (Godwin and McAndrew 2008). The social element also comes to the fore in the case of OpenStudy (2012), which focuses on solving one problem: Where can learners talk to other learners about topics raised by OER? OpenStudy offers other sites the opportunity to embed or link in to a unified place for discussion, and for learners it gives the critical mass of enough other people talking about the subject in which you are interested. In this model, attention moves from the resources themselves to the structures and social connections around the content, with the questions that people are asked to solve becoming the driver.

The Challenges for OER

Progress for OER is visible in the expansion of the approach, but clearly challenges remain. Some of these can be identified in the work of OpenLearn which, in 2006, set out the aspects it could meet in terms of six different stages (Lane 2009; McAndrew et al. 2009). Reviewing first the six stages identified by OpenLearn, we will see how the maturity identified by the project in 2006 (as a result of building on five years of OER experience) has continued with the consequence that we can start to feel ready to fulfil the promise of OER.

Six Stages of OER (OpenLearn Model)

When establishing OpenLearn, a six-stage description of possible work was developed:

1. Legal: release of copyright through Creative Commons
2. Practical: provide access to content
3. Technical: develop an environment for open access
4. Pedagogic: understand the designs that work
5. Economic: devise a model for sustainable operation
6. Transformative: change ways of working and learning

In the first two of these, legal and practical, OpenLearn was able to build on considerable existing work. In the legal area, adopting the Creative Commons licence gave a shared legal framework that has now become the dominant method for signaling the intent that resources are open. At a practical level, the first wave of open projects (e.g., Connexions from Rice University, Carnegie Mellon University's Open Learning Initiative, and MIT's OpenCourseWare) had established the identity and expectations of access to openly licensed material.

The third and fourth stages — technical and pedagogic — have been addressed to a lesser extent in earlier initiatives where the primary aim was to achieve the open release of material. For OpenLearn, an important change from embedded content-specific tools to an overarching environment of learning and sense-making tools was devised, using an open source learning environment (Moodle), enhanced by custom tools. This meant that OpenLearn could offer a chance for self-study embedded in a supporting site, rather than transfer of materials.

Pedagogically, materials in OpenLearn start from a basis of distance learning. It was recognised, however, that these could not necessarily be made available in the form that was already provided to registered Open University students, but rather be made to act more as “Learning Objects” (Rehak and Mason 2003). The structuring of material for OpenLearn built on work done into structured authoring and learning design (McAndrew and Weller 2005).

The fifth stage considers models for sustainability and takes a broad approach to the economy of openness. OpenLearn was an experiment and so did not have to meet any particular targets. However, it also intended to understand the economics of operating openly by being attentive to the opportunities that could arise. These included attracting further funding to projects that need to disseminate and share their materials, attracting new learners, and bringing in new content for existing courses. OpenLearn’s continuance was supported across a range of benefits identified during its experimental period (McAndrew et al. 2009). However, it also has a basis in a straightforward financial position that the additional costs, once processes can be embedded in existing practice, can be justified by the financial return through increased economic activity.

The final stage of the OpenLearn model (transformation) was not felt to be something that could be required of a time-limited intervention. So, in that sense, it was seen as beyond the scope for OpenLearn. However, we find a rationale for further action in the demonstrated potential of OER to act as an agent of change.

As OpenLearn progresses to be an integral part of the Open University, it is clear that adopting OER has had a wide-ranging influence, changing the way that the university collaborates with other organisations and having significant impact on mainstream production techniques and on approaches to research. As a result of some of the lessons learned from OpenLearn, the Open University has developed a broader understanding of business models and has demonstrated a willingness to experiment with alternative ways to offer mass learning beyond its existing student base. While it needs to be considered alongside other economic and structural factors, openness has offered a way to respond constructively in a period of change and so has a reasonable claim to have been transformative: a recent internal review of the major grants received by the university identified that in all but one of those grants there was at least some dependence on OER, and that the ability to operate as a provider of open and free resources is now part of the university’s identity.

This six-stage OpenLearn model is ordered to imply a growth from practical issues to greater impact. In reality, there is a mix across all the stages of different needs and ways to meet them. If it is genuinely the case that OER have particular abilities to support transformation in education, then we need to understand how to enable that aspect. At the *macro* level, this is about finding support for two main contentions. Firstly, that OER contain transformational elements; and, secondly, that these elements are of some educational merit. We propose to examine the former claim in light of the practical challenges facing the OER movement and the latter by assessing the extent to which OER can be understood to be aligned to particular educational philosophies.

Twelve Key Challenges of OER (OLnet Framework)

The Open Learning network (OLnet) was established in 2009 with an aim to collate evidence and encourage research into the development and practice around OER. Taking a multi-strand approach a repeated element within its work has been to iterate through reviews of the priorities emerging from literature, key stakeholder interviews, analysis of online sites and studies of OER project reports. Through the collective intelligence research strand, the data gathered has been entered into the OER Evidence Hub (OLnet 2012). The Evidence Hub provides an open online environment which scaffolds and structures debates around key questions for the OER movement. By aggregating and mining individual contributions, it has been possible to isolate the main issues that the OER community feels are important, and to identify potential solutions that might help overcome any legislative, cultural or practical barriers to mainstream OER.

In late 2011, a message was distributed (De Liddo 2011) asking for community feedback on ten challenges that had emerged (including data from the OpenLearn project). Following consultation, the challenges have been refined (and extended) to become 12 “key” challenges, as follows:

1. Who and how to create new appropriate **Assessment/Evaluation** models and practices for OER?
2. What **Technologies and Infrastructure** are needed/in place to help the OER movement?
3. What **Institutional Policies** are needed/in place to promote OER?
4. What evidence is there of **Use (and Re-Use)** of OER?
5. What can be done to improve OER **Sustainability**?
6. What are the issues surrounding **Copyright and Licensing**, and how can they be overcome?
7. What are the costs and benefits of using OER in **Teaching**?
8. What are the best ways to **Promote and Advocate** educational methods which use OER?
9. How do we ensure OER is of high **Quality**?
10. How do we create the right culture of teaching and learning to improve OER **Adoption**?
11. How can we improve the value and impact of OER **Research**?
12. How can we improve **Access** to OER?

(Given the dynamic nature of collective intelligence, these challenges may extend further. The latest version can be found through olnet.org and ci.olnet.org.)

The challenges facing the OER movement are diverse, but also fall into four categories (Figure 5.1).

Figure 5.1: Categorisation of key challenges facing the OER movement.

1. Persistent challenges	2. Underlying challenges
Copyright	Cost/benefit
Technology	Impact
Access	Policy
3. Sticking points	4. Emerging challenges
Quality	Advocacy
Sustainability	Culture
Re-use	Open assessment

- The first category contains challenges relating to copyright, technology and access. These are the most **persistent** questions, but also those where we can suggest solutions.
- The second category contains key **sticking points**, namely those of quality, sustainability and re-use. These can be considered barriers as the existing models and measures do not easily transfer to the open context. The open approach is interesting precisely because of the challenge to those models and the spur to rethinking that it brings. In this sense, the sticking points are distractions and will only ultimately be addressed through experience.
- The third category is of **underlying** challenges of cost/benefit, impact and policy. Here, OER offer a new dimension and the role of individual pieces of evidence is critical. Applying research to these challenges has particular potential to increase understanding and take-up.
- In the fourth category are the **emerging** challenges of open assessment, culture and advocacy which reflect the contemporary issues faced by the movement.

The OER Evidence Hub is a tool that was designed with the real needs of the OER community in mind. While there are a plethora of normative arguments in favour of OER, evidence about OER is somewhat harder to come by. Keeping in mind the diverse ways in which OER are remixed, redistributed and used, evaluating and modelling the use of OER are not always straightforward. The Evidence Hub is a tool which enables the community to make sense of fragmentary evidence and assess the validity of claims and questions facing the movement as it enters a new phase of maturity.

Is the “Resources” Part of Open Educational Resources Solved?

As stated above in reviewing the challenges, some of the main issues facing the movement may be considered to have largely been solved (at least in principle). When OER first became an object of attention in the early 2000s, they also became a focal point for the various discourses surrounding open education (distance learning; learning objects; open source software; copyleft; etc.).

As a practical issue relevant to a range of different stakeholders, copyright offered a natural point from which advocates of open education could explore, discuss

and argue for change. The successes of the (often diverse) OER movement have depended to a certain extent on a sense of purpose and frame of reference that could be shared across international and institutional borders.

The importance of Creative Commons (2012) in creating a culture of confidence and legal awareness shouldn't be understated. As Atkins et al. (2007, p. 13) note, the range of licensing arrangements supported by Creative Commons is an important part of the international infrastructure of the OER movement — a movement that continues to grow all around the world. This growth is undoubtedly supported by the relative ease with which educators, producers and remixers can manipulate and share OER through Creative Commons licences. One consequence of the success and impact of the work of Creative Commons is that practical questions about open education are now typically framed in terms of OER. Conversely, OER in turn are still generally defined in terms of copyright and licensing.

There have been some attempts to widen the scope and definition of OER beyond copyright status. For example, Wiley (2011) has argued that OER are artifacts that are either (1) licensed under an open copyright licence or (2) otherwise in the public domain. It is worth noting two things that appear to follow from his proposal. Firstly, it means that OER are a subset within a wider taxonomy of “things that can be copyrighted.” Copyright is designed to protect individual works of authorship that have received some sort of fixed expression (like a book, DVD or webpage). Thus, copyright covers intellectual and literary works, but ideas, concepts, methods, people, places and events can never be copyrighted. Secondly, by including public domain, Wiley suggests that, irrespective of copyright circumstances, something being in the public domain is itself enough for a resource to be considered “open.” Arguably, this would entail the possibility that ideas, concepts and other forms of work that are not considered in law to be capable of reaching a tangible expression could be considered OER when they exhibit adequate senses of “publicity.” Licensing remains the least contentious and most practical way of identifying OER, and the convention (perhaps derived from the influence of funding bodies) is that educational resources are considered open when they are produced or released through the appropriate “open licence” (see Chapter 6).

In practice, most educational resources exist somewhere on a scale of ease of access and amenability of re-use. This depends on many factors, including the format (not necessarily digital), the legal context, who is trying to access it and the nature of the intended use. The “openness” of a particular OER is also contextual, and not necessarily a feature of the resource itself. The open education movement needs a better understanding of these contexts and the ways that practices surrounding the use and re-use of OER are having an impact on educational institutions. The debate around these issues is often framed in terms of “Open Educational Practices” (OEP).

Open Educational Practices

The boundaries of the debate around open education are increasingly expanding in order to encompass the institutional, cultural and pedagogical implications of adopting an open model rather than retaining focus on the resources themselves. For each of the 12 “key challenges,” there are many areas where OER have the potential to challenge existing institutional structures and ways of working. We will discuss just three aspects here, but there are others we could have chosen,

such as curriculum design, sustainability, research, dissemination, recognition and attribution. As each of these examples indicates, the shift to the open model of education entails changes much more profound than simply amending the legal status of a particular educational resource. OER can throw into question the validity of existing institutional systems.

Thus, as the OER movement enters a new phase of development, the values and practices associated with being “open” are coming to the fore. In a recent poll organised by the World Summit on the Information Society (WSIS) Knowledge Community, for example, 75 per cent of respondents expressed the view that “mainstreaming the use of Open Educational Practices (OEP) will really transform education” (WSIS 2011). (Interestingly, there was a suggestion that those who disagreed may have done so on the basis that “OER alone would not be enough to transform educational practices” [Johnstone 2011].)

Assessment and Evaluation

The production of OER content may be less pressing than the question of how to connect the wide range of existing content through to learning activities. Learning is a complex process with the “pain” that is part of acquiring new knowledge balanced by the “pleasure” of building extra understanding once grounding is available. There are motivations that come from individual goals and social connections, but what is also clear is that the addition of external assessment can be the catalyst to turn intentions into motivations and structure them into effective learning.

Lack of a viable assessment model is a central issue for a number of OER providers who operate outside (or parallel to) traditional educational institutional boundaries, including Peer 2 Peer University (<https://p2pu.org>) and Khan Academy (www.khanacademy.org/). The Massachusetts Institute of Technology (MIT) recently announced its intention to expand the successful OpenCourseWare programme and offer certificates to students who complete the course. The new MITx programme will not involve any charge as such, although learners who wish to have their progress accredited in some way will have to pay a fee (MIT 2011b). Furthermore, MIT will not itself be the awarding body for any credits earned through the OER model. The disaggregation that is a possibility of OER offers a potential solution illustrated by the plans of the OER university (OERu 2012) to establish a consortium of universities that will accredit learning from OER.

Do strategies such as this make education more “open”? On the one hand, well-designed learning materials are being made available to a wider audience, but one could also argue that tiers of accessibility are being re-introduced despite the open nature of the resources themselves. One popular option for accreditation is provided in the form of a digital badge system, recently praised as the future of learning by the U.S. Secretary of Education, Arne Duncan. Badges, he suggested, hold the key to recognising non-traditional learning and skills developed in informal settings, empowering students and marking personal development. But even the most optimistic assessment of the badge system must acknowledge that context is crucial: the badge system cannot work without an open educational infrastructure (Duncan 2011).

Technological Infrastructure

One of the central challenges faced by the OER movement is the development of an infrastructure that can support the distribution and use of digital resources through workflow and course management, provide tools for dealing with copyright and re-use of materials, and aspire to ensure pedagogical quality. In practice, this has perhaps proven to be much more complex than first appreciated. Reflecting on the eduCommons project, Atkins et al. (2007, p. 12) noted:

“The philosophy of the Center for Open and Sustainable Learning team is that all resources emitted by eduCommons should be covered by an educational Creative Commons license.... This philosophy suggests that two different digital course resource systems would emerge within a university: one built entirely of Creative Commons material, and another built within the IP environment of the institution’s digital library/repository allowing access to copyright material only to authenticated members of community.”

The emergence of parallel systems for formal, institutional learning and informal general learning reflects the tensions that govern the use of OER within institutions. While OER are not dependent on any one technology, an ideal solution to meet their various requirements has also been lacking. The ideal platform for the providers of OER should: offer multiple content; input and multiple content output formats; support clear licensing; track all use of the content; provide easy tools for customisation and sharing back; enable very easy resource discovery; and reveal the options for how the resources are intended to be used and how they actually are used. For users, one of the key requirements for OER is its invisibility as part of the range of resources they would use. This means that OER need to be flexible across context, linking through to other relevant content and assessment as required. Under this view, the ideal platform is not something that can be provided just for OER: resources need to be thought of as elements that are continuous with the rest of the learning environment.

Weller (2011) has pointed out the interesting distinction between “big OER” and “little OER” in his book *The Digital Scholar*. His distinction is based mainly on the origin of a particular resource. Big OER mean funded projects, institutions and collaborations that, in turn, tend to produce big products, such as modules, learning environments, lectures, textbooks, courses and pilots. On the other hand, little OER relate to the individual and the community with learner-generated products such as images, presentations, video clips and notes. The distinction also reflects the impact that OER can have in the “big” world of universities, education systems, funding organisations and governments, and in the “little” world of tutoring, homework help, informal education and learning for fun. The reason that OER can make a difference is reflected in this broad range of impact. The “openness” of OER means that what a university releases can be picked up in any way that suits the user. Indeed, big OER can appear to people who come across it as the ideal solution to their “little” problem because a more complete and structured solution may be better for the learner than isolated components (i.e., little OER).

Research and Scholarship

A third area where OER challenge existing institutional models concerns the production and consumption of research. The majority of scientific papers are still published by traditional journals whose business models prohibit the use of an open system. While there are many compelling reasons why academic and research leaders should publish on an open basis in order to offer the widest access to their work, the central role of prestige publication remains in acquiring academic tenure and recognition. The message that is still often handed down from senior staff to early career researchers is that it's better to concentrate on traditional publishing routes, as these will be recognised as valid while publication in open access journals will not. The result is a bias towards print publication (Cheverie et al. 2009) and institutional cultures that do not reward openness.

Beyond the general idea of facilitating access, the values associated with open education have perhaps yet to receive full expression, although a number of researchers have written about the practical and ethical significance of OER. Angell et al. (2011) have identified the emergence of large-scale public health OER which are expanding despite the fact that public health involves the transmission of complex and rapidly changing information across different disciplines and is an area where high-quality learning is of paramount importance. Similarly, Heller et al. (2007), Ijsselmuiden et al. (2007), Geith and Vignare (2008) and Lee et al. (2008) have sought to connect the OER movement with discourses about public health and human rights in developing countries. In cases like these, OER are becoming part of a wider discourse about rights and social justice, which goes beyond simply promoting access (and may be seen to reconnect with the original aspirations of the open education movement).

It should be noted that being open is not the same thing as being against the commercial use of intellectual property in education. As Downes (2011) has observed, releasing materials under open licences can even provide less scrupulous commercial publishers with free content if they choose to disregard the spirit of sharing by making small changes and then claiming it as their own content.

In some ways, progress made in the OER world can be seen to have resulted from turning a blind eye to deeper questions about the impact of OER on institutional structures. Nonetheless, as the key challenges from the OER Evidence Hub (OLnet 2012) illustrate, the move towards OER provokes critical reflection about a whole range of changes for practices surrounding education. As the discourse about practical licensing of intellectual property moves on, debates now often focus on the practices (OEP) as a complement to the resources (OER).

OEP is defined by the International Council for Open and Distance Education (ICDE 2011) as follows:

“Open Educational Practices (OEP) are defined as practices which support the production, use and reuse of high quality open educational resources (OER) through institutional policies, which promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path. OEP address the whole OER governance community: policy makers, managers and administrators of organizations, educational professionals and learners.”

Similarly, the OPAL Open Educational Quality Initiative — a partnership between seven organisations led from University of Duisburg-Essen and including ICDE, UNESCO and the Open University UK — has suggested eight dimensions to OEP, based on a review of 58 case studies in open education (OPAL 2011a). Much of the support and commentary on OEP in this work is directed at educational institutions (OPAL 2011b), with a particular focus on aspects such as adoption, institutional sustainability and development of staff. This encourages a view that OEP are incremental rather than radical practices. Indeed, the ways that open education clearly transcends institutional boundaries and embraces informal learning scenarios is reflected in the emergence of non-institutional providers such as OpenStudy, Khan Academy and P2PU. Seen in this light, OER can be understood as radical objects that open up space for critical reflection on our most deeply held assumptions about the point and value of educational systems.

OER as the Supporter of Educational Theory

The OER movement emerged from the recognition that the Internet has great potential to change the way we live and learn, provided it can be harnessed for common good. It is questionable that OER exists as an independent approach. Rather, it can be seen as reflective of the evolving thought around education provision. Through the 20th century, there were a series of rethinkings of the way education can work (e.g., Dewey 1916; Ilich 1971; Vygotsky 1978; Piaget 1967). In the 21st century, the realisation is that there are now few barriers to the provision of these models. The free access to educational materials and tools allows us to revisit more radical ideas as to how learning might operate. Ilich (1971), in *DeSchooling Society*, envisions a learning web to “enable the student to gain access to any educational resource which may help him to define and achieve his own goals ... [from] Reference Services to Learning Objects...” While this may well have been suggested as a thought experiment at the time Ilich wrote his book, it can now be mapped on to achievable technology.

Equally, there have been arguments about the control structures that were intended through common curricula and assessment to bring everyone to a common standard as to whether those structures are any longer viable or desirable. The “learner as a compliant consumer” (Goodyear and Ellis 2007) that is needed for such control to work is not a reasonable assumption. We need to prepare for a more distributed and less restricted expectation of learner behaviour. To learners this may feel like abandonment and confusion as much as liberation and choice. The multiple paths they can follow mean that the expectations of the originator of the educational material and the users can no longer be seen as matched, and this has to be accepted as an increasingly common experience in the process of learning.

In this, the approach of OER resonates with the thinking of recent innovative educators. Bruner, for example, reached a position where he felt that progression of education, or at least the educational system, would be achieved by adopting the view that education was a function of “culture-at-large” (Bruner 1995, p. 84) and supported by interactions around attempts to co-construct knowledge. Thus, a world where learners can act directly and interact with others could help provide the ideal cross-over from the restricted models of teacher-based education to the more independent and holistic approaches envisioned. Those who draw on the

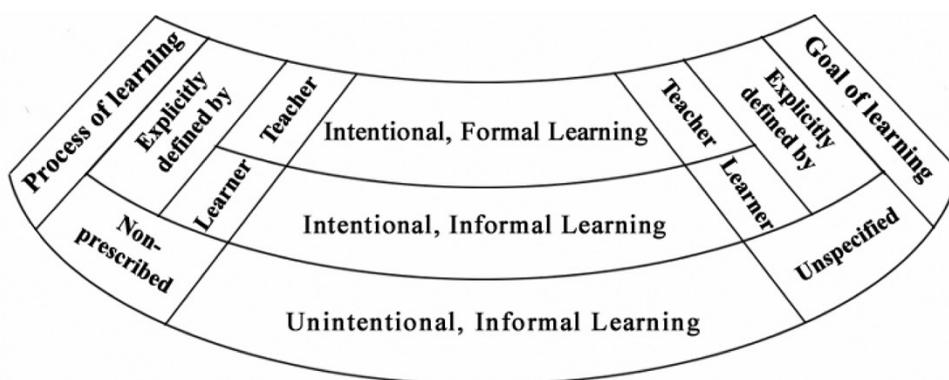
Vygotskian approach have identified the need for social connections as a key part of his once radical view that learning “is the very pathway through which human mind develops” (Stetsenko and Arieivitch 2010). The principle of Vykotsky’s “Zone of Proximal Development” is that by working alongside those of similar or slightly advanced skills, individuals are able to improve their own performance. This is scaled up in the open: limitations on finding peer learners are now unrestricted by location and geography.

Mayes and Fowler (1999) proposed a three-level view of “courseware”: the primary being the provision of resources themselves; the secondary, the work of learners with those resources; and the tertiary, the building of interactions around the work of the learners. The pedagogical mechanisms they describe for this overlooked tertiary level are dialogic and include passive, vicarious learning, through the observation of others as they work through challenges. In their original work, Mayes and Fowler considered the way in which the activities of students might be made available to following cohorts — in the open, the group who can see such materials extends and blends.

Vavoula (2004) makes a useful distinction between the process and goals of learning to provide a typology of informal learning that considers the role and source of the learning process and goals. As shown in Figure 5.2, she identifies:

- traditional *intentional formal learning* as being intentioned by a teacher who defines both the goals and the process;
- *intentional informal learning*, where the learner determines the goals and process rather than a teacher; and
- *unintentional informal learning*, where the goals and, indeed, the process remain imprecisely defined.

Figure 5.2: Typology of informal learning (Vavoula 2004).



Open resources are an enabler for all of these forms of learning because they provide resources that can transfer into formal contexts. It is their direct availability to learners that is their more distinct contribution. In the examples of OER in action, we can see both intentioned learning taking place (explicit outcomes specified, recognised and obeyed in the guided paths of P2PU and the transferred self-study materials from OpenLearn to Bridge to Success); and less directed, probably unintentional, learning taking place from the large numbers who land from Internet searches on individual OER pages or follow the distraction paths that lead from one online resource to another.

Conclusion

This chapter highlights the potential impact of OER on policy and on practice in education and points out that while there are weaknesses in the evidence base, there is a common position that allows progress. The way forward, then, is through finding a way to accept some of these partial pieces of evidence while making their basis clear and while understanding the contexts in which they can apply. Gathering such evidence will allow the OER movement to progress beyond practicalities and consider whether open approaches have the potential to support more innovative models of learning that have been proposed alongside the innovative models of operation.

The need to make connections in learning has influenced educational thinkers in recent times to go beyond individual teaching to the impact of culture and collective behaviour. Openness as a principle and as a practical mechanism is now giving us the ability to explore many of those ideas and offers an improved outlook for future approaches to learning.

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Realising the Open in Open Educational Resources: Practical Concerns and Solutions

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Introduction: The History of Open Licensing

The term “Open Educational Resources” was first adopted at the 2002 UNESCO “Forum on the Impact of Open Courseware for Higher Education in Developing Countries,” sponsored by The William and Flora Hewlett Foundation. The term was defined as “the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes” (UNESCO 2002, p. 24).

This definition and its emphasis on open availability and non-commercial use remains central in the way the term is understood, used and also discussed (and at times disputed) in the current context. The key is that these resources, unlike previous attempts to create collections of reusable resources and communities of users (e.g., Roschelle and Kaput 1996), are to be available under licensing that is *different* from conventional copyright, and also that it is not to be encumbered by digital rights management or other mechanisms for enforcing licensing restrictions.

The term “openness,” however, can be understood in a wide variety of ways. In the context of open software and content in particular, openness has been characterised and defined in different ways. As early as 1986, Richard Stallman, founder of the Free Software Foundation, emphasised the importance of being able to have the ability to “copy,” “distribute” and “improve” software, and to be able to “exchange the changes with others” (Stallman 1986, p. 8). These four abilities, or “freedoms” (copying, distribution, changing and distribution of changes), have become a central part of the notion of openness in connection with content generally and Open Educational Resources (OER) in particular. One frequently referenced set of criteria for the area of content echoes Stallman’s

criteria, and is referred to as the “4Rs Framework” by David Wiley. It outlines the “primary permissions or usage rights open content” as follows (Wiley 2009, 2011; WikiEducator 2011a):

1. Re-use – the right to re-use the content in its unaltered/verbatim form (e.g., make a back-up copy of the content)
2. Revise – the right to adapt, adjust, modify or alter the content itself (e.g., translate the content into another language)
3. Remix – the right to combine the original or revised content with other content to create something new (e.g., incorporate the content into a mashup)
4. Redistribute – the right to share copies of the original content, your revisions or your remixes with others (e.g., give a copy of the content to a friend)

This and other articulations of openness and freedom, applying to both technical and creative works, have been given legal force and definition through a range of licences that have been developed since the 1980s. As Stallman’s four freedoms indicate, these licences first emerged as informal practices of copying, changing and distributing short programmes in print (and other forms). They then proliferated and the label “copyleft” emerged — more as a general philosophy or approach than a specific solution — to describe the approach to intellectual property associated with them.

As the name suggests, copyleft goes slightly further than simply recognising Stallman’s four freedoms. Instead of simply modifying or lifting copyright restrictions to enable revision and (re)distribution, copyleft seeks to emphatically invert these restrictions. Instead of declaring “all rights *reserved*,” the idea was (and is) to have “all rights *reversed*,” to *require* that the software be openly available, regardless of how it might be modified or put to use, sometimes referred to as enforcing “symmetric collaboration” (WikiEducator 2011b).

Attempts to formalise these practices in different contexts and for different software projects led to a range of permutations, and applications eventually led to the proliferation of a range of types of licences. These include, for example, the Open BSD and GNU General Public License (BSD and GNU being software and operating system projects), the Apache licence (Apache being popular Web server software) and the Sun Public License (formulated for a computer company later to become a part of Oracle). In fact, the not-for-profit “Open Source Initiative” lists 69 different “open source licences” that meet their specific criteria of “open source” specifically for software. They include licences for special purposes such as for fonts, and others that can only be used by the authors of the original licence (for more information, see www.opensource.org/licenses/category and www.gnu.org/licenses/license-list.html).

These different licences reflect the different interests of their originators, ranging from hobbyists and hackers to academics and entrepreneurs. This is particularly captured in the question of requiring derivatives to be shared as the original. The MIT (Massachusetts Institute of Technology) and Apache licences allow software to be revised and then redistributed without restriction, while the GNU General Public License (not to be confused with the lesser GNU Public License) does not. The latter very explicitly forbids the redistribution of modified software under any

terms other than those of the same licence, a requirement that is subsequently carried to all subsequent derivative works.

The issue of combined revision and equitable redistribution (or the requirement of “symmetric collaboration”) needs to be highlighted because it has become contentious in defining the notion of open and free, as they relate both to software and to other intellectual and creative works. For example, this type of licensing has been derisively described as viral or even as “a cancer that attaches itself in an intellectual property sense to everything it touches” (Steve Ballmer, as quoted in Newbart 2001). Adding a relatively minor copyleft component (e.g., a software module or an illustration) to a substantial copyright-protected work (e.g., an operating system or a course module) can have the effect of changing the more substantial work from being “copyright” to “copyleft.” Through a small addition or remix, an entire software system or course would now have to be made available *without* restrictions on its further distribution and revision.

A similar diversity of licences for educational and other works has also become manifest outside the world of software and operating systems. Development of alternative licences for material *other* than software began at the turn of the millennium, beginning with the OCL (Open Content License) developed by David Wiley in 1998 (Wiley 1998) with assistance from Richard Stallman. Many other licences followed for Web content and initiatives for facilitating access to and use of these contents. These include the GNU Free Documentation License (GNU FDL, initially developed for documentation in the GNU project in 2000); the Open Directory Project License (2010); the Open Publication License (2007); and the Creative Commons licences (2002).

Creative Commons: Four Licensing Options and Tools

It is the Creative Commons licences that are the most widely used in online collections of learning resources: 95 of 107 collections using standard licences used one or more (or a customization of) Creative Commons licences, according a recent Hewlett Foundation study (William and Flora Hewlett Foundation 2008).

The Creative Commons licences also take a notably different approach from many other efforts. Instead of attempting to completely remove or reverse copyright restrictions, the Creative Commons approach is to keep “some rights reserved” through a voluntary selection of licences with different types and levels of restriction. As Wang (2004, pp. 305–306) explains:

“Creative Commons [(CC) has] established a flexible copyright implementing model, the ‘some rights reserved’ model ... which values innovation and protection equally. CC licenses change the traditional mandatory rights assertion into a voluntary, optional rights approach.”

These licences, along with what Creative Commons has characterised as the CC0 and the “public domain mark,” constitute the focus of the remainder of this chapter. These licences have been developed by a non-profit organisation of the same name, founded by law professor Lawrence Lessig, with the ambitious mission of realising “the full potential of the Internet — universal access to research and education, [and] full participation in culture” (Creative Commons 2011).

In keeping with this ambition, the six Creative Commons licences have been made as easy as possible to understand, choose and apply to a work. As the Creative Commons homepage explains:

“Licensing a work is as simple as selecting which of the six licenses best meets your goals, and then marking your work in some way so that others know that you have chosen to release the work under the terms of that license.”

As one member of the “open culture” movement describes it (Möller 2007), the announcement of these licences has been perceived as an enormous boon for those wishing to make their work freely available:

“When the Creative Commons project published its first licenses in December 2002, it finally brought a sense of unity to the free culture movement. Instead of having to choose from many scattered licenses, creators now have the option to pick the right license for their work using a simple tool.”

Others have been similarly complimentary: “It’s got to be CC [Creative Commons] or we’re not using it. Because that just removes all the complexities” (strategist, as quoted in “OERs: The Value of Reuse in Higher Education” (Talis Aspire 2011)). As this chapter will show, it is unfortunately not quite that simple.

All of the six Creative Commons licences require that the creator of the original work or content be attributed, and this is the *only* requirement of the most simple of these licences, the “attribution” (or CC BY) licence. The question is how to adequately attribute a work in compliance with this licence, as when attributing a piece of material via a name or a citation is a matter of convention and differs from one context and medium to another. The Creative Commons website provides some best practices, as does a document available from the Australian Research Council Centre of Excellence for Creative Industries and Innovation (ARCCECII 2009), but these are recommendations only.

Combined with attribution (BY), other restrictions or requirements articulated in Creative Commons licences are as follows:

- CC-BY-NC [non-commercial]: Requires the content to be used only in non-commercial contexts and for non-commercial purposes.
- CC-BY-ND [no derivatives]: Restricts modification of the content or the creation of derivative works from it.
- CC-BY-SA [share alike]: Requires subsequent users to license derivative works under the same terms as the original.

Further logical combinations of these requirements constitute the remainder of the six Creative Commons licences, which combine the non commercial and share-alike restrictions (CC-BY-NC-SA), and the no derivatives and non-commercial restrictions (CC-BY-NC-ND).

In addition to these licences and the tools to choose between and assign them, Creative Commons has more recently provided two further ways of making works available: The CC0 (CC-zero) licence, which, as the initiative explains (2011), allows:

“creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as

completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.”

The CC0 provides the most complete and broadly applicable way of dedicating one’s own work to the public domain — a process which, as the Creative Commons text points out, “few if any jurisdictions ... [provide] a process for doing ... easily and reliably.”

The second option represents a variation on this: It is a “mark” for declaring works by third parties as being in the public domain. “The Public Domain Mark operates as a tag or a label, allowing institutions like [museums and libraries] ... with such knowledge to communicate that a work is no longer restricted by copyright and can be freely used by others” (Creative Commons 2011).

The public domain mark is used, for example, by Wikipedia to label photographs of original visual art works, where the original is in the public domain. It would also apply to digitised texts copyrighted prior to 1923, which are thus in the public domain (with a few exceptions; <http://onlinebooks.library.upenn.edu/okbooks.html>).

Practical Concerns

Practical Concern 1: The Non-Commercial (NC) Restriction

Like the restriction to attribute a work, almost all of the other restrictions specified in the Creative Commons licences here raise some practical concerns, questions and, sometimes, criticisms.

One licensing category that has been the source of some controversy is the NC restriction, which forbids the use or redistribution of a resource “in any manner that is primarily intended for or directed toward commercial advantage or private monetary compensation” (Creative Commons 2011). A resource bearing such a licence cannot appear on a webpage that has commercial advertising or in a journal that requires subscription. Möller (2007) has pointed out that:

“Many bloggers and blog communities on the web use advertising as a way to recoup costs and generate income.... [Their] publications often use Google Ads to make some extra money. Other sites use small-scale subscription models to unlock additional features and content or disable advertising.... Compilations which are sold are another example of commercial use. For example, if one MP3 music file which is licensed for non-commercial use only is included among thousands on a DVD collecting free music and sold for a small personal profit, that is a violation of the license.”

Möller argues that the NC restriction also “effectively support[s] the existing, extremely [restrictive] ... international copyright terms,” which prevent a work from being used for commercial purposes for 70 years after the authors’ death.

In addition, it is worth noting that nearly half of the 107 collections listed in the 2008 William and Flora Hewlett Foundation study that use standard Creative Commons licences require this non-commercial restriction. At the same time, public educational organisations are frequently classified as being not for profit. As such, their purposes are not strictly commercial or oriented towards “private

monetary compensation.” Thus, even when those organisations charge tuition and fees for other services, the use of OER is considered to be non-commercial.

Practical Concern 2: Compatibility Between Licences

A second issue of importance for distance and open education organisations and others wishing to use or create Creative Commons licensed content is the matter of the compatibility between different licences. Content licensed under one Creative Commons licence cannot necessarily be combined or remixed with a resource bearing a different Creative Commons licence. For example, the non-commercial restriction, as Möller noted, does not work particularly well with licences that do not impose the same restriction. For example, material with the NC restriction could not be incorporated on a page that contains other open material along with a set of Google AdWords. Highlighting specifically the incompatibility of the non-commercial with the share-alike restriction, Möller (2007) explains:

“You can make derivative works, but they have to be licensed under the same terms. You cannot make a derivative work through addition of -NC content, as you can no longer apply the (more liberal) ‘share-alike’ license to the entire work. This is true even for Creative Commons’ own licenses: You cannot combine, for example, BY-SA content with BY-NC-SA content.”

Since revising material, remixing it and then redistributing it covers three of Wiley’s four criteria for “open” content, incompatibilities of these kinds are significant, and are considered in some detail here. (Note that problems with licence incapability, such as between the BSD and the GNU licences, existed well before the introduction of the tools and resources of Creative Commons.) As a table included in the Creative Commons FAQ indicates, there are no fewer than 25 incompatibilities out of a possible 36 combinations of their six licences (Creative Commons 2012). (Indeed, such a licence incapability, between the BY licence of Creative Commons and the BY-NC-ND licence of the publisher of this collection would prevent me from reproducing this same table here.)

What is more important, though, is the potential limitation on revision and re-use presented by the presence of licence incompatibilities between collections of resources. As indicated earlier, the majority of OER and resource collections use licences from Creative Commons. However, the Creative Commons licences that they use vary considerably. Resources from Connexions, a popular collection of Rice University, have a relatively open BY licence, and can be recombined with resources from any of the other collections. However, it is the very openness of this licence that sometimes prevents the incorporation of resources with different licences. In other words, a relatively small Connexions resource could not be permissibly combined with a larger resource with a more restrictive licence; and any combination of a Connexions resource with a differently licensed resource could not then be housed in a collection using more restrictive licensing terms.

Translating the licence types into different, well-known OER collections shows that fully half (15 of 30) of the possible combinations of resources from the different collections listed in Table 6.1 (and from collections with the same licences) are not permissible. The ones that readily allow for combinations and

remixing, and the collection and redistribution of such resources, are those that impose the least restriction. In addition, it is important to note that the public domain and CC0 options, as shown in Table 6.1, allow for nearly the same flexibility as the Creative Commons BY licence.

Table 6.1: Compatibility of resources for remixing, by collection

An OER from one of these collections (or with one of these licences):	... can or cannot be remixed and redistributed with one from ...				
	Connexions BY	EduTools BY-NC	JISC BY-NC-ND	MIT Courseware BY-NC-SA	WikiEducator BY-SA
Public Domain, CC0	✓	✓	✓	✓	✓
Connexions, BY	✓	✓	✓	✓	✓
EduTools, BY-NC	✗	✓	✓	✓	✗
JISC, BY-NC	✗	✗	✗	✗	✗
MIT Courseware, BY-NC	✗	✗	✗	✓	✗
Commonwealth of Learning	✗	✗	✗	✗	✓

It is not surprising, then, that the recent study from the Hewlett Foundation from which this data is taken concludes: “The terms of different licenses are often incompatible with one another in a way that prevents combining materials from different providers” (William and Flora Hewlett Foundation 2008, p. 13).

Practical Concern 3: Share-Alike

As indicated above, one Creative Commons restriction (and variations of it in other licences) is of particular concern for open and distance education organisations, especially those with a legacy of content. This is the “symmetrical collaboration” or “share-alike” restriction. It allows subsequent users to “alter, transform, or build upon [the] work,” but only under the condition that “the resulting work ... [may be distributed] only under the same, similar or a compatible license.”

This is clearly one of the most popular types of Creative Commons licences. It is used by Wikipedia and its sister projects and is assigned to about 45 million photos on Flickr. And 46 out of 105 projects listed by the William and Flora Hewlett Foundation use a licence with this restriction. This share-alike restriction means that the inclusion of a relatively minor addition to a work that bears the “SA” requirement, such as a photo or audio clip in a course module, would need to be “shared alike.” This means the resource has to be explicitly described as being free not only of legal restrictions, but also of unnecessary technological barriers to access — for example, being distributed in a PDF format that does not allow for editing and other operations. (So, a restriction might state: “You may not Use the Work with any technological measures that control access or use of the Work in a manner inconsistent with the terms of this License Agreement.”) This presents obvious difficulties related to branding, quality assurance and the overall business model of some

educational institutions. For example, work under this licence could not be used by an organisation that requires students to log on (say, to a learning management system like Moodle) to access course materials, unless it is also shared alike in both legal and technical terms. It would present problems to a similar organisation wishing to control how and when its materials work under this licence and branding appear and are circulated in public. Additionally, it presents challenges for publishers and distributors of content whose business model is based on the limited availability of such content.

It is therefore not surprising that the share-alike restriction has also been the subject of much debate, as indicated by blog articles (e.g., Blackall 2007) and online debates (e.g., WikiEducator 2007).

Still, this share-alike provision is not absolute or unconditional, and the extended legal documentation that constitutes both the Canadian and U.S. versions of this licence identifies an important set of exceptions that may be of some importance to open and distance education organisations. These are the exceptions provided by the definition of “collective work” in the licence. Such a collective or aggregate creation is defined in this text in relation to a given resource (the “work”) licensed under this Creative Commons provision (Attribution-ShareAlike 2.5 Canada 2009):

“‘Collective Work’ means a work, such as a dictionary, yearbook, encyclopedia, or a newspaper, review magazine or singular periodical and any work written in distinct parts by different authors, or in which works or parts of works of different authors are incorporated. A work that constitutes a Collective Work will not be considered a Derivative Work (as defined below) for the purposes of this license.”

This definition presents the collective work, in other words, as a kind of aggregate work that is exempt from the “viral” characteristic of copyleft. A resource with a Creative Commons Share-Alike licence can be “incorporated” into a collective work (such as a review magazine or singular periodical) without the resulting aggregation being seen simply as a “derivative work” and as subject as a whole to copyleft. The Creative Commons licence FAQ provides other examples of collective works, including anthologies and broadcasts.

This exception is made in the case of works that can be seen to be aggregations of multiple contributions, with each contribution (in the words of the American licence) “constituting [a] separate and independent” work in itself.

Given the wording of these provisions and examples, it is possible to draw conclusions about a number of types of resources and forms of resource integration that are likely to fit with the quality concerns and business model of many distance and open learning organisations. A number of types of combinations of copyleft and (conventional) copyright resources — and the kind of collective work that they would constitute together — are listed in Table 6.2. The first three rows provide examples of copyleft resources that could be used together with resources bearing other licences (including unmodified copyright restrictions) to constitute a collective work that would be for the exclusive use of a single organisation. The second two rows provide examples of resources for which it is *difficult to be certain* about the status of other resource types and their

combinations on other kinds of collective works. And the three bottom rows provide examples of combinations with share-alike resources that would not be permissible under any circumstances.

Table 6.2: Combinations of educational works likely to constitute a non-public collective work

	Copyleft resource	Copyright resources	Collective work incorporating both
Combinations acceptable for use by a single organisation	Textbook (e.g., from textbookrevolution.org)	Online course resources or a “course manual”	“Course” constituted through the provision of the two resources.
	Article (e.g., from DOAJ)	Other articles/readings	Readings associated with course
	Video or audio podcast ^a	Other multimedia resources	Bibliography of multimedia resources for course
Combinations in which the status of some resource types is uncertain	Podcast on iTunes University (accessed via iTunes)	Course manual instructing students to access iTunes podcasts	Integrated course resource requiring the use of other resources
	Collection of resources (e.g., merlot.org)	Integrated course resource online referencing specific resources in the copyleft collection	Integrated course resource requiring the use of other resources
Combinations not permissible under any circumstances	Interactive resource (e.g., simulation from merlot.org)	Specific exercises for the use of the simulation	Fully integrated course manual or other kind of resource
	Photograph from Flickr or diagram from Wikipedia	Text referencing photo or diagram and its particular contents	Fully integrated course manual or other kind of resource
	Video or audio podcast (e.g., clip from YouTube EDU)	Webpage from course materials that directly embeds YouTube player and clip, and adds contextualising text	Password-protected Web (HTML) documents constituting course materials

a The effective limitation of the collective work to “written works” in the Canadian version of the licence casts the viability of this last example into some doubt where “Canadian” resources referencing this licence are concerned. Note that such a limitation (to text and writing) is *not* present in the American licence.

It is important to note that, based on these sets of resource combinations, types of resources and forms of integration are of paramount importance. As long as resources licensed under the share-alike provision are unmodified and otherwise retain their integrity as individual works, they can be brought together with other materials in Collective Works.

Conclusion

Although the implications of the practical considerations discussed here are complex and manifold, there are some fairly simple conclusions and recommendations that can be formulated for OER collectors, developers and others in open and distance education institutions.

First, in investing in OER, whether as a creator, collector or institution, it is important to recognise that licences have far more implications than what might initially appear the case. The NC restriction is a good example. This restriction can prevent all kinds of use within the public and not-for-profit sectors or contexts, as well as in the for-profit sector. Many of these uses would not be immediately

recognisable to creators or others who would be inclined to label their resource with this licence.

Second, concerning the complex issue of compatibility between licences, the situation is best summed up in “you get as good as you give” or “what goes around comes around.” Collections, designs and individual resources with more open terms of use will be more flexible in terms of what they can incorporate. The more restrictive the licence chosen in connection with OER, the more limited the possibilities for the resource and the collection bearing that licence.

These points are particularly important to keep in mind in light of the original intention behind OER. In their final declaration, the participants in the UNESCO forum expressed their “wish to develop together a universal educational resource available for the whole of humanity to be referred to henceforth as Open Educational Resources” (2002, p. 6). They contextualised this ambitious aspiration by comparing their vision to UNESCO’s existing programme for the identification and preservation of “cultural and natural heritage around the world considered to be of outstanding value to humanity” (UNESCO 2009): “Following the example of the World Heritage of Humanity, preserved by UNESCO, [we] hope that this open resource for the future mobilises the whole of the worldwide community of educators” (UNESCO 2002, p. 28). Such a resource would undoubtedly have this mobilising potential, but for this value to be realised, the worldwide community of educators needs to be willing to collaborate on terms that are as open and flexible as possible.

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Approaches to the Production and Use of OERs: The African Virtual University Experience

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Introduction

Information and communication technologies (ICTs) are at the forefront of the post-industrial economy (Diallo 2005). As we enter the second decade of the 21st century, the Internet, the World Wide Web, computers, mobile devices and their applications have impacted nearly every aspect of our lives. They have redefined our perception of time and space by providing the possibility to see, interact, share information and speak to anyone from anywhere. Social media has empowered individuals and communities, who can generate, manage, distribute, share, publish and access text, sound and images.

New types of learners and learning are emerging through online communities. The academic literature reveals that all aspects of education have been affected by ICTs (Germain-Rutherford and Diallo 2006).

In this context, it is crucial to think innovatively and to act strategically and promptly in order to adapt and improve the role of universities in this fast-changing environment (Diallo et al. 2010). One of the core activities of higher education or education at large, teaching and learning, is being recalibrated to align not only with the pedagogical theories and principles of integrating ICT, but also with the needs and interest of learners.

The design, production and delivery of academic content has largely benefited from possibilities offered by digital devices, Web 2.0, learning management systems and social media. The flexibility to access academic content, synchronously and asynchronously, has made it possible to reach multiple learners in multiple locations. In this situation, Open Educational Resources (OER) are opening a new horizon for formal and informal learning. OER can facilitate access to educational resources and quality education while reducing cost.

In this chapter, we consider the OER in a practical way, moving beyond their definition and policy consideration. Our focus is primarily on the approach used by the African Virtual University (AVU) to develop and use OER in Africa. We examine the use of OER for accredited programmes and for non-formal learning, as well as the need to make OER relevant to the local context. Thus, this material will contribute to understanding how OER can be developed and used in the African context and may lead others to apply principles and processes learned by the AVU in their situation.

The AVU Approach to the Production and Use of OERs

The AVU is a pan-African intergovernmental organisation established by charter with the mandate to significantly increase access to quality higher education and training through the innovative use of ICTs. The charter has been signed by several African nations. The AVU has its headquarters in Nairobi, Kenya, and a regional office in Senegal. It has host-country agreements and diplomatic status with the two governments.

The AVU Business Plan 2009–2014 has two main thrusts: (a) educational and support services provided on a fee basis; and (b) not-for-profit development services. The not-for-profit development services focus on building the capacity of AVU partner institutions with the objective of increasing access to quality education through the following activities:

- updating and developing content,
- OER development,
- training of trainers,
- distance and eLearning infrastructure,
- developing professional networks through communities of practice,
- research and development, and
- quality evaluation and benchmarking.

Developing and Delivering OER Collaboratively

Recognising the importance of increasing access to tertiary education in Sub-Saharan Africa and the role of ICT as a key component of development, the AVU implemented a project that demonstrated the possibilities of open distance and eLearning strategies.

With primary funding from the African Development Bank (AfDB) and partial funding from the United Nations Development Program (UNDP) Somalia, the project, called the AVU Multinational Project, was implemented in ten countries. The 12 institutions involved in this initiative include:

- Jimma University in Ethiopia
- University of Nairobi in Kenya
- Université d'Antananarivo in Madagascar
- Universidade Pedagógica in Mozambique
- Université Cheikh Anta Diop (UCAD) in Senegal

- Amoud University, University of Hargeisa and East Africa University in Somalia
- Open University of Tanzania
- Kyambogo University in Uganda
- University of Zambia
- University of Zimbabwe

While the selection of participating countries was executed by the African Development Bank, the selection of a participating institution in each country was undertaken by the AVU in conjunction with the ministries of education in the various countries. A competitive process was meticulously executed to ensure that only those institutions that were capable of implementing the project were selected.

A comprehensive approach was introduced to address the untapped potential among academic staff. Also, many challenges that limit the effective use of ICT in education in the Sub-Saharan African context were addressed. These include lack of or restrictive institutional policies, lack of infrastructure, limited access to the Internet and ICT equipment, lack of reliable power, limited availability of quality eLearning programmes, lack of professional development opportunities for faculty and poorly motivated faculty members.

In order to develop the OER in a collaborative manner and to address the challenges associated with the deployment and support of the learning materials, four main activities were conducted as outlined below.

- Establishment of ten functional eLearning centres to serve as institutional and country hubs for the development, delivery and management of eLearning programmes – The centres also serve as physical locations for research and a revenue generator for the institutions.
- Training of university staff members in course material development, Web design, instructional technology, and the delivery and management of eLearning.
- Development and delivery of ICT-integrated teacher education programmes structured as four Bachelors of Education in Mathematics, Physics, Chemistry and Biology – In addition, diploma and certificate programmes were also developed.
- Mainstreaming of gender issues in tertiary education through the development of a guiding framework and gender-responsive materials, and the awarding of scholarships in science-based programmes in order to promote the educational development of women.

The results of the actions taken above include: the installation of ten functional eLearning centres; the training of 459 faculty members; the production of 219 textbooks available in three languages; the provision of 537 scholarships to females and other disadvantaged groups; and, as of January 2011, enrolment of 4,000 students. One of the most important accomplishments is the production of the 219 textbooks that were released as OER and that are available through an interactive portal called OER@AVU.

The Consortium Program Model

The objectives for developing the programmes were to improve the quality of teaching and learning in schools through the use of ICTs; to increase the number of mathematics, science and ICT basic skills teachers; and to promote regional integration as well as strengthen relevant partnerships with other teacher education initiatives in Africa. The key components of the Consortium Program Model are related to policy and curriculum conceptualisation, curriculum design, content development, content production, content delivery, quality assurance and accreditation, and management of the consortium and OERs. These components are described below.

Policy and Curriculum Conceptualisation Workshop

To ensure that the programme was well conceptualised and that it addressed the needs of the participating countries, the AVU convened a Policy and Curriculum Conceptualisation Workshop that drew participation from the ministries of education, the Teachers Service Commission (or their equivalent) and representatives from the selected co-ordinating institutions. To enrich the workshop's outcomes, teacher education and open distance and eLearning experts from all over the world were invited to the workshop. The outcomes of this workshop included the development of policies to guide the programme and to conceptualise the curriculum (AVU 2005). The collaborative process and the engagement of experts in the relevant areas ensured that the outcomes of the workshop presented the programme with guidelines that would ensure high-quality outputs.

Curriculum Design Process

In line with the collaborative approach adopted by the AVU, subject matter experts from the participating institutions and seasoned ICT educational experts from all over the world engaged in the curriculum design process. During the curriculum design workshop, the items below were accomplished.

- Through a curriculum mapping process, the Mathematics, Chemistry, Physics, Biology and Teaching curricula were analysed and harmonised for all 12 universities. In addition, recommendations for developing open distance and eLearning modules were drafted.
- Common thematic areas in the curriculum of the 12 universities from the ten countries were identified, as well as how ICTs would be used in the teaching and learning of Mathematics, Chemistry, Physics, Biology and Teacher Education.
- The following items were established based on the policy and curriculum conceptualisation deliberations: learning objectives, learning outcomes, assessment strategy, learner support requirements and a quality assurance framework.
- Basic ICT competencies needed by the teachers were identified and recommendations for an appropriate in-service and pre-service teachers' curriculum were drafted.

Content Development Process

The content development process, structured in three phases, led to the production of 73 textbooks which were translated into two other languages, making it a total of 219 textbooks. All textbooks were developed and peer-reviewed by African subject matter experts from the 12 participating institutions. This process was supervised by ICT integration educational consultants who were competitively engaged from both the African continent and beyond. The subject matter experts or authors and peer reviewers were recruited in collaboration with the participating institutions.

Each phase of the development process started with a content development workshop during which the subject matter experts were trained in the skills of identifying and presenting eLearning content. Subject matter experts were required to insert subject matter, learning activities, assessment activities and references into an adopted template. For each workshop, a gender expert trained the subject matter experts on developing material that are gender responsive. Once the textbooks were drafted, they were given to the peer reviewers for comment. Then, the authors were given the opportunity to revise and finalise the material. Peer reviewers did not review a draft written by a colleague from the same institution.

Authors and peer reviewers were contracted and paid by the AVU and agreed to waive their intellectual propriety rights to the AVU. All content strictly adhered to copyright regulations and was developed as open education resources, with the authors signing a Creative Commons Agreement to this effect.

All 73 modules were written in the language of the subject matter experts: English, French and Portuguese. Then the material was translated into the two other languages. The translated versions were peer reviewed once more.

Content Production

All final textbooks were sent to the Materials Development Coordinator who was responsible for the production of the textbooks. This individual led a team of editors, instructional designers and graphic designers.

Ensuring all had access to the learning materials in ten participating countries was of absolute importance to the AVU. It was for this reason that the developed learning materials were produced in various formats and made available through different media that support open distance and eLearning. The materials were uploaded onto Moodle, an open source learning management system (LMS) that supports online interactive course delivery. The main LMS was located at the AVU and the LMS was installed on mirror servers at each participating institution. Thus, the materials were accessible through the Intranet of these institutions. The materials were also made available in digital video discs (DVDs) and in printed booklets. All the materials were posted on the AVU interactive OER portal for access beyond the 12 participating universities and ten countries.

The delivery options outlined above were implemented to ensure that the materials were accessible to all learners — those with continuous access to the Internet and those with limited or no access. Participating institutions were encouraged to identify strategies for efficient and effective ways of ensuring student access to learning materials.

Quality Assurance

It was important to ensure that high standards were maintained in the development, implementation, delivery and management of the teacher education programmes. Quality assurance becomes even more critical because of the various modes of delivery: online, blended and face-to-face. It was also important to maintain quality in order to ensure the credibility of the programme in all ten countries. Thus, internal quality assurance was built into the development and delivery processes. These mechanisms included:

- the meticulous selection of participating institutions;
- the curriculum conceptualisation and policy formulation that stipulated standards to be employed;
- selection of top quality experts to carry out curriculum design and development as well as production of the materials;
- the training of trainers;
- an effective student support system and effective assessment strategies for multiple delivery modes;
- the development of institutional readiness;
- admission strategies that defined minimum entry points; and
- the implementation of a pilot to test the materials, programme delivery, and monitoring and evaluation structure.

A Teacher Education Advisory Committee was established to act as the governing body for the teacher education programme in the ten participating countries and to oversee the implementation of quality. Its membership includes: Pro Vice Chancellors/Deputy Vice Chancellors/Deputy Rectors and Deans at each participating partner institution, and the programme team at the AVU. The committee reported to the participating university and AVU top management. The committee met once a year to carry out the following tasks:

- co-ordinating the AVU teacher education programme at the partner institutions;
- representing interests of the programme within the governing bodies of partner institutions (e.g., Senate/Council);
- drafting legal agreements between the AVU and the partner institutions;
- developing a quality assurance mechanism;
- developing financial models for the programme, including those that generate revenue and will sustain the programme;
- managing the inter-institutional development and implementation of the programme in ten countries; and
- developing and implementing a monitoring and reporting system for the programme's activities and progress.

A quality assurance framework (AVU 2007) was developed for the teacher education programme by using and improving the existing quality standards from seven of the participating institutions. The common framework was adopted by all participating institutions. The quality assurance framework is a descriptive

and not a prescriptive document. It allows institutions to adapt or adopt it to suit the realities of their respective countries. The document outlines the following six steps through which the framework can be implemented:

- establishment of a Quality Assurance Unit at the AVU for the teacher education programmes, to co-ordinate officials responsible for quality assurance in each participating institution;
- interpretation of the quality assurance framework, including self-evaluation, prioritisation and planning by individual participating institutions;
- conducting of a SWOT (strengths, weaknesses, opportunities and threats) analysis;
- review of the SWOT analysis and support by the Quality Assurance Unit at AVU;
- continuous monitoring; and
- sharing of best practices and information amongst the participating institutions.

Another important quality assurance tool was the legal agreements signed between the AVU and the participating universities. Each agreement stipulates the roles and responsibilities of each party, and is centred on a collaborative approach in order to achieve their respective objectives. It established the legally binding principles that regulated the development and delivery of each teacher education programme. It detailed collaboration in the two following areas:

- the development of a policy and curriculum framework that would guide the design, development, delivery and accreditation of the programme, together with a quality assurance framework that would govern all e-programme in the participating institutions; and
- the design, development and delivery of an open and distance eLearning teacher education programme that would be of high quality and benefit from the pool of expertise available from other participating universities in Africa – To achieve this, it was necessary for a partner institution to acquire skills that will build and enhance its capacity to design, deliver and manage its own open, distance and eLearning programmes. In addition, partner institutions must be willing to establish and actively participate in the teacher education consortium.

The 12 participating universities and the AVU decided to form the Teacher Education Virtual Consortium which will ensure sustainability of the teacher education programme beyond the Multinational Project. The goals of the consortium are:

- to develop and promote appropriate open and distance eLearning (ODeL) programmes for teacher education; and
- to enhance the capacity for members both in terms of quantity and quality, for the acquisition of necessary expertise in open and distance eLearning methodologies, as well as for the development and management of distance learning programmes.

Accreditation

All 12 participating universities have adopted the programmes through their senates and are accrediting the programmes in their countries. A learner has to enrol in one of the universities in order to receive credits.

It was agreed that the participating institutions should commit themselves to exploring and determining mechanisms for encouraging and implementing cross-institutional recognition of credits gained by graduates of the teacher education programmes. These mechanisms must take into account national regulatory requirements of each country so that each partner institution can deliver, accredit and award certificates for the various programmes derived from the teacher education programmes.

Programme Delivery

As part of the delivery process, the AVU conducted a pilot delivery (AVU 2010) in four of the participating institutions. The pilot indicated that the ICT-integrated teacher education program had the capacity to assist learners perform better in mathematics and sciences, and contribute to addressing the gender divide in performance in science. Female access to higher education was enhanced through eLearning, as this circumvented the time constraints faced by females with other competing personal issues, including family commitments. The approach enabled them to learn in a flexible manner at a time that is convenient to them. The pilot also demonstrated the innovative use of ICTs in designing and developing the programme, as well as the benefits that the learners receive from the flexible mode of delivery and increased access. Once the pilot was completed, the teacher education program was launched in all institutions for delivery within existing university structures.

Although the AVU played a central role in the development of the learning materials and other related activities (such as the establishment of the eLearning centres and hosting of the content on its eLearning platform and OER portal), it is the participating institutions that remain responsible for delivering and awarding certifications for the programme. However, the AVU entered into specific agreements with five of the participating universities to deliver joint certificate programmes in ICT basic skills and ICT integration in math and sciences.

Each institution used the developed learning materials and the quality assurance framework agreed on. To maximise the benefits of the programmes, the institutions were required to perform the following tasks:

- Sensitise all levels of the institution — councils, senates, faculty boards, staff and student community — to the eLearning programmes.
- Select modules and programmes to be taken.
- Examine the curricula to determine “fitness” for purpose.
- Provide students with learning materials in various formats.
- Select students to enrol in the various programmes derived from the teacher education modules.
- Make arrangements for effective student support, including pre-enrolment counselling, access to library resources and face-to-face sessions. If

necessary, institutions were required to identify study centres and select an effective LMS.

- Articulate an effective learner assessment strategy.
- Engage human resources from the relevant university departments such as the registrar's office, dean's office, and departments with a central dedicated team comprising a programme co-ordinator, course leader, subject tutors/lecturers, eLearning centres manager and a national co-ordinator from the Ministry of Education. Therefore, each institution ensured that all relevant human resources were available and motivated to deliver services efficiently and effectively.
- Monitor and evaluate the programme, thereby ensuring clear communication and reporting structures with all the aspects of the delivery of the programme. The outcome of the monitoring and evaluation activities is used to identify and address challenges and to provide for continuous improvement of the programme.

The Role of OER in Designing, Developing and Delivering the Teacher Education Learning Materials

Since 2005, the AVU has had an OER strategy. The strategy was configured as a conceptual framework and architecture — the AVU OER Architecture — through which the creation, organisation, dissemination and utilisation of OER were expected to lead to the development of a dynamic, rational and comprehensive strategy for collaborative partnerships for African higher education and training institutions.

The AVU OER strategy recognised the importance of collaborative partnerships in advocating and raising awareness for OER in the African higher education sector. By involving African institutions in the OER evolutionary process, the AVU envisaged addressing the issues pertaining to epistemological, ideological, cultural and social relevance as well as reducing technological challenges, while enabling the institutions to participate actively so that they drive and own the process in terms of form, content, structure and orientation.

Activities related to OER have been constantly embedded in AVU policies, objectives and activities. The AVU participated in major international OER initiatives such as the Massachusetts Institute of Technology OpenCourseWare (MIT-OCW) and the World Summit of Information Society in 2005. The AVU implemented activities on behalf of the Open University UK initiative called Teacher Education in Sub-Saharan Africa (TESSA). As well, the AVU began implementing an OER portal project, which was later relocated to the South African Institute for Distance Education (SAIDE) and became an initiative known as OER Africa in 2008. Throughout all of these activities, the AVU has developed solid partnerships with OER and OCW bodies on all continents, including global players such as MERLOT, MIT, the OpenCourseWare Consortium and UNESCO.

Open Educational Practices were implemented in the design, development and delivery of the teacher education programme developed as part of the AVU Multinational Project. For instance, materials developed using OER and the 219 textbooks produced were released as OER under the Creative Commons licence.

The effective management, review and sustainability of these materials required the AVU to build an interactive portal that would support its strategy. The AVU started developing the OER repository called OER@AVU in 2010. The main objective of this repository was to serve as a platform for the 219 textbooks, as well as to serve as a platform for educators to use, modify and contribute to the AVU collection, thereby making their educational resources available to others. The educators could discuss and comment on the OER and collaborate in the development of additional OERs. The portal was also expected to host future AVU collections in areas such as business studies, computer sciences, and agriculture and environmental studies.

OER@AVU was launched in January 2011 and publicised using various media, including traditional media, strategic partners' networks and social media. It exceeded expectations, attracting visitors from 187 countries and with 393,000 textbooks viewed as of October 2011; winning an Education-Portal.com global award as Best Emerging OCW initiative; and sharing its resources. In this way, the AVU has gained global recognition of its Open Educational Practices and it has increased awareness of the quality resources developed in Africa. These resources can be used globally.

The developments outlined above led to a review of the AVU's OER strategy. The AVU now aims to:

- increase access to quality and relevant education through the innovative use of ICTs;
- develop and share quality OER that are relevant to the AVU network;
- create, maintain and improve an African-based OER library;
- facilitate the adoption of OER practices in the AVU network; and
- build effective partnership that will add value to the this strategy.

One immediate consequence of this revised strategy is the use of OER as a means to increase access to education in Africa through the delivery of accredited and non-accredited programmes. The target of the Consortium Program Model was to enhance existing formal accredited programmes. The OER were instrumental in developing and delivering cross-border educational programmes relevant to the local context. Unexpectedly, the AVU discovered that its OER collection was being used by institutions and individuals in Africa and around the globe, and that world-leading OER repositories were adding AVU textbooks to their collections. This has encouraged the AVU to consider including the accreditation of self-learners in the Consortium Program Model.

The issue of accrediting self-learning through OER has been explored through the OER university concept (Day and et al. 2011). In the case of the AVU, it focused on the mandate of the AVU and on lessons learned. The AVU will explore having self-learners sit examinations at consortium universities that have granted senate approval for their programmes.

It is anticipated that the inclusion of the accreditation of self-learners will contribute in increasing access to quality education in Sub-Saharan Africa where tertiary education enrolment was 6 per cent in 2008 (UNESCO 2010). In addition, most countries in this region are unable to enrol all high school graduates because of barriers such as limited seat capacity.

Challenges

A few challenges were experienced with the development and delivery of the teacher education programme:

- As most of the participating institutions did not have an ICT policy at their institutions, it was difficult to draft suitable ICT and curriculum policies.
- Several challenges were encountered during the curriculum design process. For example, there was a scarcity of ICT-integration educational experts in Africa. Although it was generally easy to agree on commonalities in the curricula of the anglophone universities, differences between the anglophone and francophone education systems resulted in a separate process for the francophone group in designing their curricula. However, the groups later merged in subsequent processes.
- Four primary challenges were encountered with the content development process. First, academics who were to undertake the writing process lacked ICT skills. Second, there was a lack of ICT-integration experts within Africa. Third, the translation of modules required expertise both in the subject matter and in two languages. Firms with such expertise were not found and it was challenging to source academics with such skills. Fourth, in many cases, the authors and peer reviewers had competing responsibilities in their universities that would not allow them to meet most deadlines. Thus, considerable delays were encountered during the writing process.
- In order to use the Moodle LMS effectively, academics who were accustomed to face-to-face delivery methods needed extensive training in eLearning.
- Due to inflexible internal processes, university authorities delayed the approval of the teacher education programmes.
- Regulations in some participating countries caused delays in using equipment at eLearning centres. For example, delays were encountered during the granting of VSAT licences (for satellite Internet services) and the passage of equipment through customs.
- Employing three languages during the development and delivery of OER was challenging and costly. However, the use of several languages meant that a greater number of people could use the material.

Lessons Learned and Recommendations

This final section provides a summary of the key steps in the formation of the Consortium Program Model that may assist others who want to set up or review similar initiatives. However, it is important to note that the AVU model was implemented in a specific context. Therefore, these recommendations may need to be adapted to different situations.

The key steps in the formation of the Consortium Program Model are as follows.

- Harmonising the educational policies and adoption of policy guidelines to inform the implementation of the programme. All stakeholders must be involved in the process.

- Forming an advisory committee to oversee the implementation of the programme. The members should be drawn from the top management of the universities and the relevant faculties.
- Developing a quality assurance framework.
- Agreeing on an accreditation scheme.
- Agreeing to assign intellectual property rights to one institution or consortium and to releasing the resources under a Creative Commons copyright licence.
- Agreeing on a common structure for the curriculum and designing a curriculum that takes into account the needs of the institution and countries involved.
- Developing the content in a collaborative manner.
- Producing material in several file formats and making them available online and in compact disc (CD), DVD and print formats.
- Securing agreement on OER practices and releasing the content as OERs.
- Enabling participating universities to deliver programmes as their own programmes or jointly with the AVU and other partners.
- Supporting participating universities in terms of ICT and eLearning infrastructure, technical advice, and capacity enhancement of staff members.
- Forming a dedicated Program Coordination Unit which is responsible for the daily implementation.

The Consortium Program Model was implemented in a specific context that overcame political, geographic, cultural and linguistic barriers. As the model had never been implemented before in Sub-Saharan Africa, it required thorough planning, monitoring and adjustments. Below are some of the lessons learned during the development and implementation of the model.

- Managing academics from different countries under “one roof” can be difficult, thus one needs to be well prepared to engage with teams from different countries (who have different cultures and languages), and consider different educational policies and practices.
- Collaboration is key to the success of the Consortium Program Model. Institutions involved in such development projects must feel that they are improving their own programmes, that their input is important, that decisions are made upon agreed principles, and that the outcome will address their needs.
- It was essential to harmonise policies, to contextualise the curricula and to agree on a common modular structure and common objectives acceptable to all countries.
- It was vital to keep the participants motivated and committed.
- Without acceptable quality mechanisms, the process would not have been fully implemented or the expected outputs would not have been achieved.
- Publishing the materials as OER was done carefully, progressively and systematically. The focus of material development and production was

primarily on creating high-quality materials relevant to the context of each country, and to have participating institutions accredit the programme as their own programmes.

- The purpose of using OER in authoring and publishing the content was to improve the content and share the resources with other African countries and universities.

The Consortium Program Model is scalable: it can be expanded to include additional countries and universities, as well as other subject matter. The AVU is preparing a second phase of the Multinational Project that will strengthen the gains made during the first phase of the project and expand its benefits to more countries. The objectives of the second phase include reviewing and improving the AVU OER collection, developing and delivering a consortium programme in computer science, and releasing the computer science content as OERs. Thus, the AVU plans to develop additional high-quality educational resources that will meet the needs of educators and learners in Sub-Saharan Africa, but also those in the 180-plus countries that access the AVU OER repository.

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Sharing of Open Science Education Resources and Educational Practices in Europe

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Introduction

Science Education is recognised as top priority for European policy makers (Rocard et al. 2007). During the last few years, technological advancements (such as ubiquitous devices and wearable computers) and innovative applications (such as data analysis tools, simulations, augmented reality and virtual reality interfaces) have allowed the enhancement and enrichment of the current science education curricula (Rocard et al. 2007). Furthermore, a large amount of digital science education resources have become available worldwide through science museum collections and digital repositories such as Exploratorium Museum of Science (www.exploratorium.edu/), Science Museum of Minnesota (www.smm.org/) and NASA's Education Materials Finder (<http://search.nasa.gov/search/edFilterSearch.jsp?empty=true>), all of which aim to facilitate sharing and re-use of digital science education resources among science education communities. These resources have the potential to support technology-enhanced science education by enabling science teachers to improve their day-to-day science teaching (Rajashekar et al. 2007).

On the other hand, it has been recognised that science teachers could improve the quality of their teaching and support their motivation for enriching their teaching practices through their participation in communities of best science teaching practices, which facilitate sharing of not only digital educational resources, but also educational practices that represent their pedagogical approach. More specifically, science teachers are able through their participation in communities of teaching practices to: (a) search and download best science teaching practices for share and re-use; (b) discuss and collaborate about best science teaching practices; and (c) provide their feedback about the actual use of a science teaching practice via ratings and comments (Fu-ren et al. 2008). As a result, there is an increased interest for the development of Web-based repositories that facilitate open access to both educational resources and educational practices (Paquette et al. 2008).

In response to this increased interest for providing open access to both educational resources and educational practices among science education teacher communities, a number of prominent European initiatives have been launched. The aim of this chapter is to discuss issues related to the current trends in Web infrastructures that can support open access to educational resources and practices (namely, Learning Objects and Learning Designs Repositories) and then to present three case studies of key European initiatives in this field (the OpenScienceResources Repository, the COSMOS Repository and the PATHWAY Coordination and Support Action).

Open Educational Resources (OER) Repositories

OER can be of different granularity and different formats (Lane and McAndrew 2010). According to Geser (2007), OER should have three core features: (a) be available for open and free-of-charge access by educational institutions and end users (such as teachers and students); (b) be licensed for re-use, free from restrictions to modify, combine and repurpose, as well as be designed for easy re-use in open content standards and formats (such as SCORM, IEEE LOM and IMS LD); and (c) with regard to software tools, have a source code that is open and licensed for re-use.

Learning Objects (LOs) are a common format for developing and sharing educational content and they have been defined by Wiley (2002) as: “any type of digital resource that can be reused to support learning.” More specifically, LOs include: “video and audio lectures (podcasts), references and readings, workbooks and textbooks, multimedia animations, simulations, experiments and demonstrations, as well as teachers’ guides and lesson plans” (McGreal 2008). Thus, one can claim that OER are a subset of LOs that are openly licensed (Friesen 2009; Lane and McAndrew 2010).

LOs and their associated metadata are typically organised, classified and stored in Web-based repositories, which are referred to as Learning Object Repositories (LORs). McGreal (2004) has defined LORs as systems that “enable users to locate, evaluate and manage learning objects through the use of ‘metadata,’ namely, descriptors or tags that systematically describe many aspects of a given learning object, from its technical to its pedagogical characteristics.” Most of the LORs that have been developed worldwide adopt the IEEE LOM standard (IEEE LTSC 2005) or an application profile of IEEE LOM (Smith et al. 2006) for describing their LOs, aiming to facilitate search and retrieval of them among different LORs (McGreal 2008).

Typical examples of existing LORs are summarised in Table 8.1. These LORs have been selected by considering whether they are specifically targeting science education or whether they include a considerable amount of science education LOs. For the purpose of our work, we define as a science education LO any type of digital resource that can be re-used to support science education. Note that all LORs presented in Table 8.1:

- adopt the IEEE LOM Standard or an IEEE LOM Application Profile of IEEE LOM (Sampson et al. [in press]) for describing with metadata their LOs; and
- include LOs that may target either teachers or students and this can be distinguished during searching according to the LOs metadata provided by their creators.

Table 8.1: Typical examples of existing Learning Object Repositories (LORs)

LOR name	Educational sector	Subject domain	Region coverage	Licence	No. of users	No. of total LOs ^a	No. of science education LOs	Science education LOs per total LOs
ARIADNE ^b	All sectors	Cross-disciplinary	International	Open under Creative Commons	N/A	819,177 (Large LOR)	120,993	14.76%
LRE ^c	School education	Cross-disciplinary	Regional (Europe)	Open under Creative Commons	N/A	294,429 (Large LOR)	163,734	55.61%
COSMOS ^d	School and higher education	Science education	Regional (Europe)	Open under Creative Commons	2,519	230,128 (Large LOR)	230,128	100.00%
AMSER ^e	All sectors	Science education	National (USA)	Free under Custom Licence, openness depending on the LO	N/A	134,637 (Large LOR)	134,637	100.00%
MERLOT ^f	Higher education	Cross-disciplinary	International	Open under Creative Commons	103,479	34,181 (Medium LOR)	12,491	36.54%
OER Commons ^g	All sectors	Cross-disciplinary	International	Open under Creative Commons	N/A	32,448 (Medium LOR)	17,041	52.51%
Connexions ^h	All sectors	Cross-disciplinary	International	Open under Creative Commons	N/A	21,556 (Medium LOR)	7,654	35.50%
Open Science Resources ⁱ	School education	Science education	Regional (Europe)	Open under Creative Commons	2,312	3,031 (Small LOR)	3,031	100.00%
ATLAS@CERN ^j	School and higher education	Science education	Regional (Europe)	Open under Creative Commons	N/A	1,740 (Small LOR)	1,740	100.00%

^a Data retrieved on 10 April 2012.

^b <http://reforschools.eun.org/>

^c <http://www.cosmosportal.eu/>

^d <http://www.ariadne-eu.org/>

^e <http://amsr.org/>

^f <http://www.merlot.org/>

^g www.oercommons.org/

^h <http://cnx.org>

ⁱ www.osportal.eu/

^j www.learningwithatlas-portal.eu/

As Table 8.1 shows, a considerable number of science education LOs are currently available in existing LORs; and the COSMOS Repository is currently the largest existing science education LO repository in the world. Moreover, most of these science education LOs are OER since they are openly licensed using Creative Commons (<http://creativecommons.org/>), which provide simple, standardised alternatives to the “all rights reserved” paradigm of traditional copyright. This provides us with evidence that LOR development for supporting the sharing and re-use of openly licensed science education LOs is an emerging trend. Nevertheless, in reality most LORs include limited explicit information about their hosted LOs’ learning and educational context of use — that is, the pedagogical approach adopted, the subject domain, the intended learning outcomes and the environment within which the LOs are used (Bailey et al. 2006; Conole 2007).

It has been identified that teachers would benefit from: (a) having access to best teaching practices, (b) sharing their teaching practices with other teachers and (c) reflecting on others’ teaching practices (Griffiths and Blat 2005; Conole 2008; Galley et al. 2010). This has the potential to provide learning and educational contextual knowledge of LOs available in LORs. For this purpose, there are efforts for designing and developing Web-based repositories of educational practices.

Learning Design Repositories

Learning Design (LD) is defined by Koper and Olivier (2004) as: “the description of the teaching-learning process, which follows a specific pedagogical model or practice that takes place in a unit of learning (e.g., a course, a learning activity or any other designed learning event) towards addressing specific learning objectives, for a specific target group in a specific context or subject domain.” As this definition suggests, LD includes information that can contribute to the definition of learning and educational context of use for the LOs.

Similar to LOs, LDs can be organised, classified and stored in Web-based repositories, which are referred to as Learning Design Repositories (LDRs). LDRs are built so as to support storage, discovery, retrieval, use, re-use and sharing of LDs and LD Templates among educational communities (Griffiths et al. 2005; Wilson 2005). An LD Template is an LD without specific educational content (Griffiths et al. 2005). Figures 8.1 and 8.2 present an example of an LD and a corresponding LD Template.

One way of providing a standard notation language for the description of LDs and LD Templates is the IMS Learning Design Specification (IMS Global Learning Consortium 2003) and many of the existing LDRs adopt this specification for describing their LDs and LD Templates. Table 8.2 summarises key characteristics of the main existing LDRs.

Figure 8.1: A Learning Design (LD) example from the OpenScienceResources Repository.

The electromagnetic spectrum
Please click on a phase to view related activities:

Introduction
Pre-visit
Visit
Post-visit

Pre-visit

Provoke curiosity

Define questions from current knowledge

Propose preliminary explanations or hypotheses

Plan and conduct simple investigation

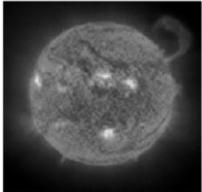
Pre-visit > Question Eliciting Activities

Provoke curiosity

What do space observatories have in common with the movie "Hollow man" and an engineer?

In all cases there is use of certain devices which visualize images our eyes can't see:

- Space observatories use cameras to detect radiation from outer space in non-visual wavelengths.
 ⇒The teacher should inform the students that objects in all these impressive images from outer space wouldn't be visible to the naked eye and that they are properly modified in order for us to be able to see these objects.
- The actors in the movie use thermal cameras in order to be able to see the hollow man and the invisible animals.
- Engineers use thermal cameras to detect heat or gas losses in houses and other installations.



Supporting Material

Figure 8.2: A Learning Design (LD) Template example from the COSMOS Repository.

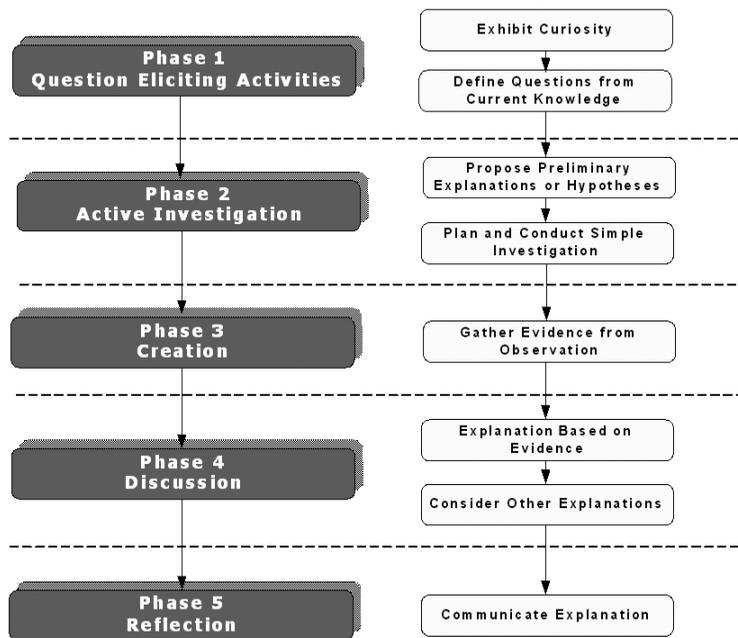


Table 8.2: Overview of the main existing Learning Design Repositories (LDRs)

LDR name	Educational sector	Subject domain	Region coverage	Licence	No. of users	No. of LDs / No. of LD Templates ^a	LDs / LD Templates modelled with IMS LD
The LAMS Repository ^b	All sectors	Cross-disciplinary	International	Open under Creative Commons	6,779	875 / 0	—
iCOPER LD Repository ^c	All sectors	Cross-disciplinary	Regional (Europe)	Open under Creative Commons	N/A	520 / 0	✓
COSMOS ^d	School and higher education	Science education	Regional (Europe)	Open under Creative Commons	2,519	450 / 5	✓
Open Science Resources ^e	School education	Science education	Regional (Europe)	Open under Creative Commons	2,312	158 / 2	—
The Learning Designs Repository ^f	Higher education	Cross-disciplinary	Regional (Australia)	Free under Custom Licence	N/A	32 / 5	—
The Canadian LD Repository ^g	All sectors	Cross-disciplinary	National (Canada)	Free under Custom Licence, openness depending on the LD	N/A	N/A	✓
DialogPlus Repository ^h	All sectors	Cross-disciplinary	National (UK)	Free under Custom Licence, openness depending on the LD	N/A	N/A	✓

^a Data retrieved on 10 April 2012.

^b www.lamscommunity.org/lamscentral/

^c www.icoper.org/repository/learning-design

^d www.cosmosportal.eu/

^e www.csportal.eu/

^f www.learningdesigns.uow.edu.au/

^g www.ild.org

^h www.nettle.soton.ac.uk/toolkit/

As we can notice from Table 8.2, four out of seven existing LDRs adopt the IMS LD Specification for modelling their LDs or their LD Templates, whereas the other three use their own internal format. This means that interoperability of LDs/ LD Templates among different existing LDRs is partly facilitated. Moreover, we should note that four out of seven existing LDRs include LDs, which are openly licensed following Creative Commons. This is an important indication that LDs are aligned with the OER openness feature. Next, we discuss in more detail the OpenScienceResources Repository and COSMOS Repository as key representatives of the current state-of-the-art in Web infrastructures that can support open access to educational resources and practices.

The Case of OpenScienceResources Repository

The OpenScienceResources Repository was developed in the framework of an EU-funded project, referred to as “OpenScienceResources: Towards the Development of a Shared Digital Repository for Formal and Informal Science Education” (www.openscienceresources.eu/). It provides access to openly licensed (through Creative Commons) science education LOs and LDs, which can be used by science teachers connecting formal science education in schools with informal science education activities taking place in European science centres and museums. The OpenScienceResources Repository has 2,312 registered users and it includes 3,031 LOs and 158 LDs (data retrieved on 10 April 2012). It follows the institutional sustainability model, meaning an institution (in our case a partner of the specific EU-funded project) undertakes the responsibility to sustain the OER initiative (Downes 2007).

The main functions of the OpenScienceResources Repository include:

- **Store LOs:** The users of the OpenScienceResources Repository are able to store in the repository their LOs along with their metadata descriptions following an LOM Science Education Application Profile (Sampson et al. 2011c).
- **Design and store LDs:** The users of the OpenScienceResources Repository are able to design a new LD according to a pre-defined LD Template, which follows an inquiry-based, pedagogical model (the step-by-step wizard is shown in Figure 8.3). In the final step of this wizard, the user is able to store his or her LD along with its IEEE LOM compatible metadata (Figure 8.4). The LDs that are developed and stored in the OpenScienceResources Repository are not modelled with the IMS LD Specification.

Figure 8.3: OpenScienceResources Repository wizard for designing a new Learning Design (LD).

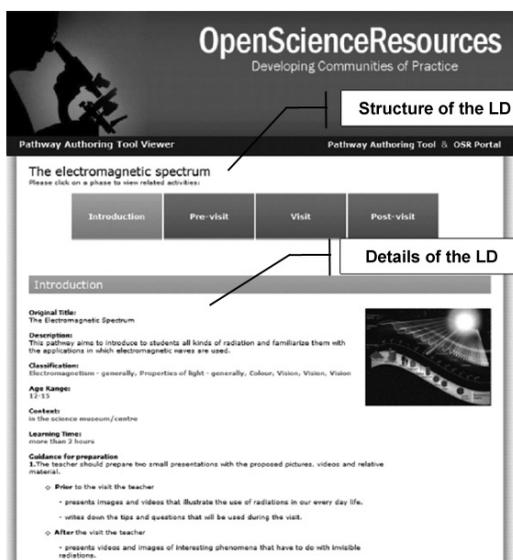


Figure 8.4: OpenScienceResources Repository Learning Design (LD) storage mechanism.

- **Search for LOs and LDs:** The users have the capability of searching, browsing and retrieving LOs and LDs by using terms that are matched with metadata descriptions of LOs and LDs. Figure 8.5 presents the process of searching LOs in the repository.
- **Preview LOs and LDs:** The users are able to preview LOs and LDs. Figure 8.6 presents the process of previewing the structure and the details of a selected LD.

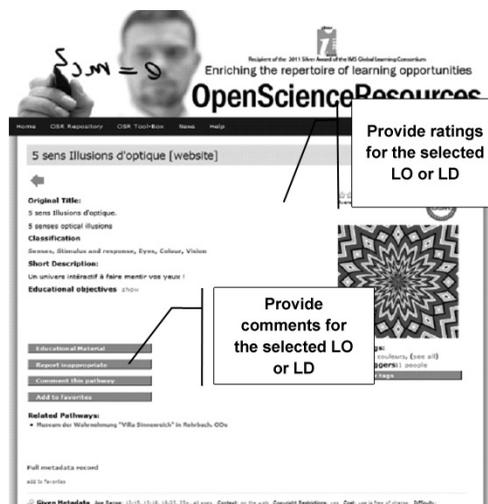
Figure 8.5: OpenScienceResources Repository searching mechanism.

Figure 8.6: OpenScienceResources Repository Learning Design (LD) preview mechanism.



- **Rate/comment on LOs and LDs:** The users are able to provide their ratings and comments for an LO or LD stored in the OpenScienceResources Repository. These ratings and comments could be related with the impressions of the users who have used a specific LO or LD. Figure 8.7 presents the process of rating and commenting a selected LD.
- **View and download LOs and LDs metadata:** The users are able to view in detail the metadata descriptions of LOs and LDs, so as to be able to decide whether or not to use a specific LO or LD. Moreover, the users are able to download the LO or LD metadata in XML format conforming with the IEEE LOM Standard. Figure 8.8 presents the educational metadata of a selected LD and the functions that can be performed.

Figure 8.7: OpenScienceResources Repository ratings and comments mechanism.



The Case of COSMOS Repository

The COSMOS Repository was developed in the framework of an EU-funded project, referred to as “COSMOS: An Advanced Scientific Repository for Science Teaching and Learning” (www.cosmos-project.eu/). It provides access to openly licensed (through Creative Commons) science education LOs and LDs for science teachers in school and higher education. The COSMOS Repository has 2,519 registered users and includes 230,128 LOs and 450 LDs (data retrieved on 10 April 2012). Similar to the OpenScienceResources Repository, the COSMOS Repository also follows the institutional sustainability model. The main functions of the COSMOS LD Repository can be summarised as follows:

- **Store LOs, LDs and/or LD Templates:** The users of the COSMOS LD Repository are able to store in the repository their LOs, LDs and LD Templates along with their metadata descriptions following a LOM Science Education Application Profile (Sampson and Zervas 2008). The LDs that are stored in the COSMOS Repository are modelled based on the IMS LD Specification and are developed by using a customised version of the ASK Learning Designer Toolkit (Sampson et al. 2005), which incorporates five LD Templates that are based on different pedagogical models (Sampson et al. 2011b).
- **Search for LOs, LDs and LD Templates:** The users have the capability of searching, browsing and retrieving LOs, LDs and/or LD Templates by using terms that are matched with metadata descriptions of LDs and LD Templates. Figures 8.11 and 8.12 present the process of searching LDs in the COSMOS Repository.

Figure 8.11: COSMOS Repository searching mechanism.

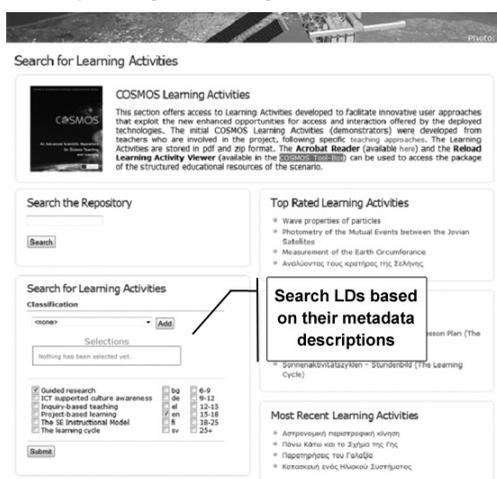
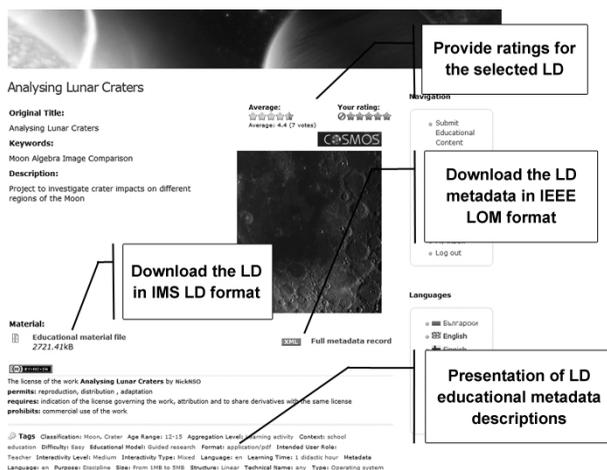


Figure 8.12: Learning Designs (LDs) search results based on selected searching criteria.



- **Download LOs, LDs and/or LD Templates:** The users are able to download LOs, LDs and/or LD Templates (in IMS LD compatible format), as well as their metadata in XML format conforming with the IEEE LOM Standard. Figure 8.13 presents the process of downloading a selected LD and its IEEE LOM compatible XML metadata file.
- **Rate/comment on LDs and/or LD Templates:** The users are able to provide their ratings and comments for the LOs, the LDs and/or LD Templates stored in the COSMOS Repository. These ratings and comments could be related to the impressions of the users who have used a specific LO, LD or LD Template. Figure 8.13 presents the process of providing ratings to a selected LD.
- **View LOs, LDs and/or LD Templates metadata:** The users have the capability of viewing in detail the metadata descriptions of LOs, LDs and/or LD Templates, so as to be able to decide whether or not to use a specific LO, LD or LD Template. Figure 8.13 presents the educational metadata of a selected LD and the functionalities that can be performed.

Figure 8.13: View the full educational metadata record of a selected Learning Design (LD).

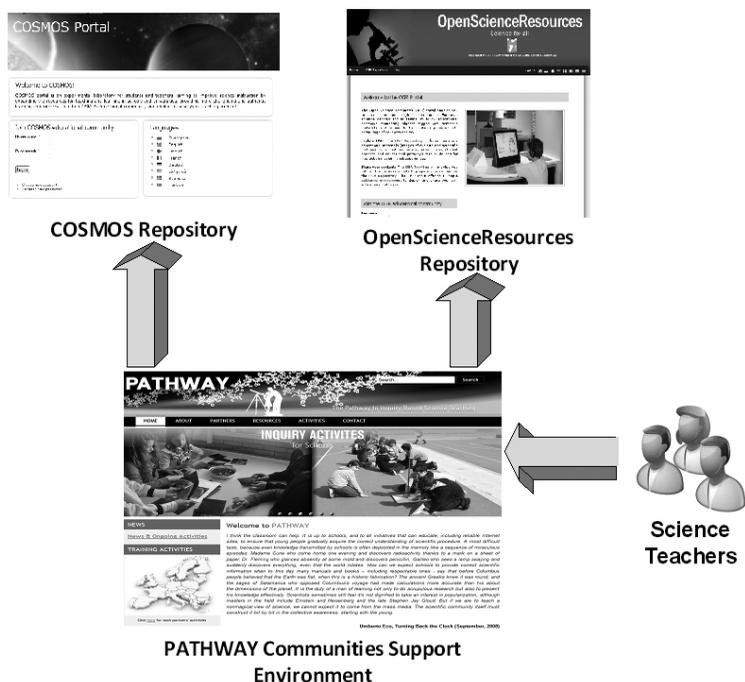


The Case of the PATHWAY Coordination and Support Action

The PATHWAY Project (www.pathway-project.eu) is an EU-funded co-ordination and support action focusing on the effective widespread use of inquiry- and problem-based science teaching practices in primary and secondary schools in Europe and beyond. In this way, the project aims to facilitate the development of communities of practitioners of inquiry that will enable science teachers to learn from each other.

Within this context, sharing, using and repurposing openly licensed science education LOs and best teaching practices in the form of LDs through Web-based repositories are key features for the success of the project. For this purpose, the PATHWAY Project is making use of the OpenScienceResources Repository and the COSMOS Repository for engaging European science teachers in the process of sharing, using and re-using science education LOs and LDs from these repositories. Figure 8.14 presents the overall approach of the PATHWAY Coordination and Support Action.

Figure 8.14: The Approach of the PATHWAY Coordination and Support Action.



As Figure 8.14 shows, science teachers across Europe are becoming members of the PATHWAY Communities Support Environment through a number of participatory engagement workshops that are organised in the framework of the PATHWAY Project. Afterwards, science teachers as members of the PATHWAY community are able to: (a) communicate by using a variety of communication and social networking tools that are integrated into the PATHWAY Communities Support Environment; and (b) share their science education LOs and their teaching practices in the form of LDs through the COSMOS Repository, which targets formal science education, and the OpenScienceResources Repository, which targets informal science education.

Conclusion

In the field of technology-enhanced science education, the process of providing open access to science education resources in the form of LOs and LDs is becoming an emerging trend. For this purpose, both LOs and LDs are organised, classified and stored in Web-based repositories (namely, LORs and LDRs) enabling their open access among science education communities. In this chapter, we discussed issues related with the current trends in Web infrastructures that can support open access to educational resources and practices. We then described two Web-based repositories that facilitate open access to both science education LOs and LDs, and co-ordination and support action that develops a community of science teachers that use these repositories.

At this stage, it is useful to summarise data collected from the use of the aforementioned initiatives:

- An online community of more than 3,000 science teachers from 20 European Countries has been created around the OpenScienceResources and COSMOS repositories.
- The members of this community have made more than 200,000 visits and downloaded more than 35,000 LOs and LDs from both repositories.
- More than 90 per cent of the total LOs and LDs included in these repositories have received comments, ratings and tags related to the actual use of these LOs and LDs by the teachers of the aforementioned community.

These data provided us indications that deployment of Web-based repositories that facilitate open access to both LOs and LDs, which also address specific subject domains (in our case Science Education), can make those repositories more attractive for use by teachers compared with broader LORs and LDRs, where teachers might face difficulties in the process of finding and using appropriate LOs and LDs for the subject domain of their interest.

Finally, the three initiatives presented in this chapter offer the infrastructure that will be integrated under a new European initiative referred to as “Open Discovery Space: A Socially Powered and Multilingual Open Learning Infrastructure to Boost the Adoption of eLearning Resources.” The Open Discovery Space (www.opendiscoveryspace.eu/) aims to include more than 1.5 million LOs and LDs by aggregating open licensed LOs and LDs from a federated network of 75 existing LORs and LDRs in Europe. The main outcome of the Open Discovery Space project will be a community-oriented social platform where teachers, students and parents from all around Europe will be able to search and retrieve LOs and LDs on their topics of interest. It is expected that at the end of the Open Discovery Space project, the Open Discovery Space portal will be the biggest federated network of existing LORs and LDRs in the world.

Acknowledgements

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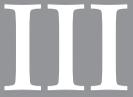
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PART



Diffusing OER

Introduction

The diffusion of learning content is essential for the development of a healthy, sustainable and cost-effective learning environment. Diffusion results in the mixing, mashing, re-using and/or repurposing of available educational content. Because of restrictions, both technological and legal, the diffusion of proprietary content becomes problematic and a serious impediment to the sharing of knowledge not only across institutions and international borders, but also internally within organisations. So, it can be argued that unrestricted OER are essential for the development of sustainable educational content ecosystems: only unrestricted OER can be diffused, supporting mixing, mashing, re-use and repurposing.

The first stage of attaining such a sustainable system — creating and deploying a critical mass of open content online — has already been reached. There are now millions of OER at all levels of education and training that can be accessed and used. Another necessary pre-condition for the diffusion of OER is one that OER proponents are now building: an international community for active, engaged users of OER: users who not only create content for others to use, but who also adapt available content and assemble courses using OER.

In Chapter 9, “Open Educational Resources: Access to Knowledge – A Personal Reflection,” D’Antoni, a leader in the OER community, writes a personal memoir. She provides us with background on the beginnings of the OER movement in supporting the development of the OER community, from the first meeting sponsored by UNESCO, which considers access to education to be a fundamental human right. It was at that first UNESCO meeting on open content that the participants coined the term “Open Educational Resources.” D’Antoni describes the creation of the first international online community of OER-interested people and the role played by philanthropic funders. She emphasises the need for inclusiveness in these activities as a way of ensuring that OER have value for

the various user communities. She identifies awareness, training and promotion as major issues for the successful diffusion of OER internationally. D'Antoni is currently leading an exploration of the feasibility of a collaborative mapping of OER initiatives worldwide. She concludes her chapter by describing some of the more significant initiatives.

Does it matter whether Internet content is open licensed or not? Based on his experience with the Open University UK's OpenLearn initiative, Lane notes in Chapter 10, "How OER Support Lifelong Learning," that learners in formal and informal learning contexts do not care about the licence as long as the content is available and accessible online. He points to the growth of both interest-driven and career-driven learners and the difference in how they approach the use of Internet resources. For the most part, especially in formal learning situations, these resources are used to supplement the course rather than as integral components. Lane sees the diffusion of quality materials as being guaranteed by the reputation of the institution that offers them. However, the need for direction and structuring with pedagogic elements is stressed, with emphasis on size and complexity issues and the differing needs of teachers and learners.

In Chapter 11, "An Open 'Materials' Repository and Global Search System: Preparing for Diverse Learners and a Variety of Learning Processes," Yamada looks at the technical issues around OER content diffusion. He stresses the need for developing, adapting and using formal technical specifications to support the diffusion of content over networks. He describes the international GLOBE consortium as a common platform, and discusses strategies for collecting digital content. He outlines the history of learning object development in Japan, describing the Open University of Japan's closed repository. Stressing the need for modularity in course design, Yamada then looks at the problems of diffusion using intelligent search engines. He supports the use of international, standards-based metadata for this purpose, proposing a metadata repository. In agreement with international partners in the GLOBE consortium, his system supports the harvesting of this metadata from a federation of metadata repositories now in existence in several countries. Examples include MERLOT in the U.S. and ARIADNE in Europe. The quality is assured by restricting submissions to educators and by allowing different evaluations of the same OER to be accepted.

Wikiwijs, the Dutch all-inclusive primary, secondary and tertiary OER initiative is the final chapter in the Diffusing OER theme. In Chapter 12, "Wikiwijs: Using OER as a Driver for Maturation," Schuwer echoes D'Antoni's (Chapter 9) emphasis on community, claiming that the "ownership" of the movement by the teachers is the critical factor in its success. In supporting openness, the Wikiwijs project, as a stimulus for change, will have a major impact on education in the country. The open design of "learning trajectories," the author contends, will change the core of education. The author even suggests that OER are a "necessary pre-condition" for professional education. The emphasis on metadata application profiles being "tedious but necessary" supports Yamada's (Chapter 11) concerns about the importance of metadata repositories and harvesting to overcome problems of granularity and scalability.

Open Educational Resources: Access to Knowledge – A Personal Reflection

*Susan D'Antoni,
Athabasca University*

“At the heart of the movement towards Open Educational Resources is the simple and powerful idea that the world’s knowledge is a public good and that technology in general and the Worldwide Web in particular provide an opportunity for everyone to share, use, and reuse it.” (Smith and Casserly 2006, p. 2)

Having followed and been engaged in the Open Educational Resources (OER) movement since 2002 when the term was coined, I feel it’s timely to look back over the decade and reflect. At the United Nations Education, Science and Culture Organization (UNESCO) until 2009, I saw Open Educational Resources in the context of their potential to contribute to the building of knowledge societies and focused on raising awareness through an international community of interest. Now associated with the UNESCO/COL Chair in OER created at Athabasca University in Canada, I have shifted my focus to promoting an international network through the UNESCO Chairs in OER and their respective networks of partners.

But this chapter is largely a personal reflection, drawing a red thread through my experience and bringing together thoughts from several of my speeches and writing. Behind the specific activities associated with one’s work lie the layers of interest and thinking that accumulate over a lifetime. We bring these to each new endeavour, which, in turn, builds upon and enriches them further. These reflections of mine lead towards opening access to education and knowledge and, specifically, Open Educational Resources. The thread links professional experience and favourite personal interests: the library (my first job) and information dissemination (projects at the Canadian Association for Adult Education, the Ontario Institute for Studies in Education), distance education and the potential of new technologies (Ryerson University in Toronto), educational planning (Association of Universities and Colleges of Canada, the International Institute for Educational Planning) and, always, learning and access to knowledge.

Introduction

“Indistinct, majestic, ever-present, the tacit architecture of that infinite Library [of Alexandria] continues to haunt our dreams of universal order. Nothing like it has ever been achieved, though other libraries (the Web included) have tried to copy its astonishing ambition.” (Manguel 2006, p. 24)

As a very small child, I was enchanted by books and loved being read to. The fat books I was given had few drawings and held their messages to themselves while I was too young to read. Those books were opened to me by my father as he read us both to sleep in my bedroom under the eaves at the top of my grandparents’ house in Toronto. My father — the reader — was the first key to opening those books, their stories and their knowledge.

As an older child, and by then a reader myself, I was allowed to cross the park in front of the house to wander freely through the children’s library that was housed in a lovely old grey stone building. Here, I began to sense there was an order that allowed one to find what one wanted by something other than size or colour, but it was not obvious yet.

Later, at school, the Dewey Decimal System and the card catalogue provided the key to unlock the library and its treasures. After I completed my university degree, that love of books and the knowledge they shared made me consider becoming a librarian, and I went to work as a librarian candidate in the public library of the small provincial city in which I had passed my university years in beautiful grey stone buildings. The library, too, I might note, was housed in a grey stone building. Assigned fortuitously to the children’s section, I found once again many of the books I had been read so many years ago. I did not become a librarian, but read to my own child each night until she herself became a reader and, in fact, created her personal library by ordering and cataloguing her own books.

Libraries have remained favourite places for me, as have bookstores. And so, when dawdling in a bookstore in the Toronto airport I happened upon a book entitled *The Library at Night*, I picked it up immediately to take home to Paris to my apartment in yet another beautiful grey stone building. Its author, Alberto Manguel, an Argentinean who lived in Toronto for some time, had subsequently moved to France where he created his own library in what I, myself, envision as a very old grey stone building. Musing about the origins of the library in the opening chapter of the book, “The Library as Myth,” he invites the reader to consider two buildings that he states stand for everything we are: the Tower of Babel and the Library of Alexandria:

“The first, erected to reach the unreachable heavens, rose from our desire to conquer space, a desire punished by the plurality of tongues that even today lays daily obstacles against our attempts at making ourselves known to one another. The second, built to assemble, from all over the world, what those tongues had tried to record, sprang from our hope to vanquish time, and ended in the legendary fire that consumed even the present.” (Manguel 2006, pp. 18–19)

It is the second concept, that of the universal library, that resonates with the objective of increasing access to knowledge inherent in the vision of the Open Educational Resources movement.

Education, Learning and Knowledge Societies

“Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.” (United Nations, 1948, Universal Declaration of Human Rights, Article 2)

One fundamental human right is education, and this right is enshrined in the Universal Declaration of Human Rights adopted by the General Assembly of the United Nations in 1948. Universal education remains a goal, but it also remains a challenge to the international community. Education for All (EFA) is an international initiative launched in Jomtien, Thailand, in 1990 to bring the benefits of education to “every citizen in every society.” A broad coalition of national governments, civil society groups, and development agencies such as UNESCO and the World Bank committed to achieving six specific education goals (World Bank [n.d.]):

- Expand and improve comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children.
- Ensure that by 2015 all children, particularly girls, those in difficult circumstances, and those belonging to ethnic minorities, have access to complete, free, and compulsory primary education of good quality.
- Ensure that the learning needs of all young people and adults are met through equitable access to appropriate learning and life-skills programmes.
- Achieve a 50% improvement in adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults.
- Eliminate gender disparities in primary and secondary education by 2005, and achieve gender equality in education by 2015, with a focus on ensuring girls’ full and equal access to and achievement in basic education of good quality.
- Improve all aspects of the quality of education and ensure the excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.”

Ten years later, the international community once again affirmed its commitment to EFA in Dakar, Senegal, aiming to meet the learning needs of all children, youth and adults by 2015. But the goal of Education for All remains elusive. According to UNESCO (2011a, p. 5), “The world is not on track to achieve the Education for All targets set for 2015.” The number of children out of school is falling too slowly, about 17 per cent of adults lack basic literacy skills, the quality of education is low in many countries and 1.9 million more teachers are needed.

And increasing participation in primary education results in increasing demand for secondary education:

- “Secondary education is becoming a growing concern and major challenge for education policy makers and researchers worldwide as it plays an increasingly important role in creating healthy and cohesive societies and spurs economic growth. It represents a critical stage of the system that not only links initial education to higher education, but also connects the school system to the labour market.” (UNESCO 2011b, p. 7)
- Education systems reflect the societies they serve. Each is unique and, therefore, diverse. The UNESCO World Report of 2005 put forward the concept of “knowledge societies,” noting that the plural form points to the need to recognise and accept that diversity.
- “The aims associated with the desire to build knowledge societies are ambitious. Providing basic education for all, promoting lifelong education for all, encouraging the spread of research and development efforts in all countries of the world ... – all these efforts towards the participation of all in knowledge-sharing and the establishment, even in the most disadvantaged countries, of a true knowledge potential, represent a considerable undertaking. Are such ambitions within reach?” (UNESCO 2005, p. 186)

If this was a challenging question in 2005, it is all the more so now with the ongoing effects of the recent financial crisis. Just at the moment, when more and more is expected of education systems, the means of reaching the goals of the Education for All initiative may be severely compromised.

In its education strategy for the next decade, *Learning for All: Investing in People’s Knowledge and Skills to Promote Development*, the World Bank has shifted the focus from education to learning (2011, p. 1):

“The overarching goal is not just schooling, but learning. Getting millions more children into school has been a great achievement. The World Bank Group is committed to building on this progress and stepping up its support to help all countries achieve Education for All (EFA) and the education Millennium Development Goals (MDGs). The driver of development will, however, ultimately be what individuals *learn*, both in and out of school, from preschool through the labour market.”

Opening Education – Enabling Learning

Open and Distance Learning

“I was persuaded that the standard of teaching in conventional universities was pretty deplorable. It suddenly struck me that if you could use the media and devise course materials that would work for students all by themselves, then inevitably you were bound to affect — for good — the standard of teaching in conventional universities.” (Perry 1988)

Open and distance learning has played a significant role in the trend to opening education to more learners, freeing them from the constraints of time and place and the need to assemble in grey stone buildings or their like. The Open University UK was founded as an institution that would be open — open to

people, places, methods and ideas. It represented an innovative means to increase access to higher education. Sir Walter Perry, the first Vice Chancellor, made the prescient comment above when stating why he was initially interested in the new university.

Brenda Gourley, the past Vice Chancellor, articulated three imperatives for finding innovative ways to expand access to quality educational opportunities (Gourley 2004, p. 4):

- a demographic imperative – meeting the increasing need for lifelong learning cannot be met by traditional approaches;
- a financial imperative – the cost of building infrastructure is simply not feasible; and
- an educational imperative – to develop a model for this century.

Not only do open universities and other distance education institutions serve to increase access, but their methods, expertise and experience have much to contribute to the planning and provision of education for all in the 21st century.

Technology

Various technologies have served and continue to serve both conventional and distance learning institutions, as well as their students, to make education more flexible, more accessible and more open. But perhaps no technological innovation has had the potential impact of the Internet and the Web. I have often made reference to John Seely Brown, who, when writing about learning in a digital age, suggested electricity as an apt analogy for the impact of the Internet and the Web (Brown 2000, pp. 1–2):

“In 1831 Michael Faraday built a small generator that produced electricity, but a generation passed before an industrial version was built, and then another 25 years before all the necessary accoutrements for electrification came into place — power companies, neighborhood wiring, appliances (like light bulbs) that required electricity, and so on. But when that infrastructure finally took hold, everything changed — homes, work places, transportation, entertainment, architecture, what we ate, even when we went to bed. Worldwide, electricity became a transformative medium for social practices.

“In quite the same way the World Wide Web will be a transformative medium, as important as electricity.”

Working in distance education in the '70s and early '80s, I felt that the focus was on each new technology and not on the applications and the appropriateness of the technology to them. Now there is a growing body of open content needing a means of being distributed and used. Furthermore, there appears to be a convergence of the increasing connectivity worldwide through the Internet and the growing pervasiveness of low-cost devices such as mobile phones and laptop computers, coupled with the increasing availability of openly licensed educational content. The Internet and the Web have facilitated access to a wealth of material in a way that may transform education and learning. When material is free of copyright, it may be readily used by educators and learners — adopted or adapted — potentially spurring creativity and innovation.

Sir John Daniel (2009) has described an “iron triangle” of access, cost and quality, which has hindered the expansion of education in a classroom setting throughout history. As access or quality is improved, costs rise as well. But, he contends, technology can transform that iron triangle into a flexible one through the principles identified by Adam Smith: division of labour, specialisation, economies of scale and the use of machines and communication media. This describes the organisation and achievement of open and distance education.

Open Educational Resources

“Open Educational Resources (OER) are high quality, openly licensed, online educational materials that offer an extraordinary opportunity for people everywhere to share, use and reuse knowledge.” (William and Flora Hewlett Foundation [n.d.], p. 1)

A Vision

For many years, the William and Flora Hewlett Foundation has acted as champion of the OER movement, nurturing and promoting it. The vision for this important role was articulated in the 2002 strategic plan that included a new component, “Using Information Technology to Increase Access to High-Quality Educational Content.” The rationale for this component resonates with the vision of the open university movement to increase access to learning, and with the comment of Sir Walter Perry cited earlier about the potential to raise the standards of teaching (William and Flora Hewlett Foundation 2002, p. 6):

“The focus of this component is on creating exemplars of academic content that are free and accessible to all on the web.... [T]hese exemplars ... will help raise the level of quality of academic content by setting a standard of practice.... One criterion [is that] ... it must set quality benchmarks and potentially establish new models for organising and delivering content.”

It was not just course materials that were to be made available, but also modules, learning objects, library materials and journal-related data. Together these materials were described as “a new public library.”

In 2002, I attended a meeting at UNESCO of a group of academics, largely from developing countries, who had been convened with support from the William and Flora Hewlett Foundation to consider a new initiative of the Massachusetts Institute of Technology (MIT). OpenCourseWare (OCW) aimed at making all MIT course materials available on the Web. The academics listened to the presentations and found both the concept and the specific initiative to have great potential for education. They coined the term, “Open Educational Resources”, with the initial definition cited above, and expressed “their wish to develop together a universal educational resource available for the whole of humanity” (UNESCO 2002, p. 1).

A Landscape of Initiatives

After more than a decade of development, a global landscape of institutional OER initiatives with varying objectives and approaches is emerging — a testimony

to the innovation spurred by the concept, along with the growing access to technology and tools and with the increasing comfort with both.

After considering a range of options for digital learning, MIT launched its **OpenCourseWare** (OCW) initiative with the publication of 50 courses in 2002. By 2010, 2,000 courses had been published. MIT's goal for the next decade is to multiply its reach by ten and reach a billion minds. "We aspire by 2021 to make open educational resources like MIT OpenCourseWare the tools to bridge the global gap between human potential and opportunity, so that motivated people everywhere can improve their lives and change the world"(OCW [n.d.], p. 1).

This model for a traditional university to disseminate knowledge and share scholarship inspired other institutions to adopt the approach and several hundred higher education institutions have come together in the **OpenCourseWare Consortium** (OCWC). OCWC is committed to advancing OpenCourseWare by acting "as a resource for starting and sustaining OCW projects, as a coordinating body for the movement on a global scale, and as a forum for exchange of ideas and future planning" (OCW Consortium [n.d.]). Building on OCW, in late 2011, MIT announced MITx, an online learning initiative with the objective of improving education at MIT and internationally. It will make online MIT courses available to learners around the world and will offer them the possibility of a certificate of completion. The open source platform will be offered to educational institutions everywhere with the "hope that teachers and students the world over will together create learning opportunities that break barriers to education everywhere" (MIT 2011, p. 1).

The **Connexions** project at Rice University was started to address some of the problems associated with publishing educational materials. The goal was to make high-quality, open source educational content widely available (Henry 2004). Connexions functions as "an open source platform and open access repository for open education resources, enabling the creation, sharing, modification, and vetting of open educational material accessible to anyone, anywhere, anytime via the World Wide Web" (<http://cnxconsortium.org/>). The Connexions Consortium links a number of institutions that have come together to advance both open source educational technology and open educational content.

Carnegie Mellon University launched the **Open Learning Initiative** (OLI) to develop "exemplars of high quality, online courses that support individual learners in achieving the same goals as students enrolled in similar courses at Carnegie Mellon" (Thille 2009). Using a concept similar to that of the course team that was originated by the Open University UK, OLI courses benefit from the close collaboration of cognitive scientists, experts in human-computer interaction and experienced faculty members. Significantly, courses have assessment embedded into the instructional activity, and the technology that delivers the instruction also collects data to give feedback to students, instructors, course designers and learning science researchers. The courses have been made available to independent learners at no cost and at low cost to students using the materials in accredited courses.

OpenLearn was established by the Open University with the vision of providing free online education, open to anyone, anywhere in the world. A website was launched in 2006, and in the first two years, 8,000 study hours of learning

material were added (Open University 2009a, p. 1). In 2010 OpenLearn was merged with open2.net that supports BBC broadcasts, and now material is available on YouTube and iTunesU as well. The OpenLearn website currently offers differing levels of engagement to potential users. They are invited to: *Explore* topics or subjects that interest them; *Try* course materials in *LearningSpace* (more than 500 units from 12 subject areas) that are freely and openly available; or *Study* as an enrolled student for accreditation. In keeping with its tradition of conducting and disseminating research on open learning, the Open University is a partner with Carnegie Mellon University in the OLnet project, “an international hub that aims to gather evidence and methods about how we can research and understand ways to learn in a more open world, particularly linked to OER” (www.olnet.org/).

The African Virtual University was launched as a project of the World Bank in 1997. In 2003, it became a pan-African intergovernmental organization with the aim of increasing access to quality higher education through the innovative use of information and communication technologies (ICTs). The African Virtual University has created a network of distance and eLearning institutions in over 30 anglophone, francophone and lusophone countries in Sub-Saharan Africa. Its Open Educational Resources portal, **OER@AVU**, has the objectives of facilitating increased participation in the creation, organisation, dissemination and utilisation of OERs; addressing issues pertaining to relevance of OERs to the African context; reducing technological challenges; and enabling institutions to participate actively, by driving and owning the process in terms of form, content, structure and orientation (<http://oer.avu.org/>). This repository was created in early 2010 to act as a platform for the 73 modules that had been developed as OER with the involvement of 12 universities. This significant initiative is a model for multilingual regional collaboration and networking.

Recognising the importance of offering academic credit to those learning with open resources, an international group of institutions has begun to collaborate in the OER university, **OERu**, initiative. The objective is to provide free learning opportunities with OER and pathways to qualifications from recognised education institutions. The initiative is couched in the community service and outreach mission of the university to provide a “parallel learning universe” (WikiEducator 2011, p. 1), an alternative path for learners to the traditional system. An inaugural meeting was held in early 2011 with ten founding partners. That number had grown to 20 partners as of August 2012, together who are now developing prototype courses.

Operating as a grassroots open education project, **Peer 2 Peer University (P2PU)** “organizes learning outside of institutional walls and gives learners recognition for their achievements” (<http://p2pu.org>). It was founded in 2009 by five people who saw the need for a peer component in open education and is committed to openness, community and peer learning: “Open sharing and collaboration enable participation, innovation, and accountability.” The P2PU community is open to any participants and their content can be accessed and used by anyone. The P2PU model, processes and technology are also open and accountable. Although some seed money has been made available by the Hewlett and Shuttlesworth Foundations, P2PU is community-centred and run largely by volunteers who organise the courses. Together the Internet and open educational materials make

high-quality, low-cost education opportunities possible. P2PU aims to create a model for lifelong learning alongside traditional formal higher education, similar in intent to the “parallel learning universe” of OERu.

Impact

The initiatives outlined above indicate the diversity of OER initiatives. Just as Sir Walter Perry felt that open and distance learning could have a positive impact on conventional institutions, these OER initiatives have a broad potential impact that will contribute to making knowledge more accessible and benefit both educators and learners. The Carnegie Mellon initiative stated explicitly its aim to create “exemplars” of high quality. But what is striking in even a limited overview of mainly institutional OER initiatives is their creativity and innovation in expanding access to new learning opportunities — and, in doing so, addressing some of the pressing efforts of nations to meet the lifelong learning needs of their populations through both formal and non-formal means. And although the OER movement began at the higher education level, there are now OER-related initiatives at other levels, including international work at the OECD (Organisation for Economic Co-operation and Development) and UNESCO (with the 2012 Paris OER Declaration), plus national and state government policies related to OER.

Promoting OER, Community Building and Networking

Although intended to promote a sharing of the world’s knowledge, much of the OER development at the beginning of the movement was in the North, particularly in the United States. For this reason, creating a space for interested individuals from developing and developed countries to come together to “talk” around a virtual table was an important step to raise awareness of this new initiative and some of the related issues and concerns.

From 2005 to 2009, I had the extremely rewarding experience of convening and supporting an international online community on OER. Launched at the International Institute for Educational Planning (IIEP) of UNESCO with support from the William and Flora Hewlett Foundation, the community assembled almost 500 people initially and grew steadily over the succeeding years. Community members represented a wide range of organisations, but over half came from universities and distance teaching institutions. About 40 per cent held senior management positions. Teachers represented about 20 per cent, and researchers and project officers each represented more than 10 per cent (D’Antoni and Savage 2009, p. 162).

This large international community remained very active for almost four years. The organisation of the interaction, and the software support chosen to support the community, took into consideration especially those with difficult or expensive connectivity. A series of short structured seminar-like discussions on specific topics kept the community discussion moving forward, but allowed a period of quiet after each session. Documentation was shared systematically: succinct background documents informed interaction facilitated by expert discussants, and summary reports captured the main points as a record for others (all accessible on the International Institute for Educational Planning [IIEP] website: <http://oerwiki.iiep-unesco.org/>).

The community assembled many OER leaders as well as those who wanted to learn about OER, and interaction was often intense. The strong engagement of the community made it an ideal group to reflect on what should be the priorities for advancing the OER movement. Those priorities identified were (D’Antoni and Savage 2009, p. 163):

To advance the OER movement

- Awareness raising
- Communities and networking

To enable creation and use

- Developing capacity
- Quality assurance

To remove barriers

- Sustainability
- Copyright and licensing

Until the end of the activity in late 2009, the interaction in the community was unflagging, and was recognised by an award — the 2008 Leadership Award of the MERLOT African Network.

It is clear that a movement that aims at worldwide impact, such as the OER movement, can be strengthened through such international awareness raising, dialogue, networking and collaboration. UNESCO now supports information exchange on OER through one of its WSIS Knowledge Communities (WISIS [n.d.]). And two UNESCO Chairs were awarded in 2010: a UNESCO/COL Chair in OER to Athabasca University in Canada and a UNESCO Chair in OER to the Open Universiteit of the Netherlands. UNESCO Chairs act as think-tank facilitators and bridge builders, and function with a network of partners. To build on the early work of the IIEP OER Community and contribute to building an international OER Network, the current plan of action for the two Chairs focuses on four main lines of action: a global OER graduate school; an OER Knowledge Cloud and publication; an exploration of the feasibility of a collaborative mapping of OER initiatives worldwide; and the geographic extension of the network of Chairs to achieve a global balance.

Sharing Knowledge

“To remain human and liveable, knowledge societies will have to be societies of shared knowledge.” (UNESCO 2005, p. 5)

The knowledge sharing that is the goal of the Open Educational Resources movement needs to be global if the vision stated at the beginning of the chapter is to be realised — that the world’s knowledge is a public good to be shared. At the inception of the movement, much of the development was in English and in the Northern Hemisphere, but cultural hegemony has no part in that vision. The concept of the library may still serve to make the vision clear. According to one’s needs and interests, one selects or ignores what is on the shelves, be they physical or virtual as in the case of the Web and OER. What is most important is that the world’s knowledge be represented on those shelves: that all nations, cultures and

linguistic groups contribute. And with such global engagement, the Web offers the possibility once again of the dream of a universal library.

Knowledge societies must strive to be inclusive if they are to further the well-being of all their citizens. The Constitution of UNESCO proposes full and equal opportunities for education for all, the unrestricted pursuit of objective truth and the free exchange of ideas and knowledge. This is what we must all strive for. The frustration and fury of the excluded — like the woman denied access to a university library — is palpable in the words below, and speaks for all those who seek access to knowledge and seek to learn, whether in formal or informal situations.

“Venerable and calm, with all its treasures safe locked within its breast, it [the library] sleeps complacently and will, so far as I am concerned, so sleep for ever. Never will I wake those echoes, never will I ask for that hospitality again, I vowed as I descended the steps in anger.” (Woolf 1993, p. 7)

The challenges of making education available to all and building knowledge societies links back to the reflection at the beginning of this chapter on the concept of the universal library.

But as Manguel (2006) reminds us, the Library of Alexandria was set up to do more than merely immortalise. It was to record everything that had been and could be recorded, and these records were to be digested into further records, an endless trail of readings and glosses that would in turn engender new glosses and new readings.

This surely describes Open Educational Resources — resources that are to be shared, built upon, reshaped, repurposed — and then returned to the commons to be available for the same exercise to take place over again.

Conclusion

The red thread of my experience has lead through increasingly interesting endeavours and career opportunities in a diverse range of institutions, with many wonderful individuals. What I retain from this is a sense of optimism and continuing renewal as we seek to improve — and that knowledge is at the base of this improvement. Of the issues on which I have worked, Open Educational Resources proved to be the most stimulating and engaging. Perhaps this is so because so many threads of personal and professional experience came together, but more because of the inherent pleasure one has when working on something that aims to contribute to the common good.

David Johnston, Governor General of Canada (and Chair of the Board of Directors of the Association of Universities and Colleges of Canada at the time I came to work there), has written about “the diplomacy of knowledge,” defining the concept as our ability and willingness to work together and share our learning across disciplines and borders. “Aristotle once said, ‘All men by nature design to know.’ Today we can perhaps recast this statement for the 21st century, envisioning a world in which all nations are eager to know and share their learning” (Johnston 2012, p. A15).

Open Educational Resources will contribute to this vision.

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How OER Support Lifelong Learning

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Introduction

The Open Educational Resources (OER) movement is a little over ten years old if we take the launch of Connexions (<http://cnx.org>) from Rice University in 1999 and the launch of MIT (Massachusetts Institute of Technology) OpenCourseWare (MIT-OCW) (<http://ocw.mit.edu>) in 2001 as the earliest seminal moments in its history.

Today the OER movement is still dominated by higher education institutions (HEIs) publishing their own resources, as witnessed by membership of the OpenCourseWare Consortium (www.ocwconsortium.org) and the development of the OER university (http://wikieducator.org/OER_university/Home).

Much of the discussion and debate about the potential value of OER has centred on the benefits of OER to those HEIs, to higher education teachers and to higher education students (McAndrew et al. 2009; Lane 2011; Masterton and Wild 2011). Such dominance has been reinforced by the more recent emergence of proprietary channels for the publishing of openly accessible, if not always openly licensed, online content from HEIs, namely iTunesU and YouTubeEDU.

There is little doubt that the publication of open educational content as OER by HEIs is generally seen as one way of providing a glimpse of the education to be had at that institution. (I use the term “content” to distinguish what I mean by OER in this chapter as the term also includes software tools.) Such content provides a showcase for teachers and students alike, and enables both to variously use such resources to supplement their teaching and their studies respectively (Lane 2010; [in press]). For instance, MIT-OCW has found through surveys (MIT-OCW 2006) and unsolicited feedback that there are large numbers of HEI teachers from around the world who use their OER, and even larger numbers of HEI students and self-learners using them as well (<http://ocw.mit.edu/about/ocw-stories/#self->

learners). On top of this, many recent alumni from HEIs are also using such OER as refreshers or top-ups for their previous studies.

The interest by alumni immediately indicates that higher education OER are not just useful for studying by people while registered at an HEI for an undergraduate or postgraduate qualification, but also for study by people throughout their working lives. However, while prospective, registered and past higher education students will inevitably be interested in higher education OER, the very openness of OER means that they can be used by more than just this already highly educated group in society: they can also be used for more interest-driven informal learning or career-driven non-formal learning at a time and place when it is needed or wanted.

The value of OER to lifelong learning is possibly less clear than it might be assumed to be for formal higher education study, but there is growing evidence of what it might be. A significant issue is that it is not easy to know who exactly is looking at something online and for what reason and what they might do with that information offline, which probably explains the dearth of papers and studies in learners' use of online — let alone openly licensed — educational resources, as noted by Bacsich et al. (2011).

Lifelong Learning

There is no commonly agreed definition of lifelong learning (see, for example, http://en.wikipedia.org/wiki/Lifelong_learning). However, the main sentiment is that it represents the learning that occurs continuously throughout life whether that be in mainly cohort-based, formally accredited education at primary, secondary and tertiary levels; through group-based, non-formal, non-accredited training, development and mentoring within the workplace or adult education classes; or through the informal learning that people do by themselves.

This certainly includes HEIs as noted in, for example, the European Universities' Charter on Lifelong Learning (EUA 2008) which asks universities to commit to, amongst other things, embedding concepts of widening access and lifelong learning in their institutional strategies, providing education and learning to a diversified student population and adapting study programmes to ensure that they are designed to widen participation and attract returning adult learners. The Charter also asks governments to commit to recognising the university contribution to lifelong learning as a major benefit to both individuals and society and promoting social equity and an inclusive learning society.

However, because lifelong learning is an all-encompassing term and can involve more than just HEIs, it is better to focus not on the definitions per se but on the perspectives of those learners.

The Lifelong Needs of Learners

Learning is not an amorphous undifferentiated activity. Learning can be for many purposes and with different intensities. One way to look at learning is to note that it can be about:

- Learning to know – to be able to recall information and knowledge about something and to understand how it is organised and connected — in other words, largely a cognitive dimension.

- Learning to do – to develop and master a practical skill or talent through regular and repeated practice. This favours a kinesthetic dimension to learning.
- Learning to be – to be able to deploy a defined set of cognitive and kinesthetic practices and, particularly, to perform in a given work role or as a professional. (Of course this can also refer to learning to “be yourself” in general, not just a particular role you may play in society, but here I am focusing on the latter.) This is a behavioural outcome.

Any individual person only spends a minority of his or her life in formal education, so it is inevitable that more learning can potentially take place in non-formal and informal ways throughout the rest of their lives. The consequence of that is that individuals have, in principle, more time to organise their own learning rather than have it organised for them. The obverse is that so much choice of resources can make it difficult for learners to understand what may be useful and how to get the most from them. In this case, OER can add to the already rich and diverse landscape of self-organised possibilities, as well as offer opportunities for the organisers of non-formal learning activities.

What Can OER Offer Lifelong Learners?

One way to answer this question is to examine what the provision of closed educational resources offers lifelong learners first, before looking at what different types of openness in educational resources offer lifelong learners. For higher education resources, only those written by academics and published by academic publishers are widely available to lifelong learners. There are public engagement events such as public lectures, which those living near an HEI can access, but often the exposure to the resources is ephemeral and only possible at the event itself. So, often closed educational resources have come at a price (“buy the textbook”) unless a free-to-borrow copy is available from a library or friend.

Also, while some of these closed resources are written as a textbook for higher education students to use, it does not mean that the resource has been designed and structured to be a self-learning resource with pedagogic elements (such as in-text questions and activities; large numbers of illustrations; use of boxes to explain difficult concepts) or with guidance on how it is to be studied by a novice independent learner. (In an HEI the teachers provide direction and scaffolding on how such textbooks are to be studied.) Furthermore, these analogue resources are often substantive in size (textbooks of hundreds of pages) and not easy to access in smaller chunks (individual chapters).

As broadcasting technologies have become widespread, educational programmes have been produced for radio and television, often involving teaching staff from HEIs as advisers or presenters. Initially these were ephemeral broadcast to air events, like public lectures, but for much greater audiences than those public lectures. Gradually there has been greater sophistication in the formats of those programmes and in the ability for people to record and use such programmes many times over if they so wished. Such technologies also became part of the educational offering from distance teaching universities such as the Open University UK (Lane and Law 2011). While the granularity of these programmes is much smaller than that of published textbooks, the programmes

can be very popular, with users numbered in millions. However, the density of information and capacity for moving beyond learning to know is still limited by this broadcast medium. So, they are mostly used as a supplement to other educational resources within formal courses rather than being the main mode of instruction.

The emergence and widespread adoption in recent years of information and communication technologies (ICTs) — devices such as computers and infrastructure such as the Internet — has meant that more academic research papers and other educational resources have become more available, accessible, affordable and acceptable to lifelong learners (Lane [in press]). Open access publications in open access journals; online digital collections from museums, libraries and archives; the informational or educational products of many organisations and other projects; social media sites and personal blogs — all of these have greatly increased the number of websites that contain potentially relevant material for learning. Most of these resources are openly accessible, but are still fully copyrighted (and can therefore not legitimately be copied or downloaded), while more and more are also openly licensed (which variously can allow for repurposing as well as copying and downloading).

The question then becomes: does it matter to a lifelong learner if an educational resource is openly licensed rather than just openly accessible? In practical terms, there is often little difference. To study a resource, a learner may want to be able to both access it online and download it for later use. Some may want to share it with others or copy it, but very few will want to modify it in some way. In principle, fully copyrighted material can only be accessed online and should not be downloaded, copied or shared unless there are statements on the host website saying that is permissible. In practice, whether fully accessible or requiring onsite registration first, any online resource can be and will be downloaded or copied for that person's use if that is what he or she prefers to do. Copyright holders do not tend to go after individual transgressors of copyright, but they do sue sites or individuals who indulge in the mass downloading or sharing of such content with many other users. Custom and practice for most people on the Internet is to copy or download. While sometimes illegal, it is an understandable response and I liken it to a bookshop putting its books outside on the street unattended and the owner then complaining about passers-by standing around and reading them.

Before looking more specifically at examples of how OER are being used for lifelong learning, let us return to the issue of size and complexity of OER and what HEIs should be providing in terms of lifelong learning. Weller (2010) has coined the terms “big OER” and “little OER.” While this is more concerned with how the size and complexity of an OER influences its re-use by other teachers, that size and complexity will also influence how learners use it. Many learners prefer or require a structured learning experience put together by a teacher of some kind. A single image, which is of value to the teacher, may not be to the learner until it is mixed in with other material. So, self-organised study will benefit greatly if the OER has a pedagogic structure built in to help guide the learning. In more organised non-formal settings, study will benefit from the guidance of the teacher or trainer and from the interactions of other learners in the group. However, for HEIs, most pedagogical models rely on providing a

collection of resources, which the teacher has selected and which the teacher then provides some guidance on use.

When this model is translated into OER, as in the OpenCourseWare model pioneered by MIT, then it has been found to be suitable for confident learners already used to higher education study, but less so for other people with lower levels of educational attainment. This is in contrast to the self-study materials from the Open University, which are designed for independent use but cost much more to develop. MIT has begun producing open courses in a more open and distance learning form, but the costs are high and the courses may not fully reflect the educational resources that actual students use.

Interestingly, the biggest growth area in quantity and use of OER has been in video lectures or podcasting by academics, mimicking the traditional mode of teaching in HEIs. However, these OER suffer from the same issue noted above of not being a medium for delivering the most effective learning experiences on their own (Lane and Law 2011). Paradoxically, the conclusion seems to be that the relevance of OER for lifelong learning depends on the aim of the developer: the more structured the material, the more useful for the lifelong learner, but the less useful for re-use by teachers or other developers.

OER for Personal Interest Learning

The most obvious use of OER by lifelong learners is for their own personal interest, which may or may not lead on to more formal study of some kind. The Open University has had numerous responses and feedback to its own OER site OpenLearn (www.open.ac.uk/openlearn), including the following.

“I’ve been in the I.T./Electronics industry for nearly 20 years, but although I have certain formal qualifications, I’ve never had time to do my degree.... [U]sing OpenLearn takes me one step closer to that goal by allowing me to “dip my toe in the water” where studying is concerned.”

“I have now retired and I am thinking about enrolling on a course. I obtained my post-graduate degrees 30 years ago and I find the OpenLearn courses useful for two reasons. The first is to see if I can regain the skills and discipline needed for formal study. The second is that it is helping to identify the areas of study I wish to pursue.”

“I have used OpenLearn to aid me in both my work and for my studies, each time finding the units very useful.”

In fact the way many people like to mix informal and formal studies in a complex profile of activities was one of the significant findings reported by McAndrew et al. (2009) about OpenLearn. Thus, prospective students “try before they buy,” looking at study units on OpenLearn before signing up for the parent Open University module or for a module at another HEI. Actual students (not just from the Open University) often dip into study units that enrich their formal studies or for modules they would like to have studied but cannot fit into their degree pathway. Many others are happy just working through what interests them on OpenLearn with no intention of signing up for a formal course or programme.

OER for Personal or Professional Development

Another significant change is the greater recognition of non-formal and informal learning achieved through OER that can replace or supplement the formal learning offered by existing HEIs. This is where individuals may operate a personalised portfolio approach to their post-secondary education, picking up formal bits of education from different providers and mixing it with non-formal learning experiences and expecting recognition of their achievements to come from trustworthy professional organisations (e.g., universities, professional associations and/or peer review by a trustworthy community of people working/active in the same field as they are). In other words, open education opens up not only who produces the “content” and the “context” in which the content is learned, but also who validates that learning so that it has currency in the labour and/or interest markets. This is beginning to be seen in recent developments in free courses (through, for instance, the Peer 2 Peer University [<http://p2pu.org/en/>]) and through novel recognition schemes such as Mozilla open badges (<http://openbadges.org/>).

McAndrew et al. (2009) also reported on how a proportion of OpenLearn users were interested in ways to gain credit for their informal learning, and on how groups could use it for professional development as noted in Case 1 below.

Case 1: Aidan Hobson, New Zealand Cricket Players Association

“100 players each year participate in a leadership program focusing on skills that are linked to high performance sport such as communication, self-management/reflection, motivation and teamwork. One of the major challenges in designing the program is finding learning materials that are not too high brow but have a good level of QA, relevancy, structure, and fit our budget. Of the hundreds of websites I’ve looked at, OpenLearn was the only one that provided a good range of topics that would allow players to take up study in areas of personal interest or skills development. While there is a lot of free information on the web, it is lightweight. We also have a business mentoring program for players to learn about different career pathways and the workplace generally, supporting them for careers after sport. Given the diversity of players’ interests and learning styles and the fact most players are away from home seven months of the year on tour or in the UK playing in the off-season, we have explored other, more informal ways for them to build their knowledge. So OpenLearn fits a number of needs of informal, self-directed learning. It is structured and quality assured but very flexible. Because of their time commitments, the players cannot attend classes or keep up to date with the assessment requirements of formal online learning programs. Many of the players don’t have any positive academic learning experiences, so it is great for them to access knowledge without someone looking at their grades, without the pressure of them doing assignments.”

OER for Enriching More Formal Adult Learning

It is not only professional groups that may organise their own learning. Most learning opportunities for later life learners are local, face-to-face and geared to interests rather than employment needs. It is believed that OER can provide more permanent learning events and enable distributed learning communities to happen, but it is also thought that access to ICTs, the accessibility of the OER and unfamiliarity with such technologies are major barriers for later-life learners, among others (Lane 2008). Case 2 below describes how one such group can benefit from OER available on OpenLearn.

Case 2: The University of the Third Age, United Kingdom

“The University of the Third Age (U3A) is a worldwide movement encouraging older people in the third age of life (i.e., those no longer in full-time gainful employment) to take up or continue educational interests in friendly and informal local settings. The collaboration started as a result of joint interest in exploiting OpenLearn for U3A members and as a result of signing a memorandum of understanding with the Open University. The main goal of the collaboration has been to assist U3A to adopt OpenLearn units and social computing tools such as Learning Clubs for the benefit of all their members but especially those already taking online courses. The challenge is that they are a voluntary group and it takes time for the senior members to identify and progress their involvement with OpenLearn. It can take a long time to develop an active relationship with collaborators, especially where new technology is involved.”

Furthermore, the capabilities of Web 2.0 technologies mean that this lifelong learning can also be truly international or global in scope and not just locally organised, with the content and services coming from different countries as well as the peer group an individual may be studying with. This has been seen recently with the development of the idea and practice of open courses. In some cases, an open course is developed in the open by some teachers but with the input of students. In this way, students can learn by co-creating the course and the educational resources are open for all to see. In other cases, a course may include OER as the educational resources, but the course is delivered in the open with a mix of formal, registered students studying for credit and informal course-followers studying for interest. These Massive Open Online Courses (MOOCs), such as the course on Connectivism and Connective Knowledge from Athabasca University (Fini 2009), blur yet further the assumed roles of teachers and students and the context in which studying takes place, opening up HEIs in new ways. Openness does not just exist in formally accredited HEIs, though, and there are some emerging community-based operations on the Web such as the Peer 2 Peer University (Thierstein et al. 2009). However, there are still many issues around whether many people may be excluded from any such opportunities (Lane 2008).

OER for Workforce Training

So, if communities can organise their own learning, what kind of community is needed in order to build, leverage and take advantage of OER and for what purposes?

I have already touched on this earlier, but communities basically need to be self-organising and -sustaining without continued third-party involvement à la Wikipedia, eBay and Flickr. That does not mean there is not some type of organising body, but it is one that manages the environment in which the many communities can collaborate. Communities for open education could be of individuals, institutions and voluntary groups. A successful community will most likely be a community of interest around a topic, discipline or issue, but some may be construed as communities of practice where it involves professional or semi-professional practitioners, such as that shown in Case 3. Some professional or semi-professional input is often needed to get open education started, but it should be the communities of interest that dominate in the long term. However, in all cases a large enough community of users is needed.

Case 3: Meriel Lee, Assistant Director, Open University in the South West of England

“The South West Higher Level Skills Pathfinder Project has funded a project focusing on development of a learning organization within Plymouth City Council’s Children’s Services. The project aims to form a model for adoption by other Councils. To date, OpenLearn has been used to generate interest in higher education and foster development of e-learning skills. Four OpenLearn workshops have now taken place and been evaluated. It has become apparent that for some employees, use of IT presents a real challenge, as does regular access to a computer for learning. However, the workshops have raised confidence and motivation for e-learning and some employees are now accessing OpenLearn units for self-development. Some staff indicated that they have no current interest in engaging with more formalised courses, but find OpenLearn very useful for learning. Foster carers, who work from home, find the units useful because they can study from home at a time that suits them. Relevant OpenLearn units have been identified as the first step of qualifications escalators (currently for Children’s Services, Youth Services and Management, with potential for Foster Care and other social care workers). Nine students have progressed from the OpenLearn workshops to registration on four of the OU’s Openings Program courses, with a further cohort being identified for the June Openings start.”

How Will Lifelong Learners Know About the Quality and Reliability of the OER They Use?

I have already noted the difficulties of self-organising informal or non-formal study and how key organisers are often needed. The same is true for the selection of appropriate resources to learn from. Currently, the quality of any particular OER is most often defined by the provider, and institutions like MIT and the Open University are the guarantors through their normal quality assurance processes. In other cases, it is for users to judge the academic or educational quality for themselves and whether it fits their need. While this may be difficult for a lay individual to do, the judgements of specialist people (as in Case 4 below) or the views of large numbers of people using rating

schemes like that on the Amazon website for books could provide such a service for target groups.

Case 4: Tony Coughlan, Resources for Charity Trustees

“I began this Open University led project by working on resources for charity trustees, a priority of the sector skills body Skills-Third Sector (www.skills-thirdsector.org.uk). Ten OpenLearn study units were adapted leaders and managers of small charities, voluntary and community organizations, mapped against Elements of the National Occupational Standards (NOS) and released through a small dedicated area on OpenLearn’s LabSpace at <http://labspace.open.ac.uk/mod/resource/view.php?id=449912&direct=1>. As OpenLearn’s LabSpace is not really designed for non-academics, a small dedicated CharityWise website was also created to act as a landing page for trustees, and the adapted study units can also be accessed from there: www.open.ac.uk/blogs/CharityWise. The CharityWise website includes video case studies about trustees of three small and medium sized voluntary organizations in the South West of England who each describe the approaches they are taking to improving their organization’s effectiveness.

“The ten adapted OpenLearn study units are those thought to be most likely to be of interest to the target audience, but they cannot hope to address the wide training needs of trustees, so the project team have assessed all of the 600+ study units in OpenLearn for their relevance to the voluntary sector. We then tagged 63 study units that might be useful to trustees with a Trustee_Development tag (<http://openlearn.open.ac.uk/tag/index.php?id=16439>) and tagged 130 study units that might be of more general use to the voluntary sector with a CharityWise tag (<http://openlearn.open.ac.uk/tag/index.php?id=16432>). In both cases, the intention is to aid discovery by making relevant study units easier to find, and our two terms now appear quite prominently in the OpenLearn tag cloud.”

Many people involved in the OER movement are looking at the different ways in which quality could be determined for users, especially resources developed by individuals or groups of people who are not part of an institutional initiative. Two examples of this are the non-institution-based MERLOT and Connexions collections of OER. In the former case, they are using a traditional peer review mechanism often *before* publication of the resource (<http://taste.merlot.org/peerreviewprocess.html>), supplemented by user comments and ratings post-publication (although actual reviews can be few and far between). In the latter case, they have set up different “lenses” for the resources to be judged *after* publication on the site (<http://cnx.org/news/LensesIntroduced>). They have endorsement lenses for material reviewed by an authoritative body, affiliation lenses where someone from an institution has created content but not necessarily had it reviewed; and members list lenses where registered users can give their views. In addition, developments such as the OER university (OERu) mean that OER that is useful for preparing you for accreditation comes yet again with the authority of the HEI that developed them, while open badges may start a whole system of user rating and review that bypasses HEIs.

Another aspect of quality is cultural or contextual relevance. This issue of resources being localised or contextualised to the needs of the user is a common discussion point because societies and cultures do differ in what is expected. I have already noted that learners, unlike teachers, are not going to want to put the effort into contextualising a resource for just themselves. Learners who directly study an OER may have to accept that it has been developed for a different setting to the one they are in, and get what they can from it as supplementary study for their formal studies or as a non-formal learning opportunity, as I discussed earlier.

Conclusions

There is little doubt that many people around the world are accessing or downloading online educational resources. The Open University alone has had over 50 million downloads from its iTunesU website in just over three years and over 20 million unique visitors to OpenLearn over five years. These online resources are not always openly licensed, but for learners that often will make little difference to whether they can use them for learning. Paradoxically, this very openness makes it very difficult to track informal use of OER.

Most HEIs do not readily have mechanisms to gather informative data on the impacts of OER on higher education study, either on informal learners or registered students. Web analytics can show many visitors to an OER but not indicate whether they learned from it in any meaningful way. (For instance, while the OpenLearn website has had over 20 million unique visitors over five years, only a little over 200,000 have registered on the site and can be seen as being potentially active learners. Many of the others might be as well, but we don't know who they are because they can simply access the OER through a Web browser.)

We can track referrals from an OER to a student's registering, but not whether that registration would have happened anyway. Experience with OpenLearn is that up to 1,000 people per month go direct from it to register on a formal taught module, but the broad characteristics of those people are no different from those coming from other recorded marketing or informational channels, with two-thirds being existing students anyway.

Measuring such impacts of OER is very challenging and the subject of much debate and activity because engagement by learners with them is so open and difficult to track, and most evidence is anecdotal or from small qualitative studies (Masterton and Wild 2011).

Whether lifelong learners are self-organised or within community or professional groups, it seems that good quality educational resources from HEIs are offering those learners new learning opportunities, and that many more innovative ways of using these resources are emerging, driven by the needs and ideas of those lifelong learners. Supporting lifelong learning is often a stated goal and ambition of many local, regional and national governments, although often there are relatively small amounts of public monies directed at informal adult education unless it provides direct vocational benefits. As most OER do not cost the lifelong learner anything beyond Internet access costs, these resources may help make that limited public funding go further and contribute to the underlying philosophy of open education unlocking knowledge for all and empowering more people to access educational opportunities that were not previously available or accessible.

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An Open “Materials” Repository and Global Search System: Preparing for Diverse Learners and a Variety of Learning Processes

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Introduction

The Present

The learning environments of lifelong learners are drastically changing due to the implementation of information and communication technologies (ICT). With the progress of Open Educational Resources (OER; cf. OECD 2007; D’Antoni 2007) combined with the power of e-publishing through e-books and e-journals, learners have gained access to a vast store of information and learning content, available at numerous repositories in the world. Nonetheless, the quality of the content stored can be questioned.

Successful lifelong learners are often independent, autonomous and self-directed. In addition, many live in distant and isolated areas. They have to visit many websites and compare information among pages before accessing what they believe to be optimal content. In order for their independent efforts to be successful, they can benefit from the guidance and recommendations of both educators and librarians, as well as other learners.

The Future

It would be unrealistic to expect most individual learners to assess correctly the quality and relevancy of any learning content for themselves. By analysing a learner’s profile (including, e-portfolio) and the context, computer programmes can aid in finding the most appropriate modules from content repositories available worldwide. Actual courseware can be organised in a modular fashion, sometimes by learners themselves, and stored in an e-portfolio as an artifact. In this process, course providers can control the pedagogical designs and rules and which materials are to be used, but not the courseware itself. Any teacher can

find the most appropriate materials, which she or he uses in the classroom after consulting with the knowledge base with respect to the pedagogy, quality and use rights, as well as colleagues' practices and recommendations. In both cases, users can concentrate more on learning and teaching, even in a variety of contexts.

Such a system could take into account a broad spectrum of personal characteristics such as age, interests, achievement levels, the learner's objectives and goals, the learning environments, learning styles and strategies. This system, which supports learners or teachers with the selection of the most appropriate content, should have some functions for personalisation and optimisation in order to support an optimal learning process for each lifelong learner.

The repositories will begin the sharing and distribution even in material and module levels. The rapid propagation of e-publishing and social media shows the possibilities of fusion of open and proprietary learning objects. In this context, a more holistic distribution infrastructure and marketplace will be necessary.

Background

OIJ and OER Community

The Open University of Japan (OUJ) is a national core institution both for lifelong learning and for open education. As a distance education institution, OUJ has multiple delivery channels for course materials. It has housed a television and radio station since 1978 that broadcasts video and audio course materials free of charge. In addition to these traditional delivery channels, OUJ distributes content via the Internet.

The content is digitised and stored in a repository and consists of about 42 per cent of the TV courses and all of the radio courses (71 of 169 TV courses and 157 of 157 radio courses as of October 2011), which is available only to students as "closed" content, as streaming video or audio. Nevertheless, OUJ launched "OUJ OpenCourseWare (OUJ-OCW)" in 2010 and opened some of this digital content via the Internet in order to contribute through OER movements to the lifelong learning society (21 courses available as OUJ-OCW as of July 2012).

Another contribution of OUJ to the OER community is that it has made available a cross-institutional search system. In Japan, the National Institute of Multimedia Education (NIME, the forerunner of the Center of ICT and Distance Education [CODE] at OUJ) started an educational information portal service with content and metadata repository functions primarily for higher education in 2003 (Yamada et al. 2003; Yamada et al. 2004). In March 2005, NIME launched a new gateway service on Japanese educational content, called "NIME-glad (Gateway to Learning for Ability Development; cf. Yoshii et al. 2008). In the same framework, NIME also started "JOCW Search" in October 2006 for the Japan OpenCourseWare Consortium (JOCW). NIME collects OCW content in collaboration with JOCW member organisations and adds metadata to this content, which is then accumulated in a metadata repository called a "referatory." Thus, the cross-institutional search system on JOCW content was realised. After the merger of NIME into OUJ, these services were taken over by CODE at OUJ. As of August 2010, 1,744 JOCW materials from 14 universities were registered in the referatory.

As numerous OER have been accumulated in repositories worldwide, some common platforms and strategies for collecting information and content are indispensable in order to find and retrieve quality content efficiently from scattered and distributed sources.

GLOBE: A Federation of Metadata Repositories

To facilitate the international sharing and exchange of high-quality learning content, the core organisation in each country and region, which managed the functions for federated repositories and meta-referatory, established the “Global Learning Objects Brokered Exchange (GLOBE)” consortium in September 2004. The original members were:

- ARIADNE (EU)
- education.au limited (Australia)
- eduSource Canada (Canada; McGreal et al. 2004)
- MERLOT (North America)
- National Institute of Multimedia Education (NIME, Japan)

Currently, the number of GLOBE members is 14:

February 2006	<ul style="list-style-type: none"> • eduSource Canada was replaced with LORNET
April 2009	<ul style="list-style-type: none"> • NIME was merged into the Open University of Japan as Center of ICT and Distance Education (OUJ-CODE)
March 2010	<ul style="list-style-type: none"> • education.au limited was merged into Education Services Australia
2007	Joined GLOBE: <ul style="list-style-type: none"> • Korea Educational Research and Information Services (KERIS, Korea) • European Schoolnet (EU) • Center for Open Sustainable Learning • Utah State University (COSL, USA) • Latin-American Community of Learning Objects (LACLO, Latin America)
2008	Joined GLOBE: <ul style="list-style-type: none"> • Institute for Information Industry (III, Taiwan) • Institute for the Study of Knowledge Management in Education (ISKME, USA)
2009	Joined GLOBE: <ul style="list-style-type: none"> • Thailand Cyber University Project under the Higher Education Commission (TCU, Thailand)
2010	Joined GLOBE: <ul style="list-style-type: none"> • Inter-University Center for eLearning (MEITAL, Israel) • Eummena Organization and Al-Quds University (Arabic countries) • OER Africa (African countries)

See Appendix 11.1 for a full list of GLOBE members as of November 2011.

One of GLOBE’s objectives is to assure the quality of the cross-institutional searches by sharing the metadata, which GLOBE members have collected (Yamada and Morimoto 2010). Several GLOBE members are also members of OCWC or have deep commitments to other OER movements.

Our Challenge: Development of a Repository for Open Reusable Materials

In order to develop a new OER development and delivery model, OIJ produced a series of quality video materials which can be used in the development of both TV broadcasting programmes and online courseware. These materials were accumulated in a learning object-oriented content repository with metadata and shared through a global metadata-sharing organisation.

The Content: Open Materials

OIJ developed a set of learning components on International Volunteer Studies, in collaboration with the International Society of Volunteer Studies in Japan (ISVS). In order to increase their reusability, most of the components are simple videos or photos, which can be used in modules of online courseware, as well as for classroom teaching.

This academic area focuses on the theoretical and practical research of volunteer activities in international frameworks. The society supported the concept of OER, and so most of the content is open under a Creative Commons licence.

Currently, about 1,350 movie clips have been developed with a typical duration of one to three minutes. Each clip is available in two MPEG-4 formats (720 × 480 and 600 × 440) and two WMV formats (600 × 440 and 300 × 220). One of the MPEG-4 formats has sufficient quality for broadcasting. At the opening, the author information, title and copyright are shown in Japanese and/or English (see Figure 11.1). In addition to the name of the copyright holder, the conditions for use are shown with the icons of the relevant Creative Commons licence and more detailed information if necessary.

Volunteers from the society also provided materials, which had previously been collected in their own fields and used in their classrooms. As the academic topic was still developing rapidly and the scholars had not established a standardised curriculum, the volunteers also contributed to creating a taxonomy and classifying the keywords.

Figure 11.1: The opening of a small video clip produced by Open University of Japan.



Metadata

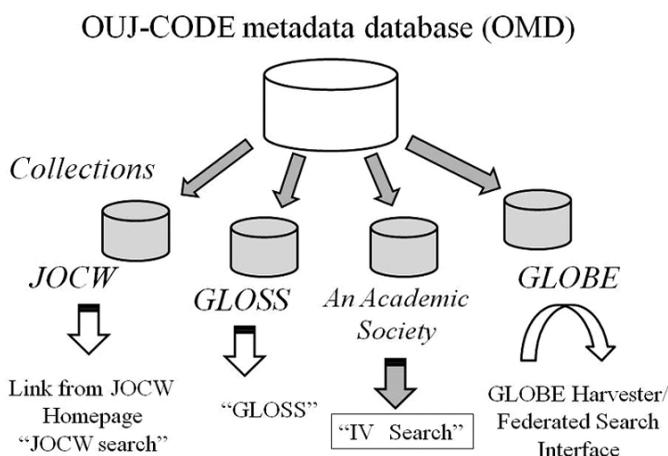
Each object in the OIJ repository is provided with metadata. While most of the metadata elements are based on IEEE LOM (IEEE 1484.12.1 - 2002 Standard for Learning Object Metadata), there are some exceptions. If the metadata element “Copyright” is used, for example (No. 19 in Appendix 11.2), the Creative Commons licence is described in the object vocabularies and the copyright

conditions are systematically shown in the search results. In addition, the metadata includes some elements for content management such as “Permission for Harvesting” and “Permission for Federated Searching.”

The Metadata Database

OJ manages a common metadata database (OUJ-CODE metadata database, OMD) with a relational database management system. By using different subsets of the metadata collections, we provide several search interfaces. One of them is JOCW Search. For the “International Volunteer Studies” materials, however, we prepared a new search interface, called “IV Search” (see Figure 11.2).

Figure 11.2: Concept of the OUJ-CODE search system and “IV Search.”



Federation of Metadata Repositories on the GLOBE: GLOBE (Global Learning Object Brokered Exchange)

The OJ metadata repository exchanges a part of the metadata with international partners through federated search and/or harvesting. For example, as a member of GLOBE, OJ has provided the metadata to the GLOBE harvester in the harvesting system and returns query results in the federated search network. GLOBE has adopted the IEEE-LOM version 1.0 (IEEE 2002) for its metadata standard, the Simple Query Interface (SQI) (Simon et al. 2005) for the query language, and the Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH) (Logoze et al. 2002) for harvesting.

Using these standards, GLOBE has realised a global search and delivery network. The current numbers of harvested metadata are shown in Table 11.1. GLOBE users can find and retrieve high-quality learning content from the repositories, as well as provide their own content to potential users worldwide.

Table 11.1: The total number of metadata collected by the GLOBE harvester, Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), as of February 2012

Note: Other GLOBE members join using federated search technologies.

Source	Number
ARIADNE (EU)	513,703
European Schoolnet (EU)	185,940
LACLO (Latin America)	40,957
MERLOT (USA)	32,735
OER commons* (world)	30,903
KERIS (Korea)	7,439
LORNET (Canada)	2,295
OIJ-CODE** (Japan)	1,761
OER Africa (Africa)	1,703
TOTAL:	817,436

* OER Commons is a project of the Institute for the Study of Knowledge Management in Education (ISKME).

** The number for OIJ-CODE does not include materials from International Volunteer Studies.

Prospects

Business and Management Issues

At OIJ, the course materials are delivered mainly as a combination of printed textbooks and digital satellite/terrestrial broadcasting materials (TV or radio). The Internet is still a supplementary medium because many OIJ students have not prepared their own learning environments and lack the skills for online learning. As our students have different comfort zones in the learning environments, we consider OIJ should still keep multiple media content delivery.

Under the supervision of the lecturers, OIJ course materials are developed in each medium, while the processes, including copyright clearance, are independent. In order to reduce the cost while assuring the quality, restructuring of the development process in a more integrated fashion is needed. One of the major costs is for the copyright clearance of materials for broadcasting and Internet use. As OIJ has its own production department, it has started to digitise its own materials and to store them in a pilot component repository (that is, a “materials” repository) so that they can be shared and re-used in different contexts. However, the accumulation of materials progresses slowly due to limited financial and human resources. A “critical mass” of high-quality components can be achieved more quickly by sharing with other organisations and the OER community. This sharing will afford more comfortable circumstances for content assembly, adaptation and development.

Quality Assurance of Metadata and Content

The quality of learning content and its metadata is a critical factor for sharing and distribution. Information on the quality of the content will be one of the basic and pressing value-added services of global search providers. One of the major differences between GLOBE search and other commercial search systems is that in GLOBE member organisations, only educators can register the metadata for their educational content. So, GLOBE search is considered to meet minimum standards for quality of educational content.

In addition, some GLOBE member organisations have their own quality assurance frameworks and standards. For example, MERLOT performs a peer review and recommendation system for higher education learning content. TELUQ (Télé-université du Québec) launched “the Quality for Reuse” project in collaboration with several Canadian universities and GLOBE. In this project, volunteers from ISVS classified the registered content based on their expertise. Results revealed new quality assurance processes through the collaborations within the academy.

The descriptions on shared metadata among GLOBE members are not absolute. They contain each member’s guidelines and the results of their evaluations, which could be different. In addition, in many cross-institutional search services, both selection of query results and display order depend on the local rules of the different members. In order to cope with the diversity of the users and their environments, it is important to have multiple viewpoints to ensure a reliable evaluation of the content. Allowing for differences ensures that the information on content quality provided by the different metadata is useful.

Technical Issues

When sharing the many different OER, it should be more efficient to have some technical standards. As discussed above, repositories and their federations use various international standards. Examples include Dublin Core and IEEE-LOM for metadata, SQI for query language, and OAI-PMH for harvesting.

OIJ uses SCORM (Sharable Content Object Reference Model) for eLearning management and content development. SCORM supports the packaging of content using a collection of standards and specifications. Organisations and consortia with sufficient resources can implement SCORM in their development. However, individuals may have serious difficulties in doing the same. They need some tools for support in generating SCORM content or adequate guidance by experts. Metadata tagging is also considered to be a major roadblock even for organisations. Some automatic or semi-automatic tagging mechanisms are indispensable.

Conclusion

When OIJ launched a cross-institutional search service on learning content in 2004, the primary concern was how to attain a “critical mass” of course materials. The initial search system focused mainly on the location of the searchable content. With the exponential increase in the number of digital learning resources and content repositories, distinctive value-added search functions

are becoming indispensable. There is a need to provide additional information and search services on rights management, quality assurance and education/ pedagogical supports or recommendations, as well as customisations such as localisation and personalisation.

When we consider how to describe and share various pieces of information on new value-added services, standardised metadata is still one of the best solutions. In order to launch actual services among related organisations promptly, a framework for shaping agreements on the specifications of metadata elements and controlled vocabularies is indispensable.

With the progress of the digital exchange of educational content, new types of players who are specialised in specific functions can participate. In Japan, the Accreditation Council for Practical Abilities (ACPA) has started evaluation activities. ACPA is a non-profit organisation established in 2003 with the support of the government, corporations and higher education institutions. In order to assure the quality of practical learning resources and to promote the exchange between universities and corporations specifically, ACPA defines the practical abilities of several professional fields, develops the standard skill matrix in each field, and performs certification and accreditation of courses, course providers, educational institutions, lecturers and trainees based on their original or standardised criteria. The standard skill matrices are open to the public (ICT domain: www.acpa.jp/en/acpa/standard_skill_matrix_bmd.pdf).

By re-using their evaluation results, we can add quality information in our metadata system. (For example, the category field of “Quality” element in our metadata system shows the name of the evaluating organisation and its standards; and the value field shows the result of the evaluation.) By sharing the metadata framework with new players in the digital exchanges, we can provide the right content to each learner more precisely and efficiently.

Sharing at the courseware level and at the component or module level is important to efficiently and effectively support localisation or personalisation of the content. In the re-use and remix, materials are often used in ways the original author never intended. Especially across borders, deployments in different cultural contexts can be pluralistic and unpredictable to the original creators. The propagation of component-oriented OER may depend on the tolerance of the original authors regarding the uncontrollability of their products. In the chain of educational content production, the providers have the roles of both authors and users simultaneously. One of the ways to support the further propagation of OER, therefore, is to respect the creator’s rights, while supporting the opening of knowledge for the benefit of all humanity.

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Appendix 11.1: GLOBE member organisations, as of November 2011

Name of organisation/URL	Country	Date of participation	Notes
Al-Quds University www.alquds.edu/	Palestine	2010/02	
ARIADNE (Alliance of Remote Instructional Authoring and Distribution Networks for Europe) www.ariadne-eu.org/	EU	2004/09	A founder
COSL (The Center for Open Sustainable Learning, Utah State University) http://cosl.usu.edu/	USA	2007/09	
education.au limited – EdNa Online	Australia	2004/09	A founder; closed in August 2009
Education Services Australia	Australia	2009/09	Successor of education.au limited
eduSource Canada	Canada	2004/09	A founder; closed in January 2006
EUN (European Schoolnet) www.europeanschoolnet.org/	EU	2007/09	
III (Institute for Information Industry) www.iii.org.tw/english/	Taiwan	2008/04	
ISKME (Institute for the Study of Knowledge Management in Education) www.iskme.org/	USA	2008/09	
KERIS (Korea Educational Research and Information Services) http://english.keris.or.kr/	Korea	2007/02	
LACLO (Latin-American Community of Learning Objects) www.laclo.espol.edu.ec/	Latin American countries	2007/09	
LORNET www.lornet.org/	Canada	2006/02	Successor of eduSource Canada
MERLOT (Multimedia Educational Resource for Learning and Online Teaching) www.merlot.org/	North America	2004/09	A founder
METAL-Inter-University Center for e-Learning (IUCEL) http://meital.iucc.ac.il/meital/English/English.htm	Israel	2010/02	
NIME (National Institute of Multimedia Education)	Japan	2004/09	A founder; closed in March 2009
OER Africa www.oerafrica.org/	African countries	2010/09	
OIJ-CODE (Center of ICT and Distance Education, the Open University of Japan) www.code.oij.ac.jp/	Japan	2009/04	Successor of NIME
TCU (Thailand Cyber University Project) www.thaicyperu.go.th/	Thailand	2009/03	

Appendix 11.2: Metadata elements used in OIJ-CODE common metadata database

No.	Name	Corresponding element to IEEE 1484.12.1-2002
1.	ID of the metadata	3.1 Meta-Metadata - Identifier
2.	ID of the LO ^a	1.1 General - Identifier
3.	Title	1.2 General - Title
4.	Language(s) used within the LO	1.3 General - Language
5.	Description	1.4 General - Description
6.	Keyword(s)	1.5 General - Keyword
7.	Aggregation level	1.8 General - Aggregation Level
8.	Contributor to the LO	2.3 Life Cycle - Contribute
9.	Language of the metadata	3.4 Meta-Metadata - Language
10.	MIME media types of the LO	4.1 Technical - Format
11.	URL	4.3 Technical - Location
12.	Technical requirements to use the LO	4.4 Technical - Requirement
13.	Educational stages ^b	5.6 Educational - Context
14.	Intended learning time	5.9 Educational - Typical Learning Time
15.	Intended user of the LO	5.10 Educational - Description
16.	Paid-for or free	6.1 Rights - Cost
17.	Restriction of usage	6.3 Rights - Description
18.	Classification ^c	9. Classification
19.	Copyright ^d	-
20.	Quality ^e	-
21.	Permission to Harvesting	(for GLOBE Harvesting)
22.	Permission to Federated Search	(for GLOBE Federated search)

a *ID of the LO* is generated automatically as Catalog is "URL"; Entry is the actual URL.

b *Educational stages* have a unique value space matched to the Japanese educational system.

c *Classification* shows the taxonomy system and its value(s).

d *Copyright* shows the rights management system and its value(s).

e *Quality* shows the quality assurance system and its value(s).

Wikiwijs: Using OER as Driver for Maturation

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Wikiwijs, a Nation-wide Initiative on OER

Wikiwijs was designed as an environment in which all teachers of the Netherlands, ranging from primary education to higher education, can (co-) develop, share, rework and use digital learning materials, published under an open licence. On December 14, 2009, the Minister of Education of the Netherlands, Ronald Plasterk, launched the first version of Wikiwijs.

Digital learning materials are more than digital textbooks. The site and community are designed to support a variety of educational materials including tests, labs, simulations and practice materials.

One main principle of Wikiwijs is using the “wisdom of the crowds” (Wikipedia 2012). Therefore, Wikiwijs should become “for, from and by teachers.” As soon as possible, they must feel ownership of Wikiwijs, its content and functionality. This feeling of ownership is considered the most critical success factor for Wikiwijs.

Although Wikiwijs is seen to be for, from and by teachers, other potential target groups for contributing to Wikiwijs are not excluded. Potentially interested groups could be, among others, former teachers, students, parents, teacher trainers and scientists.

A second main principle of Wikiwijs is that the learning materials should be openly accessible. “Open” in this context refers to the four rights a user of the learning materials has: re-use as-is; redistribute; rework; and remix with other open learning materials (Wiley 2007). This was in line with the advice of the Educational Council of the Netherlands (the counselling body of the Dutch Government) in 2008. They published the result of research they had conducted on the use of digital learning materials in the Netherlands. Their conclusions focused on the use of *open* learning materials because, in their opinion, this has the most impact on innovation in education using digital learning materials.

This conclusion was motivated by the freedom to rework and/or remix openly licensed content and applications for use in a wide variety of contexts. These characteristics give teachers the possibility to arrange and create their own lesson content, thereby directly affecting the core of education.

Some policy goals to which Wikiwijs has to contribute pertain to the quality and accessibility of education. Wikiwijs is expected to efficiently support and help create more flexible learning paths and support the professional upgrading of teachers. The availability of open learning materials will be a necessary precondition to reach this.

More information about Wikiwijs can be found in Schuwer and Mulder (2009).

Infrastructure as a Prerequisite for Wikiwijs

Before the launch of Wikiwijs, several components of a national infrastructure already existed. The components that Wikiwijs made use of were:

- a national standard for labelling learning materials with metadata; and
- a harvester of metadata for learning materials gathered into several collections that can be accessed through the Internet.

A third component at the start of Wikiwijs, was the use of learning trajectories for structuring learning materials. Each of the components is described below.

Two Dutch organisations play an important role in the remainder of this paper. For primary, secondary and vocational education, Kennisnet is a public knowledge centre providing independent advice and services to support and inspire educational institutions in the effective use of information and communications technology (ICT) in continued improvement in the quality of learning (<http://about.kennisnet.nl>). For higher education, SURF is the collaborative organisation for higher education institutions and research institutes in the Netherlands (www.surf.nl/en/oversurf/Pages/Introductie.aspx), aimed at breakthrough innovations in ICT.

Standard for Metadata

In 2003, a metadata application profile (LoreLOM) for learning materials in Higher Education was formulated (<http://wiki.surffoundation.nl/display/standards/LORElom>). This was followed by another application profile for primary, secondary and vocational education in 2006, called the *Content ZoekProfiel* (Content Search Profile; <http://standaarden.wiki.kennisnet.nl/Content-zoekprofiel>). Both were application profiles based on the IEEE LOM (Learning Object Metadata) standard (<http://ltsc.ieee.org/wg12/>). A body, *Edustandaard*, was created to manage the profiles and co-ordinate further developments. The metadata profiles consisted of conventions on:

- mandatory, recommended or voluntary fields;
- lists of values (vocabularies) to choose from for several fields; and
- the type of data to fill in and constraints on it (e.g., maximum number of characters) when no vocabulary is attached to a field.

The vocabularies for the *ContentZoekProfiel* (CZP) are in machine-readable format, accessible from a central database (www.edustandaard.nl/voculaires/vb).

Harvester for Metadata

Having a metadata standard and profile makes it possible to encourage owners of collections with digital learning materials to describe their materials according to common standards. When the descriptions of all collections are accumulated, this will result in an extensive list of descriptions, which can be used to search for learning materials. This accumulation is done by a harvester. Already in 1997, MERLOT (<http://taste.merlot.org/howmerlotstarted.html>) started developing and implementing a harvester to unlock several collections with learning objects. Another Canadian initiative, LORNet (www.lornet.ca/), started in 2003, consisted of many research activities around digital learning materials. Among them was the development of a harvester to collect metadata from collections from the partner institutions.

These existing harvesters were not suited for use in the Netherlands because they were not targeted at content for primary and secondary education or at learning materials in the Dutch language, and they did not adhere to the CZP or LORENet metadata profile. Therefore, both Kennisnet and SURF decided to start development of a dedicated harvester for the Dutch educational field.

Kennisnet started their service Edurep as a proof of concept in 2007. Edurep is a harvester for metadata from learning materials, residing in collections and described in accordance with the CZP profile. About 15 organisations with a collection of learning materials received grants to add metadata to their learning materials and to provide a technical interface based on the open OAI-PMH protocol (Open Archives Initiative Protocol for Metadata Harvesting). This interface makes it possible for Edurep to harvest the metadata periodically and add it to a central metadata repository. During the same period, SURF started to implement LORENet. LORENet was also a proof of concept for a harvester, aimed at cataloguing learning materials in higher education, to which metadata compliant with the LoreLOM profile was added. About 15 collections were connected to LORENet, also using an OAI-PMH target.

Learning Trajectories

The Netherlands government has formulated learning goals to be reached for primary and secondary education. Secondary education in the Netherlands has three levels, with each level divided into two sub-levels (the first two or three years and the second two or three years). At the end of the second sub-level, each student has the option to take a national exam in order to graduate. For secondary education, the learning goals are formulated for each subject, level and sub-level.

The learning goals are formulated on a high level. This level is too high to be workable for a teacher or a group of teachers who want to develop learning materials aimed at covering the whole or part of the learning goals. It is at this point that commercial publishers bring in a lot of experience in developing curriculum plans (applying the high level learning goals of the government) and realising this in a teaching method. Teachers who are using these methods can be certain that their students have covered all subjects of the curriculum sufficiently. Therefore, commercial textbooks are *the* guide for the majority of teachers in the Netherlands.

The disadvantage is that these methods are in most cases not tailored to specific target groups (e.g., children with dyslexia) and specific situations (e.g., a school with a high percentage of allochthon children). Furthermore, actual events are not covered, because most of the teaching methods are fixed in non-digital textbooks that need to last for several years. These disadvantages are only partly solved by the publishers with their offering of access to digital learning materials, in addition to the printed textbooks.

A possible answer to these problems is to structure a set of learning materials according to “learning trajectories.” According to Strijker (2010), “A learning trajectory is a rationalized composition of learning objectives and subjects, leading to a specific learning goal.”

Around 2005, several experiments were initiated to develop (open) learning trajectories. The goals of these experiments were to get more insight into how learning trajectories might be visualised, to experience problems and to develop solutions to these problems. A specific goal was to get more insight into continuous learning trajectories for more easily making the transition between the sectors (e.g., primary to secondary education). In most of the experiments, SLO (the institute for curriculum development in the Netherlands) was involved (www.slo.nl/organisatie/international/). The Ministry of Education, being the principal lead in the development of Wikiwijs, ordered that working with learning trajectories should be one of the functions available in Wikiwijs.

Acceleration of Infrastructure Development

Development of Wikiwijs started in August 2009. It was decided to use the aforementioned components of the infrastructure. Technically, it was not the aim to create one large Wikiwijs repository, but to provide an interface in which users could search for learning materials residing elsewhere (i.e., a portal function). This first version of Wikiwijs was not aimed at providing services for higher education.

Because of the time constraints, it was not possible to realise this. The consequences of the development of Wikiwijs on the maturation of each of the components of the infrastructure are described in the next section.

Consequences of the Metadata Standard

Together, the announcement of Wikiwijs at the end of 2008 to create a platform for all educational sectors, the decision to use the harvesters that were already available, and the promise of continuous learning trajectories seemed to offer an easy transition among the different sectors. This led to the insight that a single metadata standard for all educational sectors was necessary to make this realisable within Wikiwijs. Kennisnet and SURF therefore started a project to come to one overall standard for metadata profiling, to replace the current profiles, CZP and LORELom.

Version 1 of this new profile, NL-LOM, was published in June 2010, followed by a slightly altered version (1.01) in July 2011. This profile was implemented in the harvesters and Wikiwijs, and became available in October 2011. The NL-LOM is set up in such a way that metadata previously described in collections and implemented using one of the previous profiles do not need to be changed in order to comply with the new standard.

Consequences for Harvesting

Already during the test phase for the first version of Wikiwijs, it became clear that the harvester Edurep could not handle the expected growth in demand. The technical architecture was not scalable, mainly because the initiative was set up only as a proof of concept. Furthermore, after the launch of Wikiwijs, the quality of the metadata harvested turned out to be insufficient. This resulted in many complaints by the users of Wikiwijs. Two types of actions were undertaken. First, Edurep was redesigned and rebuilt to be able to handle large amounts of concurrent access. Also, collection organisers were encouraged and supported to improve their metadata. The latter activity was a joint effort of Edurep and Wikiwijs and it is still running.

For teachers, the overarching complaint was that adding metadata to learning materials was a tedious job, impeding them in their desire to share their learning materials. In response, the team started to redevelop Edurep. The automatic insertion of metadata and the combination of different sources of metadata were two of the functions being developed. By early 2012, this functionality became available for users of Wikiwijs. This now makes it possible to add additional metadata to learning materials. This is useful, for example, to describe experiences of the use of content and applications in specific contexts.

And lastly, both harvesters Edurep and LORENet are being combined into one virtual harvester. This makes it possible to search for content across the boundaries of different sectors, including higher education. Also, a smaller harvester targeted on “green education” is integrated into Edurep. Currently Edurep is one of the largest European harvesters in terms of the number of learning objects it can access (>750,000).

Consequences for Learning Trajectories

The Dutch Ministry of Education demanded that Wikiwijs provide an opinion on what structuring learning materials using learning trajectories actually meant, and how it could be implemented. In the same period, because of the launch of Wikiwijs, the ministry became aware that learning trajectories could offer many advantages to teachers looking for more than just materials for a single lesson.

As a result, several initiatives were started, both by Wikiwijs and by other organisations such as SLO and Kennisnet. These initiatives led to adaptations on the CZP metadata profile (transferred to the current NL-LOM standard) and the development of standard vocabularies to describe the learning materials available in a learning trajectory. Currently, the metadata for learning trajectories are seen to be essential to bridge the gap between open and closed learning materials. According to Blockhuis et al. (2011), 85 per cent of teachers in primary and secondary education use commercial products as the main source of content for their teaching. Most of them look for alternative learning materials to replace small parts of these products (e.g., a paragraph). By labelling these commercial products and open learning materials with the same metadata for learning trajectories, appropriate learning materials for a given part of the content can be found (covering the same learning goals and treating the same subjects). In the fall of 2011, experiments with this application of learning trajectory metadata were initiated.

Conclusion

When the idea of Wikiwijs was launched, it was not immediately clear the influences it could have on components of an infrastructure already available. Wikiwijs accelerated the development of the infrastructure, both direct (in the case of the learning trajectories) and indirect. Because of Wikiwijs, the use of and interest in (open) learning materials increased and led to greater demand on the infrastructure. In other words: the elements discussed reached a mature level, influenced by the demands Wikiwijs had put on them.

Of course, this is only a means to reach an important target for Wikiwijs: realising growth in using, developing and sharing open learning materials. Several research efforts are underway that should provide more insight into the influence of Wikiwijs on the motivation of teachers to use digital learning materials (Van Acker et al. 2011; Vermeulen et al. 2012).

It is too early to have hard evidence on the direct influence of Wikiwijs. Indirect evidence that Wikiwijs has a growing influence on the creation and use of digital learning materials is provided by several quantitative measures. Table 12.1 summarises for 2010, 2011 and 2012 (estimated) the development in number of uploads to the Wikiwijs repository, the number of downloads from Wikiwijs, the number of visits, and the number of remixes assembled with the remix tool of Wikiwijs. The numbers for 2012 are an estimate, based on the results until June. All figures are per year.

Table 12.1: Development in use of Wikiwijs, 2010 to 2012

	No. uploads	No. downloads	No. visits	No. remixes
2010	488	140,000	222,209	75
2011	806	345,000	345,241	425
2012 (est.)	1,800	500,000	365,000	750

Currently, 40 open learning trajectories are being made available through Wikiwijs. From 532 external websites (mostly virtual learning environments [VLEs]), more than 28,000 links to learning materials can be found available in Wikiwijs.

From this experience in the last two years, the following lessons can be learned:

- Having an infrastructure as described accelerates development of a national platform like Wikiwijs. (In fact, one can even question the feasibility of such a platform without there being such an infrastructure.)
- Parallel improvements in the infrastructure are required if delays in development of a platform like Wikiwijs are to be avoided.
- In other projects working at improving their infrastructure, Wikiwijs is an important stakeholder but not a participant. The infrastructure can also be used for other activities, and the organisations responsible for the components of the infrastructure have to balance the demands of Wikiwijs with those of the other stakeholders. In cases of delay, Wikiwijs is not able to influence this.

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PART

IV

Producing, Sharing and Using OER

Introduction

Sharing OER can be a valuable way to disseminate knowledge, diversify teaching activities and gain new insights into other teaching methods for a particular subject. Although these knowledge-sharing activities may not contribute to any strategic advantages, they can prevent teachers from reinventing the wheel and also reduce course preparation time. Sharing OER should, thus, be considered as knowledge-sharing behaviour and an effective approach to helping teachers develop professionally and supporting their content knowledge and pedagogical skills.

In Chapter 13, “Why Teachers Share Educational Resources: A Social Exchange Perspective,” Van Acker, van Buuren, Kreijns and Vermeulen identify the key determinants of teachers’ sharing behaviour using social exchange theory. This paradigm posits three key factors that determine people’s willingness to engage in a specific behaviour: the costs that are associated with the behaviour; the rewards that can be obtained by performing the behaviour; and the trust people have in obtaining this reward. As a financial incentive is usually absent in the specific context of OER, the study discussed in this chapter considers altruism, reputation and reciprocity as possible rewards. The results of the study show that knowledge self-efficacy, altruism and trust are the most important predictors of teachers’ intentions to share educational resources. The study also indicates that reputation and reciprocity may have an adverse impact on sharing intention.

The use of OER among institutions in developing countries is often seen as a phenomenon that will enable countries to harness the potential of educational resources to promote access to education and improve the quality of education delivery systems. However educational systems in developing countries do not seem to be adopting and re-using OER on the scale required to address the dilemmas posed by the increase in the demand for education. In Chapter 14, “Can Open Educational Resources Thrive in Closed Educational Systems: Some

Reflections on OER in Developing Countries,” Umar, Kodhandaraman and Kanwar argue that the low level of OER use in many developing countries can be partly attributed to the tendency to regard them as forms of technology that are neutral and value-free. The authors contend that although infrastructure and technology are important vis-à-vis the capacity to develop and use OER, there is also a need to explore the link between OER adoption and institutional structures, norms and values. Thus, one needs to consider the socio-political and institutional contexts (for example, the flexibility and freedom teachers and students have to adopt and use OER), and the extent to which educational systems and institutions are “open” or “closed” vis-à-vis OER adoption and utilisation.

Continuing the theme of communities of learners using and re-using OER in their learning, Downes, in Chapter 15, “The Role of Open Educational Resources in Personal Learning,” considers OER from two perspectives: the person who owns or produces the resource, and the person who requires access to the resource. In an effort to address the barriers to open education, a new form of online learning, the Massive Open Online Course (MOOC), was developed by Downes and his colleagues. The MOOC is designed according to the principles of self-organising networks of entities. A series of MOOC-based courses have been offered since 2008. An observation of these courses shows widespread production and use of OER within these courses. Downes suggests that by understanding the use of OER as “words” in a language used by participants in a MOOC to communicate with each other we can explain the role of OER in personal learning.

Encouraging collaboration in creating and sharing intellectual capital in higher education can assist in improving quality and achieving long-term cost-effectiveness in educational practice. While collaboration does not overcome all the issues in the complex OER agenda, it does offer educators a way to avoid reinventing the wheel and thus save their time and resources. The co-creation process can also facilitate professional development, knowledge sharing and the integration of different social and cultural contexts into the educational materials. In Chapter 16, “Towards a Sustainable Inter-Institutional Collaborative Framework for Open Educational Resources (OER),” Ng’ambi and Luo examine the development of the African Health OER Network and explore how sustainable inter-institutional collaboration can facilitate OER production and sharing. The Network is a collaborative project between one university in the United States, two universities in Ghana, two universities in South Africa, and an education-based non-government organisation based in South Africa. A primary focus of this project is to scale up teaching and learning capacity in institutions by creating new learning materials and converting existing materials into OER.

Why Teachers Share Educational Resources: A Social Exchange Perspective

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Introduction

In 2009, the Dutch government launched the Wikiwijs project to increase the use, development and sharing of digital learning materials. Wikiwijs mainly offers Open Educational Resources (OER) through a freely accessible website. Although not all resources are freely available, most of Wikiwijs's learning materials are published under an open licence. Even though part of the educational resources is provided by the project itself, Wikiwijs relies largely on voluntary contributions by individual teachers who develop digital learning materials. As most of the educational resources Wikiwijs offers come at no cost, teachers need to be willing to share their own resources without any financial compensation.

In this chapter, we address the issue of teachers' sharing behaviour with respect to OER. Using social exchange theory as a basis and empirical research on knowledge-sharing behaviour from within this framework, we explore possible determinants of OER-sharing behaviour. Our conjectures regarding these determinants are then tested empirically through a large-scale survey study.

In organisational research, knowledge sharing has been found to be a critical success factor for most profit organisations (e.g., Grant 1996; Davenport and Prusak 1998). Research shows, however, that it is hard to motivate people to use knowledge-sharing systems that are based on information and communications technology (ICT) (Cabrera and Cabrera 2002). Moreover, knowledge-sharing behaviour amongst teachers has received limited attention by scholars or organisational experts. One reason for this is that knowledge sharing may seem less important in a non-profit setting. Knowledge may often be considered of limited strategic value to teachers or school management as most of the subject-related knowledge that teachers possess is passed on through textbooks or formal teacher training. However, OER can be considered as a new kind of knowledge, which can be used to diversify teaching activities or to gain new insights into other teaching

methods for a particular subject. As such, sharing OER may be a valuable way to disseminate knowledge or insights. Although these knowledge-sharing activities may not contribute to any strategic advantages, they might prevent teachers from reinventing the wheel. By recycling other teachers' ideas, teaching activities may improve and course preparation time could possibly be reduced. Sharing OER should, thus, be considered as knowledge-sharing behaviour and an effective method to help teachers with professional development and to support them in improving their content knowledge and pedagogical skills.

Sharing OER as a Social Exchange Process

An important question asked by Cabrera and Cabrera (2005) is why one should share knowledge, such as OER, when it is possible to “take a free ride” on the OER other teachers have supplied, especially if sharing may at first sight seem to remain unrewarded.

According to social exchange theory (Homans 1958), teachers may have motives to share learning materials other than financial rewards. One possible reward for sharing OER could be the prestige a teacher acquires or the recognition (i.e., the reputation) one gets for the shared work. In the study described below, social exchange theory is used as a framework to explain why teachers would want to share digital learning materials. According to this theory, it is initially expected that teachers will weigh the costs and benefits of sharing, which will in turn determine whether or not they will share.

Another construct in social exchange theory is the concept of trust. Trust is related to the extent to which one believes the rewards can actually be acquired. According to Wang and Noe (2010), social exchange theory has been the most commonly applied framework for studying knowledge-sharing behaviour. As we have argued that sharing OER can be considered a form of knowledge sharing, we believe social exchange theory can be successful in explaining teachers' OER-sharing behaviour as well.

We will discuss the three central concepts of social exchange theory: cost, reward and trust, and present previous empirical studies in support of our conjectures regarding OER-sharing behaviour. We will conclude with several hypotheses based on social exchange theory.

Costs Involved in Sharing OER

One can assume that there are different costs associated with sharing OER. A first factor we identified is anxiety associated with sharing. In other contexts than education, this anxiety has been associated with an individual's expectations to lose a competitive advantage (Renzl 2008). In the context of OER, loss of a competitive advantage is rarely considered by teachers because it is highly unlikely that sharing OER would lead to a reduction of one's value for the organisation. Yet, anxiety with respect to sharing OER may be related to the fear a teacher experiences when his or her work is evaluated by others. Indeed, in a study by Bakker et al. (2006), it was found that employees were less inclined to share knowledge with colleagues who were perceived as very capable. That study may suggest that employees are afraid to share knowledge if they fear that others, who they believe are more capable than they are, may criticise them or depreciate their work.

We believe that teachers need to feel sufficiently self-confident in order to have the intention to share OER. When teachers consider themselves to be sufficiently skilled in developing OER and believe that their contributions will provide an added value, they will be more inclined to share. This “knowledge self-efficacy” (or confidence in their knowledge) is considered a cost for two reasons:

- A lack of knowledge self-efficacy may lead to anxiety.
- A lack of pedagogical and ICT-related skills would require an investment on the part of the teacher. In order to be able to effectively develop OER, a teacher would probably need to invest time and effort in training activities with respect to his or her pedagogic and ICT skills, which can be seen as a considerable cost.

To summarise, we consider knowledge self-efficacy as a possible determinant of sharing intention in our study, as previous research on knowledge-sharing behaviour has confirmed the importance of this factor (e.g., Cabrera et al. 2006; Lee et al. 2006).

A second cost is the time invested in the development of OER. Hew and Hara (2007) found in a qualitative study that one of the most frequently cited costs, inhibiting knowledge sharing in online communities, is employee concern about the time commitment. We expect that if teachers perceive they have invested a lot of time in developing OER, they will be less inclined to actually share their OER, especially when the benefits of sharing are considered to be low. Another study also found that the more time one expects to need for sharing knowledge through online repositories, the less likely it becomes that employees will actually share (Kankanhalli et al. 2007). Based on these findings, we believe that when teachers perceive the sharing activity to be an additional cost on top of the development cost itself, this reduces the likelihood of sharing OER. We call this latter cost the “technological cost,” which refers to the effort one must make to use ICT tools to share OER (which may be as simple as copying files to a CD-ROM or a memory stick in the case of sharing with a direct colleague, or logging into a Wiki for Web-based OER sharing).

Rewards Involved in Sharing OER

Although there is no financial compensation involved in sharing OER, a number of possible benefits can be identified which may motivate teachers to share. We will consider the benefits of reputation, altruism and reciprocity. Reputation refers to the recognition teachers could possibly receive from sharing their OER. When other teachers perceive a teacher’s OER as valuable, this specific teacher may be regarded as more capable than others. Wang and Noe (2010) mention that “impression management” may be an important reason why employees choose to share knowledge. Moreover, several scholars (Tiwana and Bush 2001; Hemetsberger 2002) believe that participants in online communities may become motivated to share knowledge through the use of “reputation points” in online communities. Similarly, by sharing OER, we believe teachers may have a way to show their competencies to other colleagues, thus improving their reputation.

An improved reputation is thus hypothesised to be a possible reward of OER-sharing behaviour.

Altruism implies that teachers see OER sharing in itself as pleasant. Teachers who share OER for altruistic reasons generally have a good feeling about the behaviour

itself. Altruism may be considered to be an intrinsically motivating factor, as teachers who share because of altruistic motives generally feel no need for any external rewards to perform a behaviour. This is in stark contrast with reputation, which motivates people for reasons external to the behaviour itself.

We believe altruism may be an important predictor of teachers' sharing intentions, probably more than reputation, given that previous studies have shown that teachers are motivated primarily by intrinsic factors (De Cooman et al. 2007). Moreover, some researchers believe that extrinsic incentives may hinder the free flow of knowledge in organisations (Wasko and Faraj 2000) and therefore the relative importance of extrinsic and intrinsic motivators should be studied. Finally, in an exploratory study by Lee et al. (2006), the enjoyment of helping others was found to be one of the most cited reasons for knowledge sharing in online discussion boards, providing empirical evidence for our assumption that altruism plays a key role in OER-sharing behaviour.

Reciprocity implies that teachers share OER because they believe others will do so as well. In a sense they trust that, by sharing their OER, they set an example for other teachers. The effect of reciprocity may also be perceived in another sense: that teachers who perceive that their colleagues share OER feel obliged to do so as well (this is known as the "descriptive norm"). We therefore believe that reciprocity is positively related to teachers' intentions to share OER. Reciprocity can also be considered as a cost: teachers may feel they are being exploited when they share their own OER without receiving anything in return. In this study, however, we consider reciprocity to be a possible positive determinant of sharing behaviour. The possibility of exploitation will be taken into account by looking at the impact of trust on sharing, which we discuss in the next section.

Trust and Sharing OER

Social exchange theory predicts that, ultimately, trust plays a role in the decision to perform a certain behaviour. Several authors (Mayer et al. 1995; Jones and George 1998; Dirks and Ferrin 2001; Chiu et al. 2006) state that trust is an important factor in cooperation and knowledge sharing. Mayer et al. (1995) define trust as the "willingness of a party to be vulnerable." This can be interpreted in several ways: Renzl (2008) considers the possible loss of an individual's unique competencies as a result of knowledge sharing to be an important factor which hinders knowledge sharing. We believe that by sharing OER, an individual teacher may not risk losing his or her uniqueness, but we think trust may affect OER-sharing behaviour in other ways. In line with Mayer et al.'s view of trust as a vulnerability issue, we believe trust may play a key role in people's willingness to share OER. The importance of trust has thus far received little attention in the knowledge-sharing literature (Wang and Noe 2010).

In this study, we consider trust in relation with reciprocity and with reputation. As both reputation and reciprocity can be considered as extrinsic factors, the satisfaction of these motivators depends on a third party, in this case other teachers or even the school management. We thus believe that the impact reputation and reciprocity have on teachers' intentions to share OER will strongly depend on the trust teachers have that their colleagues will somehow contribute to the satisfaction of these extrinsic factors (i.e., enhance their reputation and exchange OER). If teachers believe that sharing OER will not be noticed by other teachers,

they will probably be less likely to share OER because this will not strengthen their reputation. Similarly, if teachers share because of reciprocal reasons, they will be less inclined to do so if they expect that other teachers will not share their OER as well. This corresponds with the work of Empson (2001), who found that fear of exploitation is an important determinant of knowledge sharing: not getting something in return will result in a lower intention to share knowledge.

The Current Study

In the current study, we try to identify determinants of a teacher’s intention to share OER, in order to find out how OER-sharing behaviour can be stimulated. In general, it is expected that teachers are more likely to share OER when the perceived benefits outweigh the costs. Trust will strengthen the relationship between rewards and intention to share. This results in the following hypotheses:

Hypothesis 1: Self-efficacy, technological cost and development cost will be negatively related with teachers’ intentions to share OER.

Hypothesis 2: Altruism, reputation and reciprocity will be positively related with teachers’ intentions to share OER.

Hypothesis 3: The relationships of reputation and reciprocity will be moderated by trust. As trust increases, these relationships will become stronger.

Method

Sample and Procedure

Teachers from primary, secondary and higher education were contacted through an online panel to participate in our study ($N = 1,568$). The distribution of our sample with respect to education type, age and gender is shown in Table 13.1. Based on information from 2009 (CBS 2009), we found the deviations from the Dutch teacher population distribution to be relatively small.

Table 13.1: Distribution of the study sample with respect to teacher age and gender, by education type

Education type	Number in sample	% Women	Median age in years (standard deviation)
Primary	629	82.0	42.38 (12.73)
Secondary	819	55.2	44.77 (12.40)
Higher	120	49.2	41.73 (13.00)

Measures

The dependent variable (i.e., teachers’ intentions to share OER) was measured using one item that could be rated on a seven-point response scale ranging from fully agree to fully disagree. The item was: “When I develop digital learning materials or when I adapt existing materials, I would freely share them with others.” The other items, which measure different aspects of costs, rewards and trust related to sharing OER, are shown in Table 13.2.

For technological cost, altruism, reputation and reciprocity scale scores were calculated by averaging the scores on the constituting items. The internal consistency (Cronbach's alpha) for these scales is reported in Table 13.3 and was considered satisfactory.

Table 13.2: Overview of the independent variables used in this study

Note: The dimensions under study are marked in bold. Items tapping into these dimensions are numbered 1 to 13.

Item no.	Dimension/Item
	SELF-EFFICACY
1	The OER I develop would have an added value for other teachers
2	I have the necessary ICT skills to develop OER
	TECHNOLOGICAL COST
3	Sharing OER on the Internet (e.g., on a website or through Wikiwijs) would require little effort
4	Sharing OER with my colleagues at school would require little effort
	DEVELOPMENT COST
5	It will take a lot of time to develop and share OER
	ALTRUISM
6	I like to share OER with others
7	Sharing OER with others would make me feel good about myself
	REPUTATION
8	Other teachers will show me more respect when I share OER
9	My reputation will improve when I share OER with other teachers
	RECIPROCITY
10	Other teachers share OER and therefore I feel I should do the same
11	Other teachers' OER is very helpful for my teaching activities and therefore I should share my own materials as well
	TRUST
12	I expect that most other teachers would share their OER
13	I expect that other teachers would show their appreciation when I share my OER with them

Analysis

The variables in this study were standardised for analysis. School type was recoded into two dummy variables. Subsequently, a hierarchical regression analysis was performed with: in a first step, the control variables (gender, age and school type); in the second step, the independent variables; and in the third step, the interactions (trust × reputation and trust × reciprocity).

Participants whose predicted value, based on the final model, was more than three standard deviations away from the observed value, were considered as outliers. In total, the responses of 144 participants were excluded in this way.

The analysis was then repeated without these participants and reported in the results section. Descriptive statistics of the sample on the variables under study are reported in Table 13.3.

Table 13.3: Descriptive statistics of the variables under study

Note: Scores can vary between 1 and 7. The upper right part of the matrix contains bivariate correlations between the variables.^a

Variable	<i>M</i>	<i>SD</i>	α	self-efficacy 1	self-efficacy 2	technological cost	development cost	altruism	reputation	reciprocity	trust 1	trust 2	
intention	2.47	1.48		.59	.14	.40	.14	.61	.22	.28	.45	.15	
self-efficacy 1	2.93	1.39			.33	.45	.10	.47	.31	.26	.30	.24	
self-efficacy 2	3.86	1.80				.53	-.19	.13	.16	.11	-.01*	.09	
technological cost	3.19	1.42	.70				-.04*	.44	.23	.30	.28	.15	
development cost	3.23	1.73						.20	.09	.07	.13	.07	
altruism	2.97	1.38	.90						.47	.43	.54	.31	
reputation	3.87	1.47	.83							.47	.37	.58	
reciprocity	3.98	1.53	.76								.54	.43	
trust 1	3.42	1.50										.37	
trust 2	3.97	1.61											.37

a. All correlations are significant at the .05 level, except those marked with an *.

Results

The results of the hierarchical regression are given in Table 13.4. The final model explained 54.7 per cent of the variance in intention to share ($F(15, 1408) = 115.64$, $p < .001$). The control variables (gender, school type and age) together explain 1.3 per cent of the variance in intention to share. In particular, there is a negative correlation between age and the intention to share OER with other teachers ($\beta = -.09$, $p < .001$). As for school type, there was a small significant difference between primary and secondary education ($\beta = .05$, $p = .02$), indicating that teachers in secondary education seem more willing to share OER than teachers in primary education. Differences between men and women with regard to the intention to share digital learning materials were non-significant.

Of the independent variables in the model, three variables were non-significant. Development cost, reciprocity, and whether teachers have the necessary knowledge and skills to develop digital learning materials did not seem to impact on teachers' intentions to share OER.

Of the remaining variables, the expectations that one's developed material would be useful for other teachers and altruism were the most important predictors of sharing intention, as indicated by the relatively high standardised regression coefficients.

Table 13.4: Hierarchical regression in three steps, with intention to share OER as the dependent variable^a

Predictor	ΔR^2	β	t/F change	p
Step 1	.013		5.76	<.001
gender		.02	.70	.49
age		-.09	-4.54	<.001
secondary*		.05	2.33	.02
higher*		-.01	-.58	.56
Step 2	.535		187.04	<.001
self-efficacy 1		.42	18.98	<.001
self-efficacy 2		-.02	-.93	.35
technological cost		.11	4.56	<.001
development cost		.01	.66	.51
altruism		.32	12.24	<.001
reputation		-.06	-2.27	.02
reciprocity		-.01	-.59	.56
trust 1		.14	5.65	<.001
trust 2		-.07	-3.06	<.001
Step 3	.000		.78	.46
trust 1 \times reciprocity		.02	1.09	.27
trust 1 \times reputation		-.02	-1.04	.30

a Education type was analysed with two dummy variables marked by a *. The reference category was primary education. Both secondary and higher education are thus contrasted with primary education.

Technological costs exhibited the expected relationship with intention as well: as teachers expect sharing OER will require little effort, they will be more inclined to share.

Contrary to our hypothesis, reputation had a negative relationship with intention, indicating that as teachers expect they will get more respect when they share, their intention to do so will actually decrease.

Both trust with respect to reputation and trust with respect to reciprocity affected teachers' intentions to share OER. Teachers who believe their colleagues will share as well (trust in reciprocity) have a higher intention to share. On the other hand, teachers who believe their colleagues will show them more respect when they share OER seem less inclined to actually share.

In the third step of the regression, two interaction terms were added. Adding these terms did not significantly increase the explained variance in intention to share. None of the tested interactions was significant.

Discussion

The impacts of our conjectured determinants of intention to share OER are discussed below. As we expected that costs, rewards and trust would be important predictors of teachers' intentions to share OER, the discussion is organised according to these dimensions.

Costs

Only two of the four expected costs were significant predictors of teachers' intentions to share. When teachers believe their OER could have an added value for other teachers as well, they will be more inclined to share OER. We believe this perceived added value depends on the confidence teachers have in their pedagogical and ICT skills. Therefore, knowledge self-efficacy was considered as a cost, as a lack of self-efficacy would require a substantial investment on the part of the teacher. This first aspect of knowledge self-efficacy was the most important predictor of teachers' intentions to share OER. The more teachers expect their OER could be useful for their colleagues as well, the more they will be inclined to share.

Technological costs have an impact on the intention to share as well. Although the impact of technological cost was limited, it seems that if teachers expect that sharing OER would take little effort, they will be more likely to share. Our hypothesis regarding the impact of costs on the intention to share is, however, only partially confirmed. The development costs seemed to have no impact on teachers' intentions to share. Although this cost may seem similar to the technological cost, it is different in two important ways.

- The development cost is an investment teachers have to make regardless of their intention to share. In order to be effective teachers, they will probably have to develop some teaching materials themselves, which could be made available as OER.

The technological cost may require other skills than those necessary to develop OER. Therefore it is not surprising that only the technological cost is considered when teachers decide to share their

OER. Moreover, as we have argued in the introduction, teachers get no competitive (or financial) advantage by keeping educational resources for themselves. As the investment in the development of the educational resources has already been made, teachers may as well share their OER with other teachers, as long as this can be done with a limited additional effort.

The second dimension of knowledge self-efficacy we have considered, having the necessary skills to develop OER, did not have an impact on teachers' intentions to share. Although this factor may not influence the intention to share, possessing the required skills to develop OER is obviously a necessary condition in order for a teacher to be able to share. The descriptive statistics in Table 13.3 show that teachers have average scores on the self-efficacy variable, indicating that teachers' perceived efficacy with regard to the development of OER is only average.

Rewards

As expected, altruism is positively correlated with the intention of sharing OER. Teachers who like the activity of sharing OER as such are more inclined to actually share. Therefore, sharing does not have to be motivated by financial incentives or external pressure. Sharing in itself, with the positive emotions teachers experience when sharing, seems to be a sufficient motivation for them to show this behaviour. More importantly, altruism was found to be the second most important predictor of teachers' intentions to share OER.

As a second possible reward for sharing OER, we considered the positive impact that sharing OER could have on a teacher's reputation. If the shared OER are valued by other colleagues, this could possibly be beneficial for the respect a teacher receives. The results indicate that there is a significant relationship between the expected impact of sharing OER on reputation and intention to share. This impact is, however, in the opposite direction of what was expected. As teachers indicate that they would get more respect when they share OER, their likelihood to actually share seems to decrease. As the correlation between reputation and intention is positive (in contrast with the regression coefficient), a suppression effect seems responsible for this result. Although the impact of reputation was relatively limited, the unexpected direction of its relationship could not be attributed to chance.

The relationship between reputation and intention to share is hard to explain from our current results and might possibly be due to a third factor that was not measured in this study. Deci and Ryan (1985) believe that extrinsic rewards (e.g., monetary incentives or a reputation increase) can have a negative impact on intrinsic motivation. The limited effect of reputation on intention could thus be due to a lower intrinsic motivation to share OER of teachers who share for reasons related to their reputation. This particular effect was found in a study comparing different types of feedback (e.g., a thank-you message versus a relative ranking of contributors) in an online knowledge-sharing system (Cheshire and Antin 2008). The study showed that intrinsically motivated contributors were not affected by the feedback mechanisms (i.e., their number of contributions did not depend on the type of feedback) as compared to extrinsically motivated contributors who were affected by the feedback type.

Finally, the impact of reciprocity on the intention to share was investigated. The analysis showed that the relationship between reciprocity and intention was not significant. Controlling for other variables in the model, the intention to share does not seem to depend on the fact that other teachers share as well. The fact that other teachers' OER could be an added value for one's own teaching practice does not seem to be an incentive for teachers to share OER. Both this finding and the results regarding the impact of reputation are in line with research on teachers' motivation (De Cooman et al. 2007), which found that teachers are mainly driven by intrinsic factors rather than extrinsic rewards. Moreover, other studies on knowledge-sharing behaviour have failed to show an effect of reciprocity as well (e.g., Lin et al. 2009).

Trust

Trust was introduced in this study as a moderator of the relationship between rewards and intention. Both aspects of trust measured were also found to have a main effect on teachers' intentions to share OER. The confidence that other teachers would share their educational resources as well has a positive correlation with the intention to share. This may at first seem inconsistent with the results concerning reciprocity, which showed that the intention of teachers to share does not depend on the sharing behaviour of other teachers. Reciprocity, however, must be considered as a reason why teachers may or may not share OER. Trust with respect to reciprocity, on the other hand, indicates to what extent the necessary conditions are met for reciprocity to play a role in teachers' intentions to share. In the knowledge-sharing literature, trust often refers to an aspect of the organisational climate. Our measure of trust could possibly in part measure this general organisational trust factor as well, hereby inflating the impact of trust with respect to reciprocity.

The second aspect of trust that was measured is the expectations teachers have that other teacher will actually show their appreciation for the shared OER. This was considered as trust regarding the reputation. Contrary to our hypothesis, this variable showed a negative association with the intention to share. The intention to share decreased as teachers' trust in receiving appreciation for their OER increased. Correlations between this aspect of trust and reputation were fairly high, indicating that participants interpreted these items similarly, even though the trust item stressed the aspect of actually receiving respect or recognition.

The Moderating Role of Trust in the Relationship Between Rewards and Sharing

Our data do not support the importance of trust in the relationship between rewards and intention to share. Almost no additional variance was explained when the interactions were added to the model. As reciprocity played no significant role in explaining teachers' intentions, it is of little surprise that the impact of reciprocity does not depend on trust. The fact that we failed to show a significant moderating effect of trust with respect to reputation could be due to the limited impact of reputation as such or, as already mentioned, to the operationalisation of this aspect of trust which was similar to the reputation items.

Implications for Practice and Conclusions

Knowledge of the key determinants of sharing OER by teachers is crucial for initiatives such as Wikiwijs. Knowing why teachers voluntarily share OER can help with creating Web-based environments and strategic policies that foster sharing behaviour. Websites such as www.Wikiwijs.nl could use status points to enhance reputation, or users could be encouraged to evaluate learning materials, thereby showing recognition for the shared materials.

However, although such tools may seem favourable from an intuitive point of view, the results of this study show that such a strategy may not be very effective in promoting the sharing behaviour of most teachers. An improved reputation even seems to have an adverse effect on teachers' intentions to share OER.

The most important predictor in the model proved to be knowledge self-efficacy. When teachers believe that their OER has an added value for others, they will be more inclined to share. In this sense, we believe that online tools that show the appreciation for a certain resource may contribute to the visibility of the resource's use. Next to the download statistics indicating how often a document or image has been downloaded, attention should be paid to the evaluation of the material itself. If teachers notice that their shared OER are also used and appreciated, they will likely be more inclined to share their learning materials in the future. This may seem in contradiction with the finding that reputation has a negative effect on sharing behaviour. However, in this case the OER itself is evaluated and not the developer. The appreciation should therefore instead be shown for the OER itself rather than in the form of status points for the teacher who developed them.

Implications for Practice

It seems that altruistic motives play a key role in teachers' intentions to share OER. This implies that teachers enjoy the behaviour as such, without the need for any extrinsic incentives. It must also be noted that some scholars believe that providing extrinsic motivators to intrinsically motivated people can have a detrimental effect on motivation. Our results therefore suggest that motivating teachers to share OER should focus on intrinsic aspects of the behaviour. An interesting finding, though, is that trust in other teachers' sharing behaviour seems to impact intention as well. Although the impact of that was more limited, it was the third most important predictor. Moreover, as our descriptive statistics suggest, while most teachers have a strong intention to share OER, they nonetheless seem to have less confidence in their colleagues with respect to sharing OER.

We believe this discrepancy should be made apparent in order to motivate teachers to share their OER. We believe that the more teachers perceive that other teachers share as well, the more they will be inclined to share themselves. In other words, sharing OER will thus be increasingly considered as the norm. OER initiatives should therefore try showing that there is a great willingness to share. Websites could use tools to indicate how much new material is added by fellow teachers in a given period.

Although the costs involved in sharing OER seemed to play only a limited role, our results suggest that the more teachers perceive sharing OER to be effortless, the

more they will be inclined to share. Online repositories for OER, such as Wikiwijs, may help contribute to the ease of spreading OER, but should also be developed in such a way that uploading new materials is relatively effortless.

Finally, sufficient ICT and pedagogical knowledge and skills are necessary conditions to enable teachers to develop OER. Although these skills did not seem to correlate with teachers' intentions to share OER, they are still a key determinant in the development of digital educational resources. In addition, previous research regarding the use of digital learning materials showed that self-efficacy is an important determinant of the use of digital learning materials in teaching practice (Kreijns et al. 2011; Van Acker et al. 2011). Teachers' knowledge and skills with respect to developing and using OER should thus receive the necessary attention as well.

In conclusion, it seems that teachers' intention to share OER is determined mainly by intrinsic factors such as altruism. Extrinsic reward systems may therefore yield limited results with respect to increasing teachers' willingness to share OER, or may even have an adverse impact.

Limitations and Future Research

The aim of our study was to find possible moderating effects of trust on the relationship between several potential determinants of teachers' intention to share OER. Although a quantitative approach seems best suited to test this kind of hypotheses, we believe the exploratory character of this study could also have benefited from a more qualitative approach. Therefore, we suggest conducting further studies based on social exchange theory, to explore other determinants of OER-sharing intentions. Moreover, such a qualitative approach could also help to explain some of the unexpected findings from our study, such as the negative relationship between reputation and intention to share.

Finally, although our results show that trust is involved in the decision to share OER, future research could focus on other aspects of trust that could possibly impact on sharing behaviour. We believe that one issue that deserves more attention is the vulnerability aspect, with respect to knowledge and skills, to which teachers are exposed when they share educational resources.

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Can Open Educational Resources Thrive in Closed Educational Systems? Some Reflections on OER in Developing Countries

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Introduction

The importance of the OER movement in democratising education, together with the growing awareness and re-use of OER among institutions in developing countries is often seen as a phenomenon that will enable countries to harness the potential of OER to promote access to education and improve the quality of their education delivery systems (UNESCO 2002; UNESCO-IIEP 2005). However, despite the apparent advantages of OER as articulated by many scholars and international agencies such as UNESCO and the Commonwealth of Learning (COL), educational systems in developing countries do not seem to be adopting and re-using OER on a mass scale to address the problems posed by the geometric increase in the social demand for education — particularly higher education — to enhance the quality of their educational programmes.

Added to this is the potential for widening the existing “digital divide,” with institutions and agencies in the developed world seeming to lead OER production while their counterparts in the developing world seem to be mere consumers of OER. Huge disparities already exist between the developed and developing countries in the availability of, and access to, information and communication technologies (ICTs). For example, there are 80 Internet users per 100 in North America while in Sub-Saharan Africa the number drops to a mere 10 per 100 (ITU 2009).

The low level of OER re-use has become a significant part of scholarly discussion. A number of scholars have sought to identify the factors that hinder OER adoption and re-use in the developing world (UNESCO-IIEP 2005; Larson and Murray 2008; Hatakka 2009). Although these scholars, and forums such as the UNESCO-IIEP’s discussion Forum on OER for Higher Education, have provided very useful insights into the range of factors that hinder or promote OER adoption and re-use

in developing countries, there has been a tendency to overlook the socio-cultural contexts in which institutions operate and the centralised, closed organisational structures and systems that characterise them.

This chapter's main concern is to emphasise the importance of analysing the aforementioned organisational structures and systems, including the dominant pedagogical values and traditions of educational institutions in the developing world, in the ongoing attempt to identify and address the major impediments to OER development, adoption and re-use. It is argued that although infrastructure and technology are important *vis-à-vis* the capacity to develop and/or use OER, there is the need to explore the organic link between OER adoption/re-use and the organisational/institutional structures of educational systems in the developing world and their dominant pedagogical norms and values.

The chapter has four main sections:

- The first section briefly discusses the concept of OER and the impediments to their use in the developing world as articulated in the literature.
- The second section is largely conceptual and discusses key concepts such as power-distance, centralisation versus decentralisation, and the related concepts of open and closed educational systems and how they promote or impede the re-use of OER in a sustainable manner. It stresses the significance of socio-cultural contexts and institutional factors (pedagogical values and traditions, policies and power relations within institutions) in promoting or hindering OER adoption and re-use in developing countries.
- The third section is a brief discussion on promoting OER through the development and implementation of robust OER policies by institutions and the need for a paradigm shift in pedagogical values and practices (i.e., from the “banking” concept of education to more open systems of learning and teaching).
- The concluding section identifies the main areas that need to be addressed if the use of OER is to be effectively institutionalised.

The Concept of OER

The concept of OER has been defined in different ways by different scholars, organisations and institutions (UNESCO 2002; OPAL 2011). In a recent publication, OER is defined as an educational resource that incorporates a licence facilitating “re-use, and potentially adaptation, without first requesting permission from the copyright holder” (COL 2011, p. 5). In an earlier paper (Kanwar et al. 2010), we contended that much of OER discourse is premised on the pre-eminence of technology in OER development, production, and re-use “and there is rarely any discussion on issues such as stakeholder engagement and the politics of power.”

Drawing on Castells’ (2009) notion of network-making power and the concept of “domestication” as proposed by Silverstone et al. (1992), we defined the use of OER as:

“an empowerment process, driven by technology in which various types of stakeholders are able to interact, collaborate, create and use materials and processes, that are freely available, for enhancing access, reducing costs and improving the quality of education at all levels.”

Power is central to this definition. In our view, the “open” in OER draws attention to not only the technological dimension but also the governance dimension as well — that is, the institutionalisation process which enables all stakeholders to collaborate on equal terms. Hence, our conceptualisation of the use of OER as an empowerment process facilitated by technology. This point is important in the context of the current predicament of most users of OER in Africa, South Asia and Latin America who are unwittingly transformed into mere consumers of OER produced by institutions in the developed world.

OER in Developing Countries: Impediments

Although awareness of the open content movement is growing in developing countries and a number of institutions in Africa, Asia and Latin America are producing, adopting and re-using OER, most OER originate from developed countries such as the United States (e.g., the Massachusetts Institute of Technology [MIT’s] OpenCourseWare, Rice University’s Connexions, Carnegie Mellon’s Open Learning Initiative and the Open University UK’s OpenLearn). The digital divide, which characterises the development and use of ICTs, is also evident in the production and use of OER (Johnstone 2005; Wiley 2007; Hatakka 2009). For example, Africa accounts for only 1 per cent of content produced globally; this figure drops to 0.4 per cent if South Africa is excluded.

Wiley (2007) estimated that there were over 2,500 open access courses that educational institutions in developing and developed countries could use, and MIT’s OpenCourseWare had no less than 1,800 courses. Given that one of the key problems facing educational institutions in developing countries is how to democratise access to education in the context of the dearth of good quality resources and inadequate facilities, these countries ought to be intensive users of OER. Some of the potential advantages of OER include:

1. Since course development is so resource intensive, OER help developing countries save course-authoring time and money.
2. OER foster the exchange of global knowledge.
3. OER help forge south-north and south-south linkages.
4. Online collaborative OER development supports capacity building in the developing world, thereby bridging the digital divide.
5. Collaborative OER development encourages the preservation and dissemination of indigenous knowledge.
6. The availability of high-quality OER can raise the quality of education at all levels (Kanwar et al. 2010).

Given these potential advantages, why have institutions in developing countries failed to harness the potential of open content? If OER are to be used to promote access and improve the quality of education, it is essential to understand the contexts in which educational institutions in developing countries operate, particularly the character of the educational systems, their culture and traditions. The low level of OER adoption and utilisation by developing countries is part of the important discourse of the OER movement (Unwin 2005; Joyce 2007; Larson and Murray 2008). Based on a review of the literature on OER, Hatakka (2009)

identified and empirically investigated the most often cited impediments to the re-use of OER as follows:

- Language: the language used to develop the content or the style of the language
- Relevance: the extent to which OER is appropriate to the cultural milieu of developing countries
- Access: availability of open content and the ability to find suitable resources
- Technical resources: adequate infrastructure including hardware and software
- Quality: the quality of the information and knowledge contained in the OER and how trustworthy its source is
- Intellectual property: copyright issues

The subjects of Hatakka's study were teachers from Dhaka, Bangladesh, content developers at the university of Colombo, and users of UNESCO's Open Training Platform (OTP). Apart from the above commonly identified factors that impede OER re-use, his investigation revealed four additional factors: OER awareness, computer literacy, teaching capacity, and teaching practice and traditions (Hatakka 2009, pp. 6–7). Although these factors are important, we wish to emphasise the importance of the organisational structure of educational systems and the pedagogical values and traditions underpinning their operations. In the later sections of the chapter, we discuss educational systems and institutions and the paradigmatic stature that the “banking” concept of education has attained in most developing countries (Freire 1970), of which Hatakka's (2009) “teaching practices and traditions” are a part.

There are many emergent examples of OER use in different parts of Africa, Asia and Latin America, which have an immense potential for scaling up and replication, but these are still isolated instances that have yet to become a mass movement.

The most notable of these is the Teacher Education in Sub-Saharan Africa (TESSA) project. TESSA is a consortium of 18 institutions in nine countries in Africa, the Open University UK, the BBC World Trust and the Commonwealth of Learning. TESSA has developed and disseminated high-quality OER in online and print formats made up of 75 study units and covering five areas of the primary curriculum: Science, Literacy, Mathematics, Social Studies and the Arts, and Life Skills. These have been translated into four languages and adapted and localised to suit the unique cultural and linguistic contexts of the countries and institutions using them. Data from partner institutions in the nine countries indicate that TESSA OER have been integrated and used in 19 teacher education programmes, with a combined enrolment of 303,300 teachers (Wolfenden et al. 2010). Similarly, the Indian Institutes of Technology (IITs), in partnership with the government of India, have made all their engineering and technology courses available as OER. These open resources are currently being used by students and faculty in over 500 institutions to enhance the quality of their learning and teaching respectively (Kanwar 2011).

Even though the open resources developed and disseminated by the TESSA consortium in Africa and the IITs in India represent specific instances of successful OER development and utilisation, OER adoption and utilisation by the developing world continue to be slow, as demonstrated by Hatakka (2009).

Analytical Concept: OER and the Education System

OER cannot be perceived in isolation but have to be studied in the context of the education systems in which they operate. Democracy, governance, the status of teachers and culture are important determinants in the uptake of OER.

Democracy and Governance in Education

The Marxist perspectives of Althusser, Freire and conflict theorists perceive education as a tool for subjection *to the ruling ideology* (Althusser 1971, pp. 132–133). As Althusser says:

“... reproduction of labour power requires not only a reproduction of its skills, but also, at the same time, a reproduction of its submission to the rules of the established order, i.e. a reproduction of submission to the ruling ideology for the workers, and a reproduction of the ability to manipulate the ruling ideology correctly for the agents of exploitation and repression, so that they too will provide for the domination of the ruling class.”

In contrast, functionalists view education as an institution contributing to an ordered society. Excessive bureaucracy, control, an authoritarian approach are dysfunctions in the system that can be addressed through appropriate interventions.

Democracy and academic freedom in education face constant challenges. The role of government in the governance of education, particularly the centralisation of authority, is debated and questioned. While there are certain advantages in centralisation, decentralisation has to be perceived from the broader ideological perspectives of democracy, governance and human rights. According to UNESCO (2007, p. 8):

“Across the world, decentralization of fiscal, political, and administrative responsibilities to lower levels of government, local institutions, and the private sector is being attempted as a panacea to solve broader political, social or economic problems. In parallel, governments are proposing educational decentralization, as part of the sector-wide reforms. Implicit in these approaches is the assumption that increased participation in local schools would lead to democratic governance, increase accountability, and empower communities.... In the education sector this belief has led to such policies as transferring decision-making authority from central to local governments, increasing autonomy for schools, enabling communities to participate more effectively in school management and resource mobilization, and offering incentives for private providers. Underlying all this work is the assumption that when the provision or financing of education is less centralized, benefits will follow: education will become better, more efficient, more responsive to local demands, and more citizens will participate.”

How far have these strategies been adopted to realise an education system reflecting freedom, transparency and accountability? Nordmann et al. (2009) developed a Freedoms of Education Composite Index for Non-Governmental

Schools (NGSs) all over the world. It is a composite statistical tool that ranks countries from 0 to 100 by levels of freedom. A score of 0 represents complete lack of freedom, whereas a score of 100 reflects full freedom. The index has been developed based on six criteria:

1. Freedom to found and administer NGSs
2. State’s obligation to finance NGSs
3. Financing granted to NGSs
4. Parents’ freedom of choice
5. Home schooling
6. Autonomy, including pedagogical autonomy

The index revealed certain interesting trends (Table 14.1).

Table 14.1: Freedom of Education Composite Index of Non-Governmental Schools (NGSs)

	Levels of freedom	Number of countries
1	Countries with high level of freedom (score ranging from 67 to 100)	23
2	Countries with moderate level of freedom (score ranging from 34 to 66)	33
3	Countries with low level of freedom (score ranging from 0 to 33)	44
Total number of countries		100

Source: Calculated from Nordmann et al. (2009)

If non-governmental schools represent a decentralisation process, the above study shows the predominance of centralisation in many countries. Thus, freedom and autonomy are still major challenges in the education system, particularly in school education.

Higher education also faces similar challenges. A study by the OECD (Organisation for Economic Co-operation and Development) mostly in developed countries shows that only eight out of 14 countries enjoy full autonomy in setting academic structure and course content. Countries such as Japan, Korea, Turkey, Finland, Denmark and the Netherlands have only partial autonomy. The report argues (OECD 2003, p. 75):

“... higher education is moving towards a new system of governance, where the power of markets and the power of the State combine in new ways. Government is generally withdrawing from direct management of institutions, yet at the same time introducing new forms of control and influence, based largely on holding institutions accountable for performance via powerful enforcement mechanisms, including funding and quality recognition. Institutions that can no longer take their continued existence for granted are having to work hard both to meet the criteria embedded in funding and regulatory regimes and at the same time to strengthen their position in the marketplace.”

The report also offers the following suggestion:

“Government retains a strong interest in, and a complex range of objectives for, higher education. It will need to regulate the sector, to adopt policies that promote national objectives, to provide incentives

to stimulate appropriate improvements by providers, to mobilise from taxpayers the resources needed to meet public goals for higher education, and to ensure equality of opportunity and equity in access. Yet in doing all this, government will need to take care not to replace one potentially counter-productive form of control over higher education with another. The art of policy making will in future involve ensuring that public goals are met in higher education through influence rather than direction.”

A UK study concluded that autocratic management has led to a decline in higher education courses in terms of student dropout and withdrawal because of the changes imposed by management without proper staff and student involvement. Courses with high student achievement and retention are often the result of participatory and consultative decision-making processes (Martinez and Maynard 2002).

Status of Teachers in the Education System

Teachers are important stakeholders in the education system. However a study in Sub-Saharan Africa and South Asia showed that “very sizeable proportions of primary school teachers, particularly in Sub-Saharan Africa, have low levels of job satisfaction and are poorly motivated. Many tens of millions of children are therefore not being taught properly and are not receiving even a minimally acceptable education” (Bennell and Akyeampong 2007, p. viii). Poor accountability, weak policy environment, conflicts, limited pay and career progression, and heavy workload are some of the reasons cited for the lack of motivation. Substantial numbers of teachers in some African countries also suffer from poverty, poor working conditions and heavy workload (Table 14.2).

Table 14.2: Agreement rates to general statement of teachers regarding poverty and working conditions

Country	Percentage of teachers who agreed with the statement that teachers in this school come to work hungry		Percentage of teachers who agreed with the statement that the working conditions in the schools are poor	
	Rural %	Urban %	Rural %	Urban %
Ghana	36	0	77	18
Lesotho	59	44	39	25
Sierra Leone	100	100	75	45
Tanzania	20	33	43	40
Zambia	57	58	65	25
India	12	33	20	44

Source: Bennell and Akyeampong (2007)

Culture and Education

Education traditions are influenced by culture that shapes the norms, values and expectations within the teacher-student relationship. Ho et al. (2004) point out that some cultures foster a collectivist focus that strengthens interdependent relations and social responsibility. In contrast Western civilisation is oriented towards the individualistic mode (Table 14.3).

Table 14.3: Salient features of collectivist and individualist cultures

Collectivism	Individualism
Fosters interdependence and group success	Fosters independence and individual achievement
Promotes adherence to norms, respect for authority/ elders, group consensus	Promotes self-expression, individual thinking and personal choice
Associated with stable, hierarchical roles	Associated with egalitarian relationships and flexibility in roles
Associated with shared property and group ownership	Associated with private property and individual ownership

Source: Ho et al. (2004, p. 5)

The collectivist culture has a strong teacher-centric approach. The Confucian culture of Southeast Asia and China and the Guru-Shishya approach of the Indian sub-continent are characterised by a strong reverence for teachers. On the other hand, Western cultures emphasise the dialogic approach that is student-centric. Such differences have an impact on the teaching and learning environment (Table 14.4).

Table 14.4: Aspects of teaching and learning in collectivist and individualist cultures

	In collectivist cultures:	In individualist cultures:
Education	1. Education is a way of gaining prestige in one's social environment and of joining a higher status group.	1. Education is a way of improving one's economic worth and self-respect based on ability and competence.
Learning Attitudes	1. Students expect to learn "how to do." 2. There is a positive association in society with whatever is rooted in tradition.	1. Students expect to learn "how to learn." 2. There is a positive association in society with whatever is "new."
Social Interactions	1. Individual students will only speak up in class when called upon personally by the teacher. 2. Individual students will only speak up in small groups.	1. Individual students will only speak up in class in response to a general invitation by the teacher. 2. Individual students will speak up in a large group.
Harmony and Conflict	1. Formal harmony in learning situations should be maintained at all times. 2. Neither the teacher nor any student should ever be made to lose face.	1. Confrontation in learning situations can be salutary; conflicts can be brought into the open. 2. Face-consciousness is weak.

Source: Ho et al. (2004, p. 6) adapted from Hofstede (1986) and Chang and Chin (1999)

It should be noted that culture not only influences education but is influenced by education. Education is also constantly challenged by technology, demographic factors and socio-economic conditions.

Promoting OER Use at the Institutional Level

The OER movement is a people's movement, founded on principles that challenge the organisational values and pedagogical practices of most educational institutions in the developing world that still represent closed educational systems. The principles of openness, sharing and collaboration that characterise the OER movement are different, if not opposed, to the traditional "banking" concept of education in which ownership, individualism and competition

predominate. Thus, if the goal of promoting greater production and use of OER is to be actualised, it will be necessary to critically examine the ways in which the centralised, closed educational systems and institutions, with their accompanying traditional pedagogical practices, may be made to be more OER-friendly. What can be done?

The first step that needs to be taken in this transformation is the development and implementation of institutional policy frameworks that support and promote the production and re-use of OER. A key obstacle to the development and re-use of OER is the absence of a policy framework that recognises the importance of OER in promoting access and enhancing quality, and that knows how OER can further institutional goals and promote the professional growth of faculty. For example, existing policies and practices pertaining to staff promotion do not attach much importance to the contributions of faculty to OER creation, adoption and re-use. Thus, academic staff are not willing to devote a significant proportion of their time to OER (UNESCO-IIEP 2005). At present, it is individuals who are championing the use of OER.

Institutional policies on OER should, among other things:

- recognise the immense potential of the systematic and planned use of OER in transforming teaching and learning, and support the promotion of access and quality in a cost-effective manner;
- specify institutional strategies for developing and integrating OER in teaching and learning, as well as the investment that needs to be made in ICT infrastructure for easy access by staff and students;
- provide adequate incentives and guidelines to faculty to develop and use OER and support collaborative activities among faculty to do this (for example, OER activities should be given a rating comparable to research and publishing and be counted towards promotion); and
- develop staff and students' capacity on how to access, evaluate and use OER; and put in place Quality Assurance frameworks that will ensure high levels of quality in the integration of OER in teaching and learning.

Conclusion

Much has been written and studied about the impact that OER has made on the education systems in the developing countries. Sadly, the general conclusions are that OER, as a movement, has not made any dramatic transformation of the educational provision in most resource-poor nations in the developing world. In this chapter, we have identified the major reasons for the poor performance of this initiative — an initiative that can offer so much, but has delivered very little thus far.

The main findings of these studies summarise the challenges:

- a) *Inability of the legacy systems to absorb changes* – The education system in most developing nations is part of their inheritance from a colonial past. These systems are conditioned by the 18th-century European models of liberal traditions that placed a high premium on notions of autonomy, freedom of speech, academic freedom, internal democracy and non-

interference by the governments that provided them the funding for their survival. These traditions and value systems shaped the higher education systems across the world until the mid-20th century, when questions began to be asked about the massive expansion of higher education systems — including the meaning and purpose of higher education itself. As the cost of education went up and government funding began to dwindle, questions were also raised about the accountability of the system. In the last five decades, the education system has gone through a churning process, and we are witness to the emergence of several new developments such as Open and Distance Learning (ODL), OER, eLearning and mobile learning.

In its current form, ODL is over four decades old. But how universal has it become? While some of the developing countries have made substantial progress, a vast majority of the less developed nations in Asia, Africa and Latin America still lag far behind. The reasons are not far to seek. Primarily, these cultures lack the will to break the shackles of the legacy systems that have conditioned their approach to educational development; and many of them simply do not have the physical and intellectual resources to venture into areas of educational reforms and transformation.

- b) *Inability to prepare high-quality learning materials* – As the ODL system began to take root, the poor quality of learning materials was perceived to be a major reason for ODL's slow progress in many countries. Capacity-building efforts through donor support did not make any significant impact. If anything, these efforts only deepened the dependency co-efficient. The OER movement initiated at the beginning of the new century was thought to be the panacea for all the ills that afflicted the growth of the ODL system. But did it work? The available evidence does not suggest even marginal success. As we have noted in this chapter, the constraints were too many: some technological, some socio-political, some cultural. And, in many cases, there was a simple unwillingness to seize the opportunity to integrate OER into the domestic educational provisions.
- c) *Poverty and poor quality of working conditions of teachers* – These factors are often held as inhibiting innovation and motivation. While this could be accepted as a valid reason in part, the greater problem in our view is a general unwillingness among academics to experiment, take risks and show any significant entrepreneurship. Environmental constraints like state control of education, cultural incompatibility and absence of accountability within the system do certainly impact negatively on experimentation and innovation, but it should be noted that many among the developing nations have broken away from the traditions of the past and made their education systems more dynamic and vibrant. The ready availability of high-quality educational resources should play a catalytic role in such environments.
- d) *Dependency syndrome* – Economic constraints can by no means be ignored. Donor support has done a world of good for the developing nations to build capacity within their education systems. As often happens, however, donor support ends at some point, and whatever little has been achieved is never built on and, in many cases, is simply abandoned. This dependency syndrome can be seen in many different forms: inflexible academic structures and pedagogical practices; inefficient governance and

administrative processes; socio-political and cultural constraints; and the plain avarice of providers from the rich nations out to commercially exploit the poor ones.

If OER has not made an impact, it is very easy to attribute this failure to the digital divide, technology deficit or neo-imperialism. The developing countries have to accept the reality that OER is a precious resource that they can access and use through various adoption, adaptation and translation approaches. However, because the education system in the developing countries is accustomed to generous funding from a variety of sources and platforms, there is likely an expectation of funding support for OER use as well, to strengthen infrastructure, build capacity and help adoption and adaptation.

Many lessons might be learned from the ODL experience in India with the Indira Gandhi National Open University (IGNOU), initiated almost a decade before the OER movement was launched. Soon after the IGNOU was established, the Distance Education Council (DEC) was set up with the mandate to promote the ODL system in the country. The conceptual design of the DEC was: the creation of a central agency as a networking hub for all distance education institutions; promotion of a partnership among them; and most importantly, the sharing of programmes and courses as academic resources of the system. A protocol was developed, setting out the terms and conditions for drawing on a common pool of accrediting programmes and courses created and offered by various distance education institutions in the country. The model worked for some time. Then, however, problems began to crop up, firstly because the common pool consisted only of IGNOU programmes, creating doubts about the credibility of the programmes of other institutions. Using other university's learning materials, it was argued, was unacceptable in the context of university autonomy.

If detailed studies of the experience of this initiative were conducted, the findings might help guide how OER is rolled out. There is much to learn from how “open education” has evolved, from correspondence education to the emergence of open universities and now to the OER movement — the third generation of opening up education.

In summary, we point out that the general trend in the developing world is to use OER as a means of:

- meeting a tremendous demand for qualifications at all levels, secondary as well as post-secondary; OER are not simply seen as a value-add to existing educational provision, but as a route to earning credentials; and
- reaching the unreached constituencies in remote and distant locations through the use of appropriate technologies rather than computers alone.

In many developing countries, such as India, China and Vietnam, it is primarily the state rather than philanthropic organisations that has come forward to support OER initiatives, as is the case in the West.

The OER movement offers a means of overcoming these challenges and can help transform the educational system by:

- Involving all stakeholders in the participation, collaboration, creation and sharing of academic resources.

- Encouraging consumers to become the producers of knowledge – Traditionally, knowledge has flowed from industrialised to developing countries, from English speakers to those who speak indigenous languages and from teachers to students. The OER movement, by providing the opportunity to re-use adopt and adapt materials, can help reverse this trend.
- Enabling us to harness the wealth of tacit knowledge across the globe to address the great development challenges of our time.

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The Role of Open Educational Resources in Personal Learning

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Introduction

In this chapter, two perspectives of Open Educational Resources are considered: one from the perspective of a person who owns or produces the resource; and the other from the perspective of the person who requires access to the resource. The former model, it is argued, does not take into account the various dimensions of openness, and is vulnerable to various ways of closing access to resources.

In an effort to address the barriers to open education, a new form of online learning, the Massive Open Online Course (MOOC), was developed by me and my colleagues. The original MOOC is designed according to the principles of self-organising networks of entities. (I was the originator of the MOOC, delivering the first one with that name with George Siemens in 2008. It was a connectivist MOOC, a form now being distinguished with the term cMOOC as opposed to xMOOCs that deliver courses using video lectures and more traditional approaches.)

A series of these MOOC-based courses has been offered since 2008. An observation of these courses shows widespread production and use of Open Educational Resources (OER) within these courses.

It is suggested that by understanding the use of OER as “words” in a language used by participants in a MOOC to communicate with each other, we can explain the role of OER in personal learning. A course offered as a MOOC instantiates the properties of a self-organising network and, as a result, is resistant to the forces that limit the effectiveness of traditional OER.

The Idea of Openness

The central argument of this paper can be summarised as follows: learning and cognition take place in a network, and networks need to be open in order to function; therefore, learning and cognition need to be open.

To the former point we address the major tenets of the pedagogical theory known as connectivism (Siemens 2004). According to Siemens:

“Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories.... The starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed.”

As Siemens writes, “A network can simply be defined as connections between entities. Computer networks, power grids, and social networks all function on the simple principle that people, groups, systems, nodes, entities can be connected to create an integrated whole.” Connectivism, as it is typically presented, encompasses the description of learning as it occurs in two major types of network. First, it describes the conditions conducive to learning in a synaptic network, as is characteristic of the human brain (LeDoux 2002). Second, it describes the conditions conducive to learning in a social network, as is characteristic of a learning community (Watts 2003).

To the latter point we address the need of entities in the network to be able to communicate in order for the network to function. A network is not simply a system in which the entities are joined or related in some way. For a connection to exist, it must be possible for a change of state in one entity to result in, or have as a consequence, a change of state in another entity. In a simple case — for example, a Hopfield net — one entity in the network may exhibit an excitatory or inhibitory effect on the other (Hopfield and Tank 1986).

Openness, then, is in the first instance the capacity of one entity in a network to change or influence the state of another entity in the network. However, in the fields of content management and online learning, the concepts of “open” and “Open Educational Resources” have had a much wider connotation.

Much of what is written with respect to open content and open systems is derived from Richard M. Stallman’s original definition of what he called “free software” as four elements (Stallman 1994):

- Freedom to run the software
- Freedom to study the software
- Freedom to distribute the software
- Freedom to modify the software

This is a definition that has carried over into the OER movement. David Wiley’s original open content licence, for example, is based on “the premise that non-software content — specifically educational content — should be developed and shared in a spirit similar to that of free and open software” (Wiley 2003).

Definitions based on Stallman's four freedoms, however, may be open to challenge. When people talk about open source software, they talk about openness and freedom from the perspective of the person who already has the software, who already has it in his or her hands and wants to do things with it, like read it, share it or modify it. And anything that restricts what that person *does* with it is considered an infringement on the freedom. It gives the user the flexibility to do what he or she needs in order to get work done (Debian 1997).

The difference between these two models comes to a head with respect to commercial use. According to some, a licence that prohibits the sale of software is a limitation on its freedom. Debian (2007), for example, argues, "There is no restriction on distributing, or even selling, the software. This last point, which allows the software to be sold for money, seems to go against the whole idea of free software. It is actually one of its strengths. Since the licence allows free redistribution, once one person gets a copy they can distribute it themselves. They can even try to sell it."

But what of people who do not have the software, and need the software? The "four freedoms" of Stallman (1994) begin to change because, from the perspective of someone who does not have the software, freedom would be open access *to* the software with no restrictions. Anything that infringes on that open access is a restriction on that person's freedom.

In my contribution to an OER debate hosted by UNESCO, I described an alternative approach to open licensing (Downes 2011a). I described my own content licence, which was in turn derived from the licensing practices of George Reese, the creator of the Nightmare MUD Library. The licensing arrangements for MUDlibs were created, not with coders and programmers in mind, but with MUD players. As Reese (1998) writes:

"Since all drivers except DGD were derived from LPMud 3.0, they all require a copyright at least as strict as that one, which basically states that you can use the server as you like, so long as you do not make a profit off of its use. Most current servers have much more strict and explicit copyrights. On top of that, many of the mudlibs which exist also have similar copyrights. To require money of your players is therefore a violation of international copyright laws. DGD requires licensing through a third party company."

As I noted in the UNESCO debate, Lars Pensjö, who wrote the original LPMud in 1989 (Bartle 2003, p. 11), wanted to ensure free access to MUDs for the players. As the original MudOS licence stated, "Permission is granted to extend and modify the source code provided subject to the restriction that the source code may not be used in any way whatsoever for monetary gain" (mwiley 1999). As the discussion makes clear, this is not a prohibition against the recovery of reasonable expenses. It is intended mostly as a prohibition against one person using another person's work for profit.

The importance of this has become clearer 20 years later when we look at what has become of the online multi-player role-playing environment. The licence conditions weren't respected. As Richard Tew (Donky) writes, "That's the thing with releasing mudlibs: people make a few trivial changes and then decide that it has changed so much that it is effectively something completely new" (Tew 2010).

After appropriating the idea and (often) the source code, the commercial sector came to dominate the world of multi-player role-playing games. Today, if you want to play, you pay.

It is not necessary to establish that one or the other of these interpretations is “correct” in order to establish that there are different meanings of the term “open” depending on one’s perspective. So the question is: What is the correct perspective from which to be looking at the issue in the context of learning — online learning in particular?

The Challenge: Making Things Unfree

As noted above, it may be argued that the non-commercial condition attached to an open licence means that the content is not really free. But from another perspective, it can be argued that if someone is charging money for access, then the content is not free: not free in the sense that it does not have to be paid for, and not free in the sense of being able to use it as one wishes.

A common response from the defenders of commercial use has been that the content is always available for free somewhere. For example, D’Arcy Norman can be found arguing that commercial use “does nothing to push content into commercial exclusivity, and I would argue gives a relief valve against it — the original content is always available for use, re-use, etc. ... without having to give a penny to the opportunistic monetizer(s)” (Norman 2010). So, it does not matter if, say, Penguin sells a copy of *Beowulf* because *Beowulf* is in the public domain and readers can always get it for free somewhere else.

Against this response it may be observed that when there is commercial use of free resources, there is significant motivation to prohibit or prevent the free use of these resources. So even if theoretically it is the case that there could be free copies of *Beowulf*, the commercial publishers of *Beowulf* may devise mechanisms to prevent or discourage access to the free version. As a result, an entire infrastructure has been created, drawing on community support to foster the creation of open content, and then leveraging market mechanisms to commercialise this content.

For example, in my own study of models of sustainable OER, I found that most of the projects that produce OER are publishing projects (Downes 2007). The resources are coming out of either commercial publishing houses, universities that traditionally feed materials into commercial publishing houses, or foundations. The different models for the sustainability of OER were all based around that paradigm. For instance:

- *The endowment model* – This model is used by the Stanford Encyclopedia of Philosophy. A sum of money is invested and draws interest, and the earnings from interest are used to publish the resource (Loy 2009).
- *The membership model* – Fees for membership in a consortium are charged, and members participate in the creation of the resource.
- *The donation model* – Both Wikipedia and National Public Radio in the United States use the donation model. It is based on the idea that some organisation will do some publishing.

But even if you have these free resources hanging around, commercial publishers still manage to get you to pay for them. There's a variety of ways they do this (though when people pay for memberships, they usually expect privileges, and that typically means some sort of privileged access):

- *Lock-in* – If a user is locked into a certain technology (say, iTunes or the Kindle), then the material that would normally be available for free is, within that environment, only available at a price.
- *High bar* – Stringent but unnecessary conditions make free distribution unaffordable. For example, a service might require that learning object metadata, which has about 87 fields, *must* be filled in for it to be registered. The commercial publisher can afford to hire someone to sit there and fill metadata fields, but free content providers don't have that kind of resource.
- *Flooding* – Another way of making users access the commercial content rather than the free content is “flooding.” This can be observed by doing a search at Google for information on popular topics of learning — language learning, for example. The listings are flooded with search-engine-optimised commercial resources to the point that any free resources have been pushed far down the list.
- *Conversion* – Providers give users a free resource, convert it to a commercial resource, and then get users to pay for it because they have become dependent on the free resource and can't bear to be without it.

There can be disagreement with the details of this characterisation, but it becomes evident from the proliferation of such practices that there is an entire economy around creating content that is free, commercial, widely published, available by subscription — a whole infrastructure surrounding the idea of putatively open educational content. It is open educational content only to a degree, with restrictions, if circumstances permit, using certain technologies.

And that is the story of OER. Understanding the numerous other dimensions of openness also helps us understand additional ways the resources can be unfree.

Dimensions of Openness

In our work in connectivist courses, George Siemens and I have depicted the progression of openness in three major stages:

1. Openness in educational resources
2. Open courses
3. Openness in assessment — an as yet unrealised openness (Downes 2011b)

This is similar to the five-stage logic model proposed by James C. Taylor (Taylor 2007) and later adopted by the Open Educational Resources University (OERu) (Day et al. 2011):

- Learners access courses based on OER
- Open academic support by “Academic Volunteers International”
- Open assessment by participating institutions
- Participating members grant credit for courses
- Students awarded credible degree or credential

In these two models, we see three distinct forms of openness: of access to learning resources, of instruction, and of assessment and credentialing. Sir John Daniel, the former president of the UK's Open University, describing "dimensions" of openness, refers to the openness as related to openness of access or admission to a university programme, open resources, and then openness in being able to determine one's own educational progression, one's own course of studies (Daniel 2011b).

Additional literature brings to bear discussion of additional forms of openness. In order to understand the importance of openness to networks in education, we may identify these systematically.

- *Open curriculum* – The list of topics to be studied, or competencies to be acquired, or methodology by which learning is to be achieved, may be a more or less open resource. Arguably, MIT's OpenCourseWare was as much an advance in open curriculum as it was open courseware, as it now became evident to all just what MIT students studied in order to obtain MIT degrees. The South African Curriculum Wiki, no longer extant, was an early example of this (Richardson 2005).
- *Open admission* – Open admission, as documented above, is a process whereby a person is not required to offer evidence of previous academic standing in order to qualify for access to a learning opportunity.
- *Open standards* – In education, there's a variety of standards intended to facilitate how we describe, how we discover, and how we re-use educational resources. The central of these is called learning object metadata, or LOM, created originally by the Aviation Industry Computer-Based Training Committee (AICC), then passed on by Instructional Management Systems (or IMS), then standardised under IEEE, and then really standardised under the ISO standards organisations.

But there are other standards as well: Learning Design, Common Cartridge, and Learning Tools Interoperability. The United States military, under the auspices of Advanced Distributed Learning (ADL) came out with the Sharable Courseware Object Reference Model (SCORM), which is the standard in commercial online learning.

In some cases these standards are typically called "open," while in others they are more proprietary. For example, IMS supports itself with a membership system. Members that pay fees have access to the standards ahead of their formal release. By contrast, IEEE posted the Learning Object Metadata standard openly while it was still being discussed and decided upon, but charges a fee for the finished product.

- *Open source software* – Open source software has had a significant impact on online learning. Widely known is Moodle, a PHP-based open source learning management system created originally by Martin Dougiamas with the support of thousands of volunteer programmers. Moodle is small, portable and useful for colleges and schools. By contrast, the open source Sakai was built by a consortium of universities as part of MIT's Open Knowledge Initiative and is a large suite of enterprise software.

Other open source education projects include: Elgg, which is an open source social network software for learning; Atutor; LAMS (Learning Activity Management System); and School Tools. And more types of software are available at Schoolforge or Eduforge.

Open source software is released under one or another type of open source licence. To overgeneralise, one sort of open source licence, such as the Berkeley Software Distribution, allows open source software to be integrated into commercial uses while the other, such as the GNU General Public License, does not. In practice, open source software licensing is a thicket of options and permutations.

- *Open Educational Resources* – More specific to most of the papers in this volume are the open educational resource projects themselves. Here we list just a few of them. One of the earlier ones, and certainly the most famous, most heavily promoted, is MIT’s OpenCourseWare project (OCW). Something that’s also received a lot of attention recently (because it was featured on the TED videos) is the Khan Academy, which is a whole series of YouTube videos on mathematics, physics and similar science and technology subjects. MERLOT is a project that was created by a consortium of North American educational institutions.

These are just a few of dozens of projects that have been set up specifically to create educational materials for distribution for free (or some version of free) to people around the world.

The licensing of these resources, in order to make them available for use and re-use, was based on the GNU Free Documentation License (GFDL), which covered documentation associated with open source software. The GFDL did not allow for some types of restrictions, most notably, the “non-commercial” restriction.

More recently we’ve had Creative Commons. Creative Commons is now arguably the dominant mechanism for licensing OER and, indeed, for licensing open content of any sort. Devised by lawyer Lawrence Lessig, Creative Commons provides the licensor — the person who owns the material — with a series of choices allowing the author “some rights reserved.” These include the non-commercial clause, an attribution requirement, share-alike, and a no-derivatives clause.

One of the most popular forms of Creative Commons licence is the one that I use, “Creative Commons by Non-Commercial Share-Alike,” which means that I want to be attributed, I do not want the content to be used commercially, and I want it to be shared under the same licence that it was obtained under. For more information on licences, see Chapter 6.

- *Open teaching or tutoring* – Open teaching is the provision of live access to teaching activities or resources. As access to a TED video, for example, might be access to the resource, being able to watch a TED talk live — whether in person or online — is access to open teaching (though, of course, TED learning opportunities are manifestly *not* open). Open tutoring extends this idea to include openness of *interactivity* with the instructor or tutor.

MOOC Design Principles

It is evident from the discussion thus far that although much of the attention focused around open learning has been on the publication of OER, there are different perspectives and a range of types of openness to consider.

The original concept of the MOOC (Massive Open Online Course) was designed with these wider considerations in mind. It therefore focused not on the narrow question of licensing and distributing course materials, but on the wider question of promoting and preserving openness across all dimensions.

In order to best accomplish this, the MOOC is designed as a *network* rather than as a linear progression of subject materials or curriculum. In this way, all aspects of the course are distributed across all participants rather than centralised into a single location.

A network is composed of a set of *entities* (also sometimes called “nodes” or “vertices”). Entities form *connections* (also called “edges”) with each other. The Internet, for example, is a network, and network course design parallels that of the Internet (Spinelli and Figueiredo 2010). The vertice and edge terminology is from graph theory, from which the course design is also derived (Diestel 2010, p. 2). Networks of connected entities can arguably perform cognitive functions and, correspondingly, “connectionist” computer systems are intended to emulate the functioning of a “neural network” such as the human brain (Stufflebeam 2011).

These principles have been described in previous work (Downes 2005) and may be summarised as follows:

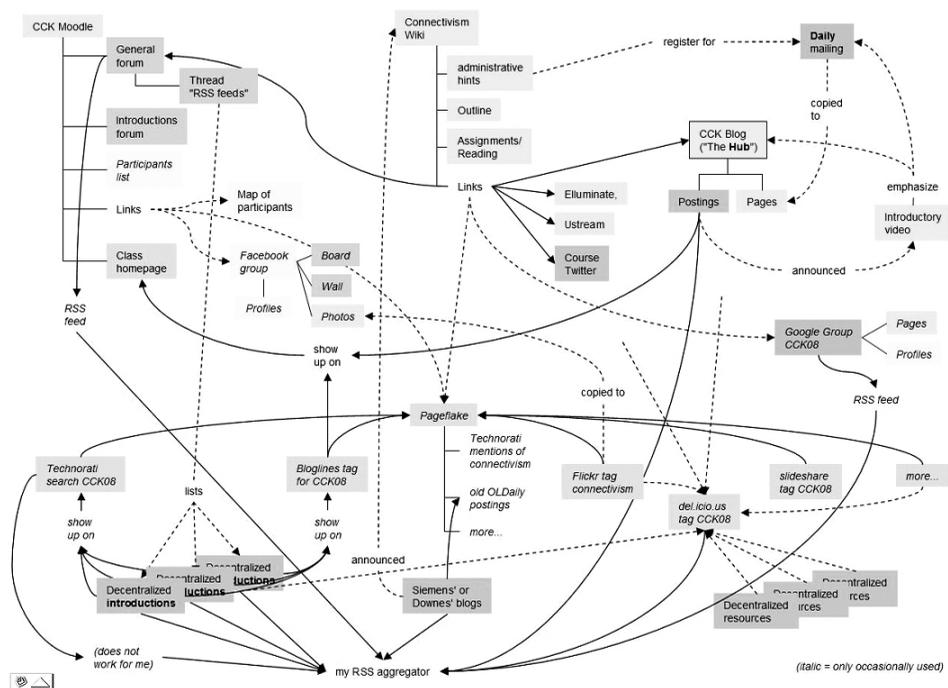
- *decentralisation* – connections are organised into the form of a mesh, rather than the hub and spokes more characteristic of a hierarchy
- *distribution* – the representation of concepts or ideas is not contained within a single node, but is distributed across a number of nodes
- *disintermediation* – direct communication from node to node is possible and encouraged
- *disaggregation* – nodes should be defined as the smallest reasonable component, rather than being bundled or packaged
- *dis-integration* – nodes in a network are not “components” of one another, and are not depicted as being organised as components of a “system”
- *democratisation* – nodes are autonomous, and a diversity of node type and state is expected and encouraged, membership and communications in the network are open, and meaning is generated interactively
- *dynamism* – the network is a fluid, changing entity with demonstrated *plasticity*, the ability to create new nodes and connections
- *desegregation* – though the network may exhibit clustering, there is nonetheless a continuity across the network, as opposed to a strictly modular design

Employing these principles, an organisation was developed that created several types of entities: persons (i.e., people registered for the course); authors (i.e., creators of learning resources); posts (entities created by course authors); links (entities created by persons and authors); files (audio, video or slide multimedia); and events.

The course proceeds by means of seeding the network gradually through time with posts, encouraging people to connect with these resources and with each other through the creation of posts and links, connecting participants in real time via hosted events, such as online lectures by guest speakers, and creating and capturing multimedia files.

That the MOOC, as described, constitutes a network becomes evident through analysis of the structure of the MOOC. Illustrated in Figure 15.1, for example, is the structure of the initial seeding provided by course facilitators.

Figure 15.1: Network structure of a MOOC: X28's New Blog, 6 September 2008 (Melcher 2008).



The deployment of a MOOC as a learning environment has been documented in numerous places elsewhere (Kop et al. 2011). What is important in this enquiry is the role being played by OER in the course structure to produce the dimensions of openness described above.

Evidence of OER Production and Use

There is significant evidence that one of the primary activities of participation in a MOOC is the use, re-use, and production of OER, so much so that the pedagogy of the MOOC is also referred to as the “pedagogy of abundance” (Kop et al. 2011).

As demonstrated in Kop and Fournier’s 2010 analysis of a recent MOOC, “Personal Learning Environments, Knowledge and Networks (PLENK),” participants submitted numerous blog posts and their discussions around these posts took the form of a network, as shown in Figures 15.2 and 15.3.

Figure 15.2: PLENK participation rates.

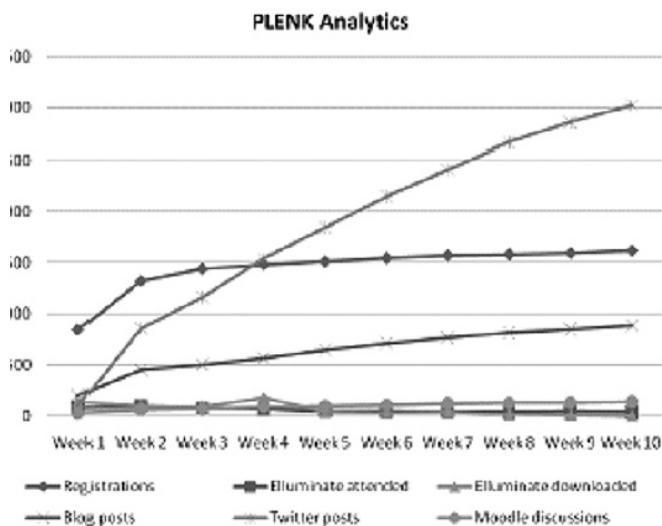
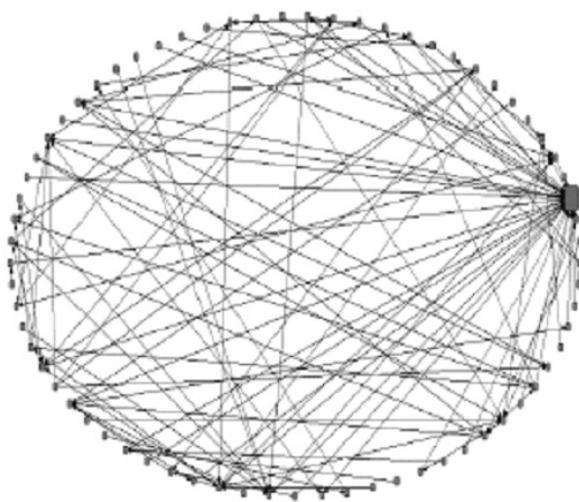
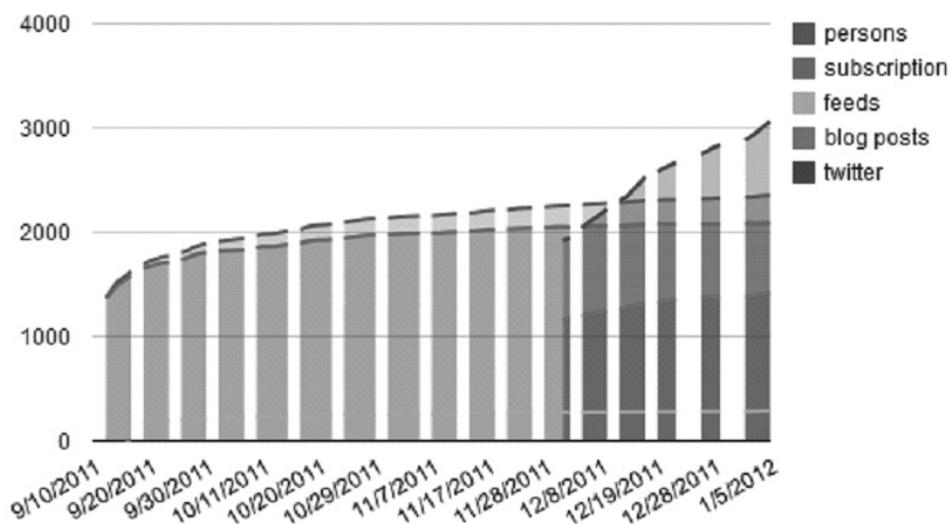


Figure 15.3: Connections between participants in a discussion (Kop and Fournier 2010).



In the more recent #Change11 MOOC (<http://change.mooc.ca>), we see even greater levels of creating and communicative activity. Figure 15.4 shows the cumulative number of feeds, the number of blog posts, and the number of Twitter posts made by course participants, as well as the level of participation by sign-ups and newsletter subscriptions.

Figure 15.4: #Change11 participation rates.



Note that day-by-day counting of blog and Twitter posts started in early December and by then had already numbered in the thousands, including 1,422 blog posts. As the course progressed through to January, the numbers of each steadily increased, showing a continued engagement and production of course artifacts.

Preliminary analysis of the #Change11 suggests that, as in the case of previous MOOCs, a substantial number of external learning resources are being referenced and linked. Half way through the #Change11 course, for example, the participants in the 286 feeds had linked to 5,150 media artifacts, as shown in the course environment printout shown in Figure 15.5.

Figure 15.5: #Change11 media artifacts.

List medias

Find: Sort:

Listing 0 to 100 of 5150 medias

[Edit] [Delete] (image) [no-300x218](#) (hits)
 [Edit] [Delete] (image) [GS+in+SL.jpg](#) (hits)
 [Edit] [Delete] (image) [Click to play](#) (hits)
 [Edit] [Delete] (image) [Books+n+Computer+Guillermo+Esteves.jpg](#) (hits)
 [Edit] [Delete] (image) [multiplayer+game.jpg](#) (hits)
 [Edit] [Delete] (image) [ISTE.jpg](#) (hits)

Participants are reading each other’s blog posts, both directly and through the email newsletter distribution. Through the newsletter, we can count the number of times readers followed through to the blog post itself, and as of the half-way point, we note more than 30 posts having more than 100 click-throughs each (see <http://change.mooc.ca/popular.htm>).

There are two salient features of this activity.

- First, *none* of it is assigned reading nor does any of it appear in the course syllabus. Contents in the MOOC software are, as noted above, separated

between what administrators provide to seed the course and what participants contribute themselves.

- Second, *all* of it is hosted and obtained from sources external to the MOOC environment, which — because it is openly accessible — makes it all OER.

Adding up these numbers (noting that they do not include comments on blog posts or material referenced in those comments, or materials read or referenced in venues outside the course environment), and not including Twitter posts, gives us 6,472 OER implicated in the course thus far. Granted, a significant number of these (and especially of the media resources) will be trivial. The picture is nonetheless one of significant dynamic creation and exchange of OER.

The PLENK course and #Change11 course are not anomalies. Other MOOC courses also result in the creation and exchange of artifacts in this way. It will be the subject of further research to identify factors impacting the nature and rate of artifact creation and exchange. But it is clear it can be significant.

Jim Groom’s “Distributed Storytelling 106” course uses the tag #ds106, and a Google search on #ds106 (as of this writing) yields more than 200,000 results. The “assignments” page, where students’ work is aggregated from external sites where it has been posted, contains almost 7,000 items (699 pages of ten items each as of this writing; <http://ds106.us/page/699/>).

It is clear from these examples that when a course is designed according to network principles, and hence as a MOOC, the role of OER changes dramatically. Far from being published materials created by academics and authors and merely consumed by course participants, they begin to become the way in which these course participants *communicate with each other* and, as a consequence, their use and exchange numbers are not in the single digits but rather in the hundreds or thousands.

The (Open) Language of Learning

And this very point, this very distinction, is the distinction between what we might say are old and new depictions of OER, or educational resources generally.

The picture presented above of OER as things that are published, things that are presented by publishers in a very formal manner, probably charged-for and commercial — is the old static coherent linear picture of the world. It’s not the model that we want to use for OER because it’s not applicable in a network learning environment.

That brings us back to what we want to think about in OER. OER are a network of words that we use in whatever vocabulary we are using to conduct whatever activity it is that we’re doing or that we’re undertaking. They are the signals that we send to each other in our network.

If that is so, then what openness means in the context of OER is whatever is meant by openness in a network, where we think of openness in a network as the sending of these signals back and forth and so the sending of these resources back and forth.

We need to think about OER not as content but as language. We need to stop treating OER or online resources generally as though they were content like books, magazines, articles, etc., because the people who actually use them — the students

and very often the creators — have moved far beyond that. Each one of these things is a word, if you will, in this very large post-linguistic vocabulary. They are now language. They are not *composed* of language, they *are* language.

And that's why they need to be open.

Suppose that everyday words that people wanted to use (like “cat”) were owned by, say, Coca-Cola. True, we have allowed a certain limited ownership of words in our society, but by and large we can't own words. We can't own the use of words to create expression. Now imagine if we had to pay royalties to use certain letters. So you could only use the letter “o” if you paid money to Ford. You could only use the letter “i” if you paid money to Apple. The effectiveness of language would be significantly impaired.

The thesis here is that the effectiveness of language would be impaired in exactly the same way the effectiveness of communication would be impaired, in exactly the same way the effectiveness of a network is impaired if you break down or block the links between entities.

The use of open resources in a MOOC is clearly that of a language, where the resources are the “words” sent back and forth between participants in a dense network of communication. It becomes clear that measures that would impair the flow of these “words” would damage this communication and render the MOOC itself mute.

We can indeed map the openness of a MOOC — which is open by design — to the various dimensions of openness mapped above.

In a MOOC, the curriculum is the construction of the MOOC itself: the lists of links to individual feeds, posts, links and other resources shared in the course. Opening these lists makes the structure of the MOOC transparent, and also allows people to participate in the MOOC without ever actually registering in it (this is a dimension of MOOC participation that has yet to be explored) and creates what amounts to open admission.

The MOOC is built using open standards to facilitate communication and content sharing. Because there is a great diversity of platforms and languages in a MOOC, common aggregation formats are used. The deployment of open source software (gRSShopper for PLENK and #Change11; WordPress for DS106) allows new standards or extensions to be implemented as needed. Participants can create their own MOOC applications or interfaces as well.

The most obvious dimension of openness in a MOOC is the sharing of OER, but it is important to recognise that the facilitators, by participating in this network of interactions, open their instruction as well. They do this by interacting bilaterally or with a group of participants in the MOOC, and by creating recordings or broadcasts of these interactions to share with other participants.

Finally, by virtue of its structure and its sharing of resources in a network environment, a MOOC is resistant to the sort of enclosure that afflicts traditional OER publishing.

Because there is no single environment, and because the MOOC consists essentially of a network of connections between autonomous entities, there is no mechanism for creating lock-in. Any technology employed by a person engaged in a MOOC could be easily exchanged for another technology supporting the same standards: any content provided by a participant could be exchanged for another.

The network structure of a MOOC also resists the privileging of certain content with high-bar qualifications needed to enter the network. Any participant in the network may contribute content and, as communications may be direct from person to person, there is no intermediating structure to impose a high bar.

Similarly, the flooding of search results and other centralised points of access is no longer an effective strategy for commercial media. Communications are exchanges of content *between the participants*, and not passive accessing of media from a centralised repository or store. Hence, there is no list to be flooded and no mechanism with which to impose undesired content into the perspective or point of view of the participant.

Finally, the means for conversion are minimal. A MOOC isn't a single entity on which one can become dependent; it isn't located in a single place; and doesn't require a key piece of technology. Consequently, there is no way to force a person to pay for access to a MOOC or any component of a MOOC.

Understanding OER as though they were words in a language used to facilitate communications between participants in a network should revise our understanding of what it means to be open, and what it means to support OER. It is clear, from this perspective at least, that openness is not a question of production, but rather a question of access.

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Towards a Sustainable Inter-Institutional Collaborative Framework for Open Educational Resources (OER)

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Introduction

The objective of the African Health OER Network project is to advance health education in Africa by creating and promoting free, openly licensed teaching materials created by African academics to share knowledge, address curriculum gaps, and support health education communities. The Network is a collaborative project between a university in the U.S., two universities in Ghana, two universities in South Africa, and an educational non-government organisation (pseudo-named Edu-NGO) based in South Africa.

A primary focus of the project is to scale up teaching and learning capacity in institutions by creating new learning materials and converting existing materials into Open Educational Resources (OER) (Luo et al. 2010a). However, achieving this outcome is not as straightforward as it sounds. Harley (2011, p. 224) reports that “creating OER has increased the workload of pressurized staff at some African institutions” even though one of the main goals of OER is to reduce the “extra workload.” In the current academic world, as Bossu and Tynan (2011, p. 261) rightly observe, “academics today are more overwhelmed and overworked than ever before,” and it will impose a big challenge on OER adoption if OER is seen as creating another task.

Another challenge of OER is that they are not universally relevant. As Ngugi (2011, p. 284) cautions, “it is naive to assume that all OER created outside Africa [are] equally relevant in Africa.” While this does not mean all OER are irrelevant outside the context of their creation, it stands to reason that if the amount of effort required for repurposing were high, the attraction to use OER would be reduced and the inclination to develop one’s own resources increases.

In 2008, the University of Ghana and the Kwame Nkrumah University of Science and Technology began to develop health sciences resources from scratch because

the resources created outside Africa were not suitable for teaching and learning in the Ghanaian context (Omollo et al. 2012). Reporting on the status of OER in Africa's higher education institutions, Ngugi (2011) observes that encouraging collaboration in creating and sharing intellectual capital in higher education is one way of improving quality and achieving long-term cost-effectiveness in educational practice. The exchange of educational materials and co-creation of OER enable educators to be kept from reinventing the wheels and thus save their time and resources. The co-creation process also allows educators to integrate different social and cultural contexts into their educational materials.

Despite the potential benefits of a collaborative approach to OER production, sharing and distribution, little research has been directed to it. Furthermore, collaboration is not a panacea to the complex OER agenda, which is not limited to intellectual property rights, cost implications and academic concerns often evidenced through resistance to giving away educational resources for free (Bossu and Tynan 2011; Harley 2011). In this chapter, through examining the development of the Health OER Network, we focus on exploring how sustainable inter-institutional collaboration can facilitate OER production and sharing.

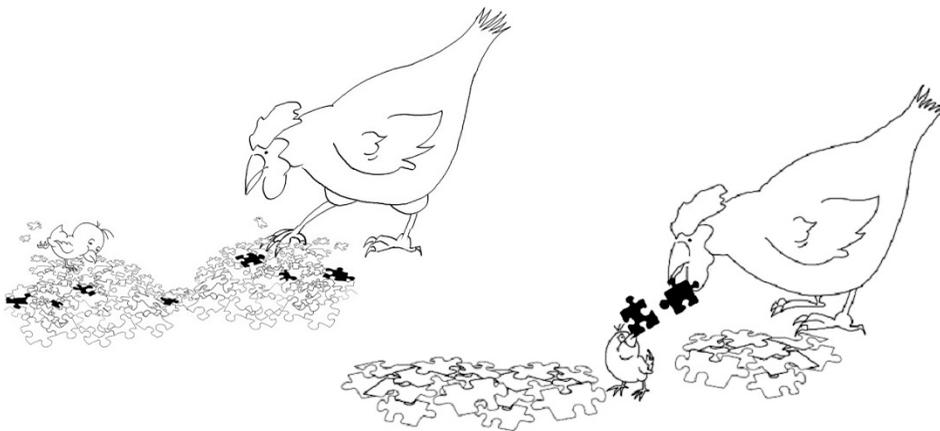
Conceptualisation

There is an increasing popularity of OER in higher education institutions worldwide due to resource constraints, faculty workload and acquisition of learning materials. Bonk (2009) observes that with 1,890 classes online, MIT (Massachusetts Institute of Technology) has almost its entire curriculum available for free to learners around the world. Although MIT expects students and instructors to be the primary users of its OpenCourseWare (OCW), 50 per cent of users of OCW are corporate self-learners (Bonk 2009, p. 164). In health and medical care, an increasing number of people are making important health decisions based on information found on the Internet (Masters et al. 2010). These users, also called e-Patients, are educating themselves using online resources much the same way they use “self-help” or “over-the-counter” self-medication. This has added increased pressure to ensure the high quality of learning resources, especially those that are freely distributed. However, the challenge is that OER producers are informed by their socio-cultural contexts and goals that could be different from those of the users. For example, medical educators and doctors in Sub-Saharan Africa might be well placed to write OER on malaria given that the vast majority of malaria cases and malaria-related deaths occur in Sub-Saharan Africa (<http://tinyurl.com/3zsu4g7>). Luo et al. (2010b) analyse social and technical needs for inter-institutional collaboration for OER production, and report on the barriers to inter-institutional collaboration for OER production. This chapter extends Luo et al.'s proposal for a collaborative framework for OER production, with an emphasis on the sustainability of an OER social practice.

One of the challenges of sustainability of OER production and use is that each learning material is like a unique puzzle piece, each created by different authors. Educators and learners must then identify an appropriate puzzle piece that could meaningfully fit a specific “teaching and learning” goal. The effective use of OER is therefore an outcome of finding the best fit of resources that matches pedagogy in a particular setting. It therefore follows that OER could be viewed as a pile

of puzzle pieces, with varying degrees of quality, and users (both experts and novices) “scratch” to find matching pieces (see Figure 16.1).

Figure 16.1: Open Educational Resources are like puzzle pieces that educators and students assemble to address a specific learning goal.



Source: “Chicken and Chick” on pile of puzzle pieces, by Stacey Stent, University of Cape Town, is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License

One obstacle for educators and learners is that creators of OER are not obligated to wrap the pieces into a usable “picture.” It can therefore be time consuming to find useful resources that can be used with less need for repurposing or remixing. Our argument is that although OER repositories could be made of “complete puzzles,” most users want only to use pieces to complete their own puzzles. The repurposing of OER suggests flexibility of the puzzle pieces to allow a user to reshape, resize and recolour to fit a new puzzle, and the obligation to share the modified pieces and the newly constructed puzzle.

Our thesis is that a strategy that fosters collaboration in the production of OER is likely to create resources that are useable at least by member institutions in the collaborative community. It therefore stands to reason that an inter-institutional collaboration would enable the creation of more collaborative “complete puzzles” and individual pieces that would find use in different contexts. In their study of teachers’ re-use, quality and trust of OER, Clements and Pawlowski (2012) observe that curriculum compatibility is a major barrier. We infer from this observation that it does not make sense to increase the production of OER when these resources are not used. Clements and Pawlowski add that teachers were left to judge for themselves the quality of resources they wished to use or share.

While educators might be in a position to judge the quality of the resource, most students and e-Patients might not be in a position to make the quality judgement. The quality of resources must be ensured before a resource is published. While there is no excuse for publishing poor quality resources, Bossu and Tynan (2011) attribute the suspicion about the quality of OER to the free and open characteristics of the OER agenda. We see this “suspicion” as a barrier to wider uptake and adoption of OER. Thus, the objective of our work has been to explore ways of improving user confidence in the OER, widening the scope of relevant resources, minimising the time and effort to find resources, and sustaining the OER practice.

Inter-Institutional Collaborative Framework

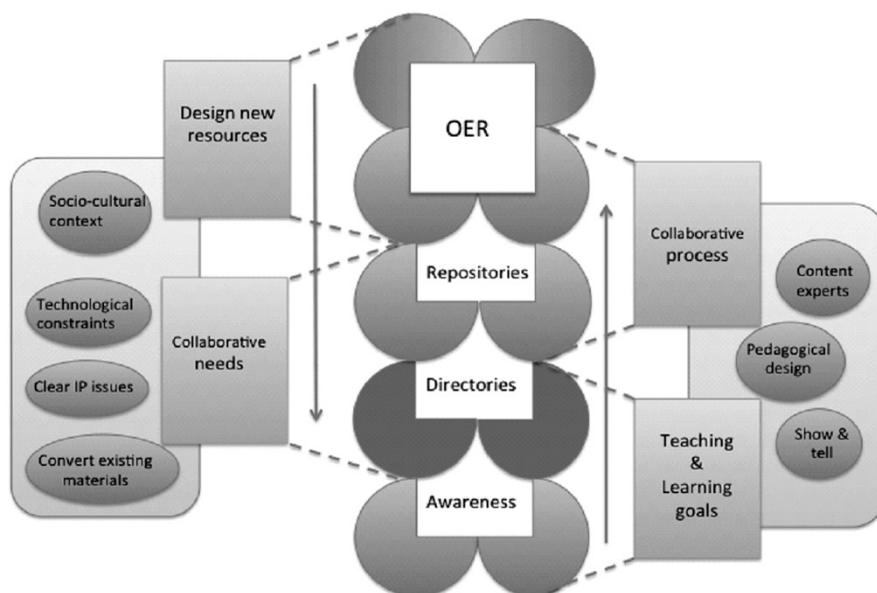
Ngugi (2011, p. 283) describes the interplay between use of OER by educators/ students and changing teaching/learning practice this way:

“As educators create and adapt OER, they have the opportunity to re-examine the ways in which they teach and rethink the ways in which their students learn — and need to learn; and as students gain access to OER, whatever their format — paper or electronic — they are empowered to study on their own, seek out alternative ways of learning, and play a role in how and what they learn.”

The framework envisaged (see Figure 16.2) has teaching and learning goals (T&L) as a possible start point. These T&L are informed by the curriculum or content experts, pedagogical intentions and appropriate designs, all of which trigger the need for awareness of what is possible. The “awareness process” would be achieved either through searching OER directories or seeing what others have done through “show and tell.” This process results in an individual or a collaborative activity of searching repositories. Ideally, the show and tell would lead to identifying people with shared interests/goals with whom the collaborative process can become possible. These activities lead to finally successfully finding the “puzzle piece” that fits the T&L.

The left-hand side of Figure 16.2 focuses on high-level activities that happen at the departmental or institutional level. The collaborative needs could include the socio-cultural context in which the institution is located, the technological constraints, issues of intellectual property (IP), and an audit of existing learning materials that could potentially be converted as OER. The collaborative needs result into some guidelines for designing and sharing OER, including possible incentives. As we expand on in the next section, the left-hand side of the framework depicts ways of achieving OER as a social practice, and the right-hand side shows how to support OER social behaviour.

Figure 16.2: Inter-institutional collaborative framework for OER sustainability, which can be used to collaborate with any number of institutions or used just at a single institution.



Our framework leverages “an incremental process in which the academics develop resources for their own students before releasing the resource as OER” (Harley 2011, p. 222) and shows how OER experiences can be shared with other institutions. We therefore argue that the model has potential for achieving unprecedented growth in both contributions and the use of OER.

Building OER Social Practices from Social Behaviours

In order for OER production and adaptation to be sustainable long term, the culture of creating and using OER should become a teaching and learning practice norm within a university. One of the challenges of institutionalising OER is transforming OER from mere individual social behaviour to OER as a social practice. Esfeld (2003) contends that social practices are regulated by normative attitudes, while for a social behaviour there is less need for co-ordination of one’s behaviour with that of others because there are no sanctions. Sanctions (i.e., reinforcements or discouragements) are necessary for transition to happen from social behaviour to social practices. Currently, OER is mostly used as a social behaviour and is yet to become an institutionalised social practice. There are fragments of OER social behaviours (usually from OER enthusiasts or champions) at most institutions.

The challenge is that if these enthusiasts leave the organisations, unless the OER emerges as a social practice, there is a danger that OER might experience a slow and gradual death. One of the aims of the inter-institutional collaborative framework is to leverage OER social behaviours to build an OER social practice. The concept of “social practice” views actions in terms of a dual perspective: on the one hand, actions are concrete, individual and context bound; on the other hand, they are institutionalised and socially anchored and, because of this, tend towards patterns of regularity (Jorgensen and Phillips 2002). Although OER are products of concrete actions by individuals who are driven by a need to freely share educational resources, until these behaviours become practices and begin to assume patterns of regularity, it is unlikely that the OER agenda could be sustainable.

The other challenge is that social behaviours of OER contributors are sandwiched between non-existent institutional policies and their semi-conscious assumptions or unspoken motivations (Thompson 2004). In this chapter, we report on these unspoken motivations of OER enthusiasts and potential contributors (chosen on the basis of their OER social behaviours) from different organisation roles and portfolios (including management, subject experts, technical support staff and researchers). The participants were interviewed with the aim of soliciting insights that would help improve understanding of ways of transitioning from OER social behaviours to OER social practice. As already alluded to, an environment is said to have an OER social practice when it has a “social cognition” of OER. Van Dijk (1996) defines social cognition as beliefs, social representation or socially shared knowledge that includes attitudes, values, norms and ideologies. An example of social cognition is how academic staff understand the importance of research and need to publish in “good” journals. The sanctions, in terms of rewards or incentives for doing this, make most academicians see research as part of their jobs. It is this state that OER would have to reach through social cognition.

Methodology

The African Health OER Network was a collaborative project between a university in the U.S., two universities in Ghana, two universities in South Africa, and an educational NGO (pseudo- named Edu-NGO) based in Kenya. Semi-structured interviews were the study’s primary data collection method. Selection of participants for interviews began with convenience sampling and was followed by snowball sampling methods. The purpose of the snowball sampling was to identify possible participants who were actively involved in OER. The Principal Investigator or a project manager was first recruited who then referred the researchers to active participants of the Health OER Network project. OER materials were not yet in use when we conducted the study, so we interviewed mainly individuals who contributed to OER content production.

The interview protocol included open-ended questions, which were built upon literature review and research questions. The interviews aimed to collect data on the need for inter-institutional collaboration in OER, as well as social and technical challenges in creating and sharing OER materials. We interviewed 52 participants from October to December 2009. Generally, the interviews lasted from 40 minutes to an hour. Most interviews were conducted in the interviewees’ offices. When this was not possible, we conducted interviews by telephone or Skype. All of the interviews were audio-recorded with the consent of participants.

Analysis

Table 16.1 summarises thematic analysis used to identify key themes from the 52 interview transcripts.

Table 16.1: Institutional interviewees

Institution	Management	Subject experts	Technical support	Researchers	Total	% age
Two universities in Ghana	6	7	8	0	21	40
Two universities in South Africa	4	10	4	3	21	40
University in USA	1	5	0	0	6	12
Edu-NGO	3	0	1	0	4	8
Total	14	22	13	3	52	100
% age	27	42	25	6	100	

The participants were distributed as follows: 40 per cent in the two universities in Ghana; 40 per cent in the two universities in South Africa; 12 per cent in the university in the U.S.; and 8 per cent in the educational NGO in Kenya. Twenty-seven per cent of the participants were management, 42 per cent were subject experts, 25 per cent were technical support staff, and 6 per cent were researchers. Based on this distribution, it can be summarised that the majority of interviewees were subject experts from the universities based in Africa. Most contributors to OER are subject experts and the need for OER is amplified in resource-constrained environments.

Having established the source of the bulk of the data (i.e., subject experts), the data was then aggregated and therefore not reported in terms of their roles. The need for a framework was partly inspired by this call from one of the participants:

“[P]eople really want to know good examples from other institutions.... [T]hey want to know how people achieve that... know what people are doing in their own institution... to know what’s happening at other institutions and learn from others’ experiences.”

Our thesis is that a sustainable framework for OER is one that is responsive to the OER needs as expressed by a community of potential contributors and users of OER. In the next sections, we present the thematic analysis of the interviews.

OER Teaching and Learning Challenges

A point of departure in finding and/or repurposing OER is a teaching and learning need. It is this T&L need that also becomes a basis for collaboration. The comment below captures this need:

“[H]is frustration was that students are not getting to see surgical procedures ... because there are too many of them. And they come into the operating theatre and they’re standing, you know, 10 feet away from the table and ... not gowned.... [Y]ou get like 10 or 12 in the room so the room is very crowded ... [and you] can’t hear anything. Even if he tries to explain something, he’s talking through a mask and it’s hard to even hear what’s going on.... So his idea was ... to make surgical videos...?”

The challenge of teaching surgical procedures in a crowded operating theatre was the motivation for exploring the creation and use of surgical videos to enhance student learning. In another case, it was the need to teach embryology in 3-dimensions, as indicated below:

“[W]hen I started teaching, the biggest difficulty for the students was to understand things in the 3-dimensional form because I teach embryology and cell biology.... [T]he mandate I was given was to take it down to a molecular level so you can find embryology anyway. There’s loads of websites where you can find embryology but you pay for them. And the other thing is ... we were taking cell biology down to a molecular level, different molecules on a cell, that I couldn’t find....”

It can be inferred from the above statements that teaching goals and the absence of resources to support teaching strategies were the motivation to explore OER possibilities. To the extent that resources were available on websites but access to them required subscription is a good case for using OER. Through the inter-institutional collaboration, the academics will be able to share with other academics the pedagogy of surgical videos and the 3-dimensional embryology, and increase re-use.

OER Champions

One of the strategies for building an institutional environment that is congruent with the principles of the “OER movement of mutual exchange and collaborative development of educational resources” (Bossu and Tynan 2011) is to create a community of OER champions:

“[We are] working with what we call champions of OER in the institution and on the other hand, we are working with people where there seems to be a sense of interest and we are trying to engage that sense and build — and play a role in building up — a network amongst people who are interested. We don’t have the capacity to do things for people, but we want to enable people to do it themselves and serve as a kind of a network in the institution so that people know who else is doing it...”

The OER champions are usually academics or senior management who are passionate about the OER phenomenon of sharing educational resources and are willing to acquire skills that empower them to accomplish these goals. It is these groupings of institutional champions that form the back-bone of an inter-institutional collaborative initiative. Inter-institutional collaboration has the potential to enable the champions from individual institutions to be connected with each other.

One of the increasing challenges of an OER agenda, say Bossu and Tynan, is keeping the momentum going:

“[So] for OER sometimes it’s not people’s focus. So it’s really hard for them to keep the momentum and they were asking questions like ... how can we keep the momentum? Who is monitoring the process and who could play the role to push each institution to move forward? ... [T]hey were asking questions like that...”

It can be inferred from the above statement that OER initiatives require impetus, advocacy and drive. It would be naïve to expect that self-motivation alone (i.e., social behaviour) is sufficient to sustain the practice (i.e., sharing educational resources freely). The African Health OER Network sponsored workshops and identified task groups for keeping the momentum going. These workshops and task groups ensure there are champions from different institutions to share their experiences among themselves and with a larger group of educators. OER momentum is therefore sustained at institutions:

“[As] she champions OER and that develops in the faculty ... it’s definitely having a spill-off to the blended learning, you know, because she is talking about it and she is having workshops...”

The OER champion could also be someone with power, someone who can be instrumental in mobilising resources, as suggested below:

“[We] were totally underrepresented. And if OER is going to happen further in our department —then I mean, yes, we have lots of needs. If people know about it, surely there is money available to address those needs. But you can’t do it without the permission of the dean. And if the dean is not involved, how are you going to do it?”

The use of an inter-institutional collaboration would also make possible the writing of joint funding proposals to address some of the mutual T&L challenges. Collaborative funding proposals assume that there is a shared need, and this could serve as a motivation for collaboration:

“So in every respect our needs are different and if we are going to address educational needs, then this is an opportunity for Africa to

actually grab onto OER. We find everywhere that we struggle — and we struggle in every aspect of teaching. We don't have funds for this, we don't have funds for that, we don't have funds for digital imaging, we don't have a teaching set in pathology. Nothing. Because there is no funds, nobody does it....”

It is such contexts of daring to desire to improve T&L that OER renders itself potentially useful. Under these constraints, the champions need to be supported to ensure that they stay focused on pedagogy and the complexity of using OER. The inter-institutional collaboration would create an environment for mutual exchange, and enhance collaborative development of resources.

OER Sharing Culture

The sharing of educational resources is a culture and it needs to be nurtured. Developing a sharing attitude is therefore useful. The sharing culture is an invaluable experience to build on when adopting OER. The culture of sharing is not new, but it's how to harness this existing culture that remains a challenge:

“[P]eople are sharing informally quite a lot, but they don't necessarily share in a way that anybody else would know and so there's quite a lot of sharing happening between individual lecturers. But it's very difficult to actually find out what that is.”

In addition to culture, some institutions already have learning resources that could be digitised and shared as OER:

“Like when N comes or when K comes and if my staff could go and look at what UM is doing or what GH is doing.... [We ask ourselves:] What do we have that we can archive? You know, what do we have in our archives that we can digitalize? ... Digitalizing all of these fantastic resources we already have....”

This underscores the need to start by documenting the source of existing resources that can potentially be converted into OER. This documentation could be a useful resource in its own right, and through inter-institutional collaboration, the digitalised materials and technologies and the skills needed for digitalisation could be shared among collaborating institutions on a need-to-use basis.

Another aspect of harnessing an OER culture of sharing is understanding the type of academics most likely to freely share educational resources. The quote below shows that academics close to retirement are more likely to give away their teaching resources as OER:

“[T]here is something particular about catching academics as they near retirement, as amongst those academics, there is a sense of preserving legacy. And to be frank, it's also a sense of frustration with how their teaching and learning materials and their teaching and learning activity has always come second to the research endeavor. So when we have shown an interest — ‘we'd love to see that as an OER’ — it's been met with a spark on their side of an appreciation that somebody else sees the value in something else that they have put so much energy and resources into over years and years, but which the institution hasn't necessarily recognized....”

This is fundamentally important, as it provides a way of understanding where the key resources within institutions could lie. By contrast, young and upcoming academics seemed not to be OER advocates:

“[P]erhaps younger academics aren’t necessarily attuned to this, and then also I think that young academics ... are so busy figuring out this enormous structure, learning the ropes, preparing teaching materials, getting their head around things....”

To the extent that OER include three types of resources — learning content, tools and implementation of resources (Bossu and Tynan 2011) — most young academics find the use of tools and incorporation of digital media in their teaching a key attraction. We infer from this argument that young academics will increasingly use and repurpose OER in their teaching.

OER Skills

It is not always possible to have all the skills required to create OER at one institution, as expressed in the statement below:

“[W]ith the OER project I have got, we are busy making videos on how to do some clinical procedures. And so [we contacted] the digital media studio on main campus.... I thought, ‘Well, they know — they know how to make everything,’ you know? And then they said to me, ‘Well, [we] have never had experience in making dental videos.’”

The specialised unit at the institution still lacked experience in making dental videos. These skills could be rare and have potential to stall an OER project if no work-around plans are put in place. The inter-institutional collaboration allows such specialist skills to be shared while creating resources that could be used at more than one institution.

Another area that could be time consuming if less than adequate skills are available is in converting existing materials into OER. Most of the teaching resources are prepared for use in a particular module to achieve a specified teaching outcome. In teaching these classes, educators either design new teaching materials or re-use existing materials. Usually the re-use is limited to resources created for a previous cohort of students or different yet related courses. These resources make good candidates for OER. However, further work is required on both of them in terms of ensuring copyright compliance and wrapping pedagogy around them. The statement below illustrates one of these aspects:

“[A] lot of the materials that people have ... weren’t originally intended as OER, they were intended as a demonstration in a classroom or they were intended as an adjunct to what the lecturer was saying in the first instance. To make them OER, they would actually need a little bit more of a wrap-around ... some kind of explanation of their context.... [O]therwise it might seem a little ‘disembedded’ from its context.”

“A little bit more” in the above statement points to the need for skills that could be leveraged through the inter-institutional collaboration.

“OER is very granular ... I think about OER as quite small actually. I think more in terms of open content and sort of not taking

somebody's whole course and using it but taking pieces here and taking pieces there. And so I don't think there's a great connection with the other person who created that piece.... [I]t's your personalizing your own OER based on OER...; you're the filter and — and it reflects your teaching....”

It can be inferred from the above statement that OER are like puzzle pieces (or granules) or completed puzzle pictures that users may choose to use as a whole or repurpose through integration of the pieces or granules wrapped in pedagogy. It is this wrapping that takes into account the context, the socio-cultural environment of users, technological constraints, and teaching and learning outcomes. A useful example of the impact of technological constraints on use of OER is narrated here:

“I was part of an International Association of Digital Publication Project where e-books were made available to students. So our rector then brought the students in the pilot program laptops and, you know, then — it was fine. But in downloading the e-books, the bandwidth was a huge problem.”

In the above statement, the problem was low bandwidth available to students to access some resources. This suggests that there is need to explore locally viable alternatives. Inter-institutional collaboration would provide a way of learning from, and with, other institutions in finding feasible solutions.

OER Awareness

The creation of awareness of the value of OER and demonstrating some of the possibilities to peers is a useful start point:

“We've actually got to speak to people and ask them and — and for most of the time, they don't know what OER means. They don't know what the concept means. So we have used other terms like 'open teaching,' 'open content' to try and attract people to come to some of the seminars to hear us....”

One of the barriers to adopting and using OER is general ignorance among academics about what it is all about and the lack of understanding of copyright issues. Some academics are surprisingly IP naïve and less informed about the affordances of the Creative Commons licences. The use of descriptive terms to advertise OER seminars was to ensure that people attend to learn more about it. Even when people know about OER, they may not be aware of OER supporting structures at their institutions:

“So then we know somebody [is] looking for OER. But that person doesn't even know necessarily that we exist.”

This problem is compounded by the lack of institutional policies and other campus-wide OER initiatives. As one person said, “There is no one central repository for OER.... There is no policy on OER.” In the absence of these, the responsibility for creating awareness lies in the hands of academics and staff:

“But in ... our faculty, we need to emphasize the importance of OER. No one has come here to do it. And it's just RZ and I that are basically doing anything and so we really, really need to put it out there to the rest of the people. Because ... most of them feel there's nothing in it for them and so they don't do it. You know?”

One of the benefits of inter-institutional collaborations is an increase in OER awareness through widening access to what academics from other institutions are doing with OER. This is key in maintaining momentum at local institutions.

OER Evaluation

While it is relatively easy to measure the impact of open access publications using the number of citations, the educational value of OER is difficult to measure. The extract below from management puts it succinctly:

“OER is a fantastic vehicle for institutions ... that’s really what we are trying to make as policymakers at this university... [I]t’s difficult because it hasn’t been measured ... there isn’t a precedent. In open access publishing there is evidence of how making data available — particularly in the health fields [like] AIDS research, that kind of thing — is unlocking research and data for the benefit people.”

Many academics have various motivations for contributing to and using OER. At the institutional level, the rationale for OER is captured in the following statement:

“[Our] motivation seems to be about making sure we have a public space for [the university] material so anybody can access it because that’s probably a very similar motivation to the University M.... We have considered the benefits of having the material stored in a place where new academics could use it.... [We] find new academics come to [the university] and they have to start building up all of their material from scratch....”

It can be inferred from the above statement that the goals for OER could be both inward and outward focused. Academics may create and distribute OER targeted at their own students, or may repurpose OER for use in their teaching. Students may use OER as supplementary resources to their study materials. And institutions may create a repository of educational resources to support new or young academics. Each of these goals would have different methods of evaluating their effectiveness. Some of the key OER evaluation questions are suggested in the statement below:

“i) How are we going to get through the workload..., ii) How are we going to make sure we do good work, and iii) How are we going to ensure that the work we’re doing is having some kind of positive impact.”

These questions suggest that the production and use of OER impact existing social practices and need to be viewed more broadly than simply as freely available resources. This broader view of OER may result in policy formulation. The OER institutional policies would be a useful resource for other collaborating institutions.

OER Funding

Most OER initiatives at institutions of higher learning receive funding from external agencies. While this is commendable, examples abound where centres established through external funds cease to exist when funding runs out, as this statement suggest:

“[The] Center for Open and Supported Learning was set up as this dedicated OER entity, ... was funded with external donor funding and then as soon as that funding ran out, the center was closed down. That’s a good example of how OER won’t be sustained...”

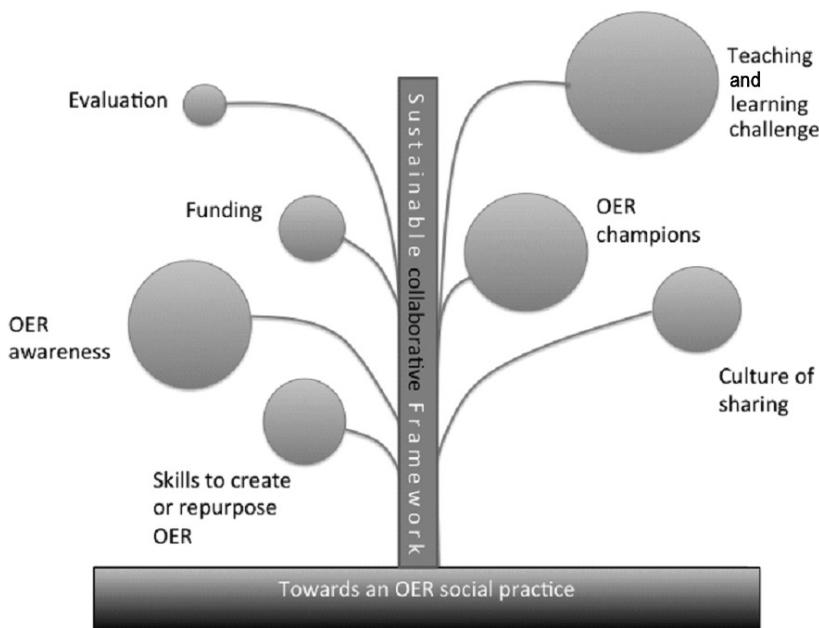
Our argument is that dedicated OER units/entities are useful and should play a leading role in creating inter-institutional collaborative initiatives that will guarantee existence beyond an individual unit.

Discussion and Conclusion

The above analysis shows that OER as a social practice did not yet exit at the institutions represented. However, the social behaviour of OER was evident mostly from the sharing of resources and less on the use of OER. This observation could be attributed to the timing of the interviews, as anecdotal evidence shows that general use of OER is steadily increasing. The analysis has brought to the surface some of the challenges for ensuring a transition from the social behaviour to a social practice. The themes are indicative of social representation or socially shared knowledge in particular attitudes, values, norms and ideologies of the people interviewed. Rather than have each individual institution deal with these factors, an inter-institutional collaboration would make it a priority to resolve these factors.

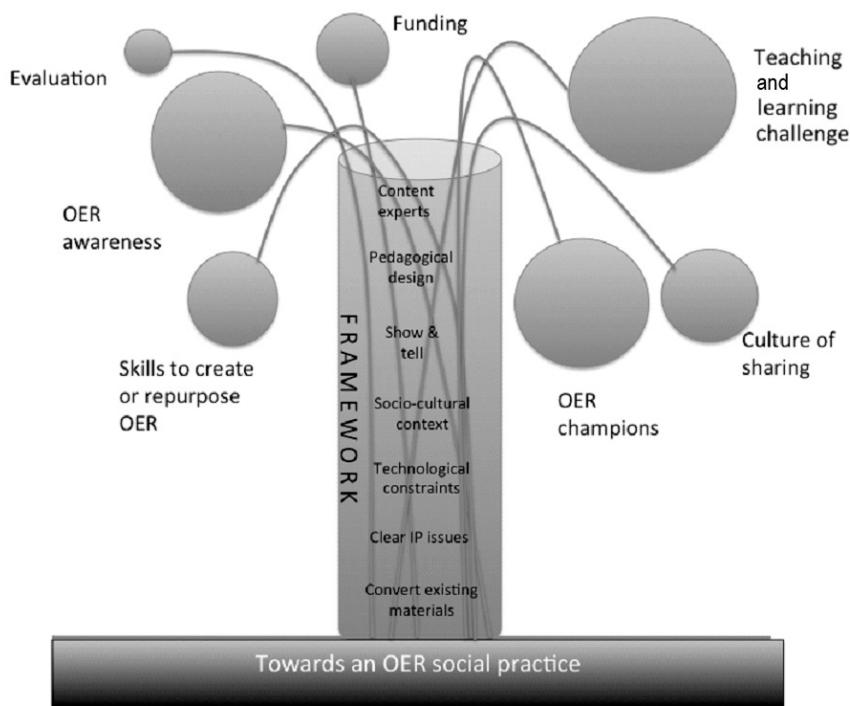
Figure 16.3 depicts an overview of the sustainable collaborative framework for OER, in which some factors are bigger than others depending on the conditions of social practice.

Figure 16.3: Overview of the sustainable collaborative framework.



These factors do not exist in a vacuum, but are part of a social context in which OER behaviour happens. This framework, shown in Figure 16.4, gives insight to the production and repurposing of OER, and hints at key research questions relating to OER. One can take any factor (a bubble) and “dip” it into the cylinder to choose any condition or issue of interest requiring exploration. For example, teaching and learning challenges can be examined in terms of content experts or pedagogical designs, socio-cultural issues or technological constraints. For each of these, one can ask questions on how to enable, enhance, improve, optimise and so on. An evaluation factor could be associated with, for instance, content, pedagogy, show and tell (workshops) or conversion of materials.

Figure 16.4: A sustainable inter-institutional collaborative framework for OER.



As already alluded to in the analysis, most authors of resources are educators targeting their own students and there seems to be a greater propensity to developing locally relevant materials than to repurposing existing resources. The assertion that staff closer to retirement are likely to be more open to sharing their teaching materials requires further investigation. The general target audience of materials (puzzle pieces) is usually local and it would be time-consuming to create pieces for different “pictures” that the international audience would find directly relevant. However, for OER to be sustained, there is a need to create granules of OER that are flexible and easy to remix and repurpose.

Another challenge is that of reward. Most institutional reward systems are beginning to recognise the effort for creating OER. The University of Ghana and the Kwame Nkrumah University of Science and Technology have developed institutional OER policies, provide guidelines for creating/re-using OER, and equate creation of an OER to a research publication, thereby making it count

towards tenure and promotion consideration (Ngugi 2011; Omollo 2012). These policies are important for transitioning OER from being a mere behaviour to a social practice.

Although most users of OER could be educators wanting to improve their teaching portfolio, the use of OER still requires integration into the curriculum. The teaching value of OER is therefore not automatically evident. It could be observed that the older generation of educators, often closer to the end of careers, could be more likely to share resources than the new generation, but the use of such resources with less customisation would only be possible if there was a match between the context/audience and curricula. This suggests that encouraging experienced educators who would have created several resources during their career to distribute them as OER, but these resources need to be wrapped in pedagogy. There is, however, no guarantee that use of OER produced in one context would be used elsewhere without repurposing. The inter-institutional collaboration would therefore enable young and inexperienced educators to contribute modifications/remixes to OER. However, formulation of communities that are institutionally based and use and contribute changes to OER would create a sustainable environment of OER.

Our metaphor of puzzle pieces suggests that freely available lecture videos, images and slides may be potentially useful, but must be distributed with flexible licences to allow easy pedagogical integration and repurposing. Otherwise they risk being “locked” for use in their initial or very similar contexts. We are mindful of the fact that the decision to share or to use resources is driven by several imperatives. These needs influence decisions about the type of resources needed and, hence, which resources will be used. We infer from this that the focus ought to be in gathering resources that are developed for “localised” audiences aligned to different curricula.

The creation of an inter-institutional collaborative environment for OER requires difficult questions to be asked. For example:

- How would contributors to OER find the time to devote to an endeavour that an institution neither rewards nor recognises? In what ways does OER contribute to “student through-put” at an institution?
- Are educators who are approaching retirement more likely to contribute to OER than are those still building their careers?
- How can institutions leverage the richness of resources developed by their staff for social responsiveness?
- In what ways would an institution develop the capacity to use, remix, improve and redistribute OER?
- How would an institution ensure that knowledge about Creative Commons becomes common knowledge among its staff?
- What incentives would motivate educators to contribute teaching resources as OER?
- How would “openness” become an institutional norm?
- In what ways would an “open culture” influence teaching and research at an institution? How can we build an “open culture”?

- What would be the measure of success at an institution that adopts OER? How would success be defined at a pedagogical level and at a student learning level?

We conclude that the sustainability of the OER initiative requires a transition from OER being a social behaviour to OER becoming institutionalised as a social practice. We believe that the sustainable inter-institutional collaborative framework for OER we presented in this chapter has potential to help achieve this goal.

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PERSPECTIVES ON OPEN AND DISTANCE LEARNING

OPEN EDUCATIONAL RESOURCES: INNOVATION, RESEARCH AND PRACTICE

“Everyone has the right to education.”

UNESCO Paris Declaration on OER, 2012

“Educators worldwide are developing a vast pool of educational resources on the Internet, open and free for all to use. These educators are creating a world where each and every person on earth can access and contribute to the sum of all human knowledge. They are also planting the seeds of a new pedagogy where educators and learners create, shape and evolve knowledge together, deepening their skills and understanding as they go.”

Cape Town Declaration, 2007

Open Educational Resources (OER) — that is, teaching, learning and research materials that their owners make free to others to use, revise and share — offer a powerful means of expanding the reach and effectiveness of worldwide education. Those resources can be full courses, course materials, modules, textbooks, streaming videos, software, and other materials and techniques used to promote and support universal access to knowledge.

This book, initiated by the UNESCO/COL Chair in OER, is one in a series of publications by the Commonwealth of Learning (COL) examining OER. It describes the movement in detail, providing readers with insight into OER’s significant benefits, its theory and practice, and its achievements and challenges. The 16 chapters, written by some of the leading international experts on the subject, are organised into four parts by theme:

1. OER in Academia – describes how OER are widening the international community of scholars, following MIT’s lead in sharing its resources and looking to the model set by the OpenCourseWare Consortium
2. OER in Practice – presents case studies and descriptions of OER initiatives underway on three continents
3. Diffusion of OER – discusses various approaches to releasing and “opening” content, from building communities of users that support lifelong learning to harnessing new mobile technologies that enhance OER access on the Internet
4. Producing, Sharing and Using OER – examines the pedagogical, organisational, personal and technical issues that producing organisations and institutions need to address in designing, sharing and using OER

Instructional designers, curriculum developers, educational technologists, teachers, researchers, students, others involved in creating, studying or using OER: all will find this timely resource informative and inspiring.

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