OPEN EDUCATIONAL RESOURCES

CONVERSATIONS IN CYBERSPACE

Education on the Move

UNESCO Publishing

Published by the United Nations Educational,
Scientific and Cultural Organization
7, place de Fontenoy, 75352 Paris 07 SP, France

ISBN 978-92-3-104085-6

Typeset by UNESCO Publishing
Printed by Nouvelle Imprimerie Laballery, Clamecy, 902108

Printed in France

ACKNOWLEDGEMENTS

Both this publication and the project on Open Educational Resources (OER) itself – initiated at the UNESCO International Institute for Educational Planning (IIEP) – have benefited from the assistance and expertise of many individuals.

The authors of the chapters of this book, most of whom have been actively involved in the OER community since its inception, deserve recognition for their multiple contributions – guiding community discussions, providing valuable input behind the scenes, or acting on the project's Consultative Committee. The members of that committee, who provided their support and advice at key moments during the project, are: Richard Baraniuk, Sir John Daniel, Kuzvinetsa Peter Dzvimbo, Nancy George, Brenda Gourley, Sally Johnstone, Vijay Kumar, Frederic Litto, Anne Margulies, Fred Mulder, Mamadou Ndoye, Tom Schuller, Joel Smith, Imma Tubella, David Vincent, David Wiley and Fun-Den Wang.

This book would not have existed were it not for the community itself, with its unflagging energy and enthusiasm, which embodies the spirit of intellectual openness and inquiry that the OER movement seeks to promote. While it seems contrary to the nature of the community to single out any of its members, the following individuals kindly gave permission for their words to be quoted directly in this publication: Graham Attwell, Paul Bacsich, Peter Bateman, Thomas Bekkers, Steve Carson, Jean-Claude Dauphin (who also made valuable contributions to the text), Bob Day, Christopher Gratham, Eve Gray, Gerry Hanley, Alfred Heller, Geoffrey Hulme, Hafiz Muhammad Iqbal, Steven Lerman, Lawrence Lessig, Ann MacCann, Wayne Mackintosh, Claude Martin, Mamadou Ndoye, Michael Rappa, Robert Rittenhouse, Sabu K.C., Paul Silva, Candace Thille, Boris Vukovic, Ellen Waterman, David Wiley, Clayton R. Wright and Richard Wyles. We would also like to thank Paul Stacey and the African Virtual University for their permission to use figures and tables that they generously shared with the community.

This publication has benefited greatly from the editorial expertise of Brian Smith. We would also like to acknowledge the release of this publication

under a Creative Commons licence – a first for the organization, and an indication of the commitment of UNESCO to the free flow of ideas.

The William and Flora Hewlett Foundation has generously provided the funding without which this project could not have been realized. In addition, Marshall Smith and Catherine Casserly have contributed support and advice throughout the project. Finally, the Foundation itself plays a unique role as an inspiration and a catalyst in the Open Educational Resources movement.

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LIST OF ABBREVIATIONS

AAC	Advanced Audio Coding
ADEA	Association for the Development of Education in Africa
AITI	Africa Internet Technology Initiative
ARIADNE	Alliance of Remote Instructional Authoring and Distribution Networks for Europe
AVU	African Virtual University
CERI	Centre for Educational Research and Innovation
CORE	China Open Resources for Education
COSL	Center for Open and Sustainable Learning
CSS	Cascading Style Sheet
DIT	Do-It-Together
DIY	Do-It-Yourself
DSP	Digital signal processing
FOSS	Free and Open Source Software
FLOSS	Free/Libre Open Source Software
ICT	Information and communication technology
IET	International Engineering Technology
IIEP	International Institute for Educational Planning
IP	Intellectual property
MERLOT	Multimedia Educational Resource for Learning and Online Teaching
MIT	Massachusetts Institute of Technology
OA	Open Access
OCW	OpenCourseWare
ODF	OpenDocument Format
ODeL	Open, Distance and eLearning
OECD	Organisation for Economic Co-operation and Development
OER	Open Educational Resources
OLI	Open Learning Initiative
OLS	Open Learning Support
OOPS	Opensource Opencourseware Prototype System
PDF	Portable Document Format

RSS	Rich Site Summary or Really Simple Syndication
RTF	Rich Text Format
TESSA	Teacher Education in Sub-Saharan Africa
UFE	Université Française d'Egypte
UNESCO	United Nations Educational, Scientific and Cultural Organization
USB	Universal Serial Bus
USU	Utah State University
WAI	Web Accessibility Initiative
W3C	World Wide Web Consortium
XHTML	Extensible Hypertext Markup Language

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LIST OF INSTITUTIONS MENTIONED IN THE TEXT

Addis Ababa University, Addis Ababa, Ethiopia	http://www.aau.edu.et/
African Virtual University (AVU), Nairobi, Kenya	http://www.avu.org/
Al Akhawayn University, Ifrane, Morocco	http://www.aui.ma/
Carnegie Mellon University, Pittsburgh, Pennsylvania, USA	http://www.cmu.edu/
Chulalongkorn University, Bangkok, Thailand	http://www.chula.ac.th/cuweb_en/
Georgia Institute of Technology (Georgia Tech), Atlanta, Georgia, USA	http://www.gatech.edu/
Johns Hopkins University, Baltimore, Maryland, USA	http://www.jhu.edu/
Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, USA	http://web.mit.edu/
Norwegian University of Science and Technology (NTNU), Trondheim, Norway	http://www.ntnu.no/english
Ohio State University, Columbus, Ohio, USA	http://www.osu.edu/
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University of Mauritius, Reduit, Mauritius	http://www.uom.ac.mu/
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FOREWORD

Education for All requires innovation and there is no innovation without knowledge sharing. Stark contradictions characterize our societies: on one end of the spectrum, over 70 million children are out of school and one adult in five lacks basic literacy skills. On the other, globalization and the rise of the knowledge-intensive world economy call for an increasingly skilled labour force. Expanding the reach of education and improving its quality are the two major challenges facing countries today if they are to be full partners in development.

The expansion of education systems will not suffice to reach the ambitious Education for All goals and to strengthen the knowledge base. New solutions will have to be found. Since the advent and expansion of the internet and the World Wide Web, many have looked to information and communication technologies to offer some of these solutions. These technologies have the potential to increase access to knowledge, and to contribute to building educated and engaged populations worldwide.

The Open Educational Resources (OER) movement offers one solution for extending the reach of education and expanding learning opportunities. It seeks to make educational content from institutions and individuals all over the world available freely and openly online for use, adaptation and reuse. Open sharing and collaboration offer real potential for enhancing both teaching and learning. And by promoting and facilitating the adaptation and translation of resources, it upholds education that is meaningful and relevant to an individual's environment and needs.

It was at a UNESCO meeting in 2002 that Open Educational Resources was first coined as a term. Since then, UNESCO has made an important contribution to building global awareness about OER, through organizing a series of online discussion forums on the theme, and creating and sustaining an online community of interest. These actions have connected and given a platform to a diverse range of individuals around the world, enhancing their ability to make informed choices about OER and empowering them to participate in this important new development. In publishing the papers and reports from two years of community dialogue, UNESCO seeks to

encourage an even wider audience to engage with the Open Educational Resources movement, and further strengthen its potential to expand learning opportunities around the globe – a fundamental human right and key component of social and economic development.

Nicholas Burnett

Assistant Director-General for Education

INTRODUCTION

Susan D'Antoni

The term 'Open Educational Resources' (OER) was coined in 2002 during the UNESCO *Forum on the Impact of Open Courseware for Higher Education in Developing Countries*, convened to consider the potential, for developing countries, of the Massachusetts Institute of Technology (MIT) initiative to put course materials online for open access. The participants in the meeting defined Open Educational Resources as digitalized materials offered freely and openly to educators, students and independent learners to use and reuse for teaching, learning and research. With their final declaration, the participants expressed

> their satisfaction and their wish to develop together a universal educational resource available for the whole of humanity, to be referred to henceforth as Open Educational Resources. Following the example of the World Heritage of Humanity, preserved by UNESCO, they hope that this open resource for the future mobilizes the whole of the worldwide community of educators (UNESCO, 2002, p. 28).

In the years following that meeting, there has been a growing number of initiatives, and an OER movement has emerged worldwide, transforming the sentiments expressed in this statement into action.

This book documents the conversation in cyberspace of a large and active international community convened to consider the concept of Open Educational Resources and its potential. In response to an invitation from the UNESCO International Institute for Educational Planning (IIEP) to take part in an internet discussion forum, some 500 individuals from 90 countries came together in 2005 to learn about a number of OER initiatives, and to reflect on some of the associated issues. They stayed together for a subsequent series of focused discussions, and they remain together in 2008 as this book is being prepared. The interaction in the community has been very lively, and much information and many ideas have been shared through the exchange of well over 2,000 messages. A website

has served to make all documents available broadly, and a wiki[1] has provided additional information and acted as a common work space.

This publication – the record of that intense conversation – aims to share even more widely the contributions made by so many. It is intended for those who may be interested in, or perhaps only intrigued by, the Open Educational Resources movement – its promise and its progress.

1. EDUCATION AND KNOWLEDGE SOCIETIES

The right to education is entrenched in Article 26 of the 1948 Universal Declaration of Human Rights: elementary education is to be compulsory and free; technical and professional education is to be made generally available; and higher education is to be equally accessible to all on the basis of merit (United Nations, 1948). This Article charges nations with a significant duty, one that many still cannot fulfil, even sixty years later.

Recognizing the importance of the gap between the objective and the reality, representatives of the international community agreed – at the 1990 World Conference on Education for All (EFA) in Jomtien, Thailand – to universalize primary education and significantly reduce illiteracy by the end of the decade. The EFA movement represents a global commitment to provide quality basic education for all children, youth and adults. When they met again in Dakar, Senegal, in 2000, many countries were far from achieving those objectives, but the commitment was re-affirmed with six main goals to be achieved by 2015:

- Goal 1: Expand early childhood care and education;
- Goal 2: Provide free and compulsory primary education for all;
- Goal 3: Promote learning and life skills for young people and adults;
- Goal 4: Increase adult literacy by 50 per cent;
- Goal 5: Achieve gender parity by 2005, gender equality by 2015;
- Goal 6: Improve the quality of education (UNESCO, 2000).

As of 2007 – nearly the half-way mark – projections indicate that, with current trend lines, the specific goals will not be reached by many countries within the time frame specified (UNESCO, 2007). Furthermore, in an era characterized by knowledge societies, provision of education at all levels is

1 A wiki is a website where users can add and edit content themselves. It is especially suited to collaborative projects, as a whole community can come together in a common workspace to create, edit and discuss content. The most famous example of a wiki is undoubtedly Wikipedia, the online encyclopedia 'that anyone can edit' (http://en.wikipedia.org/wiki/Main_Page).

becoming ever more crucial as the accelerating rate of change results in an accelerating rate of obsolescence in knowledge and skills of the population. The UNESCO report *Towards Knowledge Societies* urges governments to spend more to expand quality education for all, increase community access to information and communication technology, and improve cross-border scientific knowledge sharing. In his preface to the report, Koïchiro Matsuura, UNESCO Director-General, cautions that if they are to remain human and liveable, knowledge societies will have to be societies of shared knowledge (UNESCO, 2005, p. 5). Open Educational Resources have a key role to play in opening access to knowledge and promoting its sharing across the divides – digital, societal and cultural.

2. THE NEED FOR NEW APPROACHES

When a concept such as OER is put forward, most people will ask 'why?' and 'what will it do better?'. The current need for new approaches has been clearly articulated by Brenda Gourley, vice chancellor of the UK Open University. She identifies three imperatives for finding effective new ways to expand access to quality educational opportunities. First, there is a demographic imperative. In knowledge societies, the education model that developed eight or nine centuries ago will no longer suffice. Knowledge societies require more citizens with high-level skills, given an ever-changing context that demands a population of lifelong learners. Meeting the scale of such a demand for learning opportunities cannot be addressed easily in the current model. The second imperative is a financial one. The cost of meeting escalating demand by building more infrastructure is simply not feasible: it would be too costly, and it would take too long. Other options must be encouraged, using technology and distance education to reach more learners in a more cost-effective manner. And, finally, there is the educational imperative: to extend education to many more people, in a model appropriate to the twenty-first century (Gourley, 2004).

While the traditional model of classroom-based education may remain the core of national education systems, other approaches have been explored, tested and, in some cases, adopted. Over the years, various new technologies have been tried and tested for their potential use in education, particularly to expand access – including broadcast radio and television, audio and video cassettes, teleconferencing and videoconferencing, computer conferencing and computer-assisted instruction. Each was found to be useful in some way, but none had a profound impact on education. Many reasons for this could be put forward, but one might be a lack of available and appropriate content

for the technology and application in question. There is currently what may prove to be a fruitful convergence: connectivity to the internet is increasing; low-cost computers and enhanced mobile phones are being developed; and the body of open content in digital format is growing.

It may be the internet and the web that will fulfil the promise and deliver the level of change that had been expected of previous technologies, but their full impact may not yet be evident. The impact of the web has been compared to that of electricity: although it took several generations from its invention to the point at which all the infrastructure was in place, once that happened, everything changed – the home, the work place, transportation, and so on. '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… The web has just begun to have an impact on our lives' (Seely Brown, 2000, pp. 11–13).

If the web has yet to have its full impact, information and communication technology (ICT) is already causing change in many areas. Certainly, it is still unevenly distributed and unevenly accessible, but its reach is growing. Education systems must assess how best to take advantage of new ways of teaching and learning that are congruent with the needs of the society, be they economic, social or personal. Furthermore, there needs to be more equitable access to content. It has been noted that the so-called 'digital divide' may be less related to equipment and technology than to content and the need to bridge the content divide. If global production is the goal of globalization, value creation should be the vehicle, with local languages, cultures and comparative advantages combined for beneficial outcomes at both local and global levels. In this context, education enables individuals to participate in this process of value creation, and ICT helps to make education global (Lanvin, 2008).

3. OPEN EDUCATIONAL RESOURCES

The sharing of content in education, while certainly not a new phenomenon, has been greatly enabled by word processing software, which allows the production of digital content, and the internet, which allows the content to be easily, almost effortlessly, shared.

The history of the OER movement is often said to have begun in 1994, when Wayne Hodgins coined the term 'learning object', which he defined as 'small (relative to the size of an entire course) instructional components that can be reused a number of times in different learning contexts' (Wiley, 2000, p. 3). In 1998, David Wiley added the term 'open

content', which advanced the notion that the underlying principles of the Free and Open Source Software (FOSS) movement could be applied to content, and introduced the first widely adopted open license for content, the Open Publication License.

The founding of Creative Commons, in 2001, resulted in an elaborated set of licenses that allow copyright holders to specify the rights they wish to waive, a tool to facilitate the sharing of content. Also in 2001, MIT announced their OpenCourseWare (OCW) initiative, which aimed to make most of its instructional materials openly available on the web (Wiley, 2006). Since then, interest and action has grown considerably, and in early 2008 the Cape Town Open Education Declaration was released: 'a statement of principle, a statement of strategy and a statement of commitment ... meant to spark dialogue, to inspire action and to help the open education movement grow' (*The Cape Town Open Education Declaration*, 2008).

Looking closely at the numerous initiatives, one can discern differences in rationale and context that show that OER is in fact the nexus of a range of efforts that address the need to 'unlock knowledge' and open access to knowledge for all. MIT OpenCourseWare represents an institutional response, the advice of a committee convened to consider how MIT might make use of educational technology and distance education. The recommendation was to give away all the course materials on the web, and the result has been a web-based publishing venture that has made available almost all course materials for its more than 2,000 subjects. Charles Vest, the president of MIT at the time the decision was taken to create OCW, has described it as an adventure, and one that was congruent with the history and values of the institution (Vest, 2006). In 2005, as the OCW model was being adopted by more and more institutions, the OpenCourseWare Consortium was established with the stated mission of advancing education and empowering people worldwide through open courseware. The Consortium supports (as of early 2008) collaboration among more than 180 members from around the world to build a wealth of open educational content based upon a shared model with 95 websites and well over 4,000 courses (OpenCourseWare Consortium, 2008).

Rice University Connexions represents another approach – the response of an individual academic to frustration with the limitations of the traditional college textbook. Richard Baraniuk imagined, instead, 'textbooks adapted to many learning styles and translated into myriad languages … textbooks that are continually updated and corrected by a legion of contributors' (Wales and Baraniuk, 2008). His response was to create Connexions, an environment for collaboratively developing, freely sharing and rapidly publishing scholarly

content on the web. Authors, teachers and learners are invited 'to create, rip, mix and burn textbooks, courses and learning materials from a globally accessible, open-access repository'. At present, Connexions has one of the highest levels of use of Open Educational Resources on the web, with 16 million hits per month representing 600,000 visitors from 196 countries (Thierstein and Baraniuk, 2007).

It is not only academics and institutions that have come to see the advantages of sharing content. India offers an example of a national response: the National Knowledge Commission was established as a high-level advisory body to the prime minister, with the objective of transforming India into a knowledge society. In its second report to the nation in 2007, the Commission highlighted the potential of OER:

> Our success in the knowledge economy hinges to a large extent on upgrading the quality of, and enhancing the access to, education. One of the most effective ways of achieving this would be to stimulate the development and dissemination of quality Open Access (OA) materials and Open Educational Resources (OER) through broadband Internet connectivity (National Knowledge Commission, 2007, p. 51).

Collectively, these initiatives point to a growing energy and synergy in the OER movement, but it is still early and there is much to be done if it is to become a pervasive approach in addressing the knowledge divide.

4. UNESCO AWARENESS-RAISING ACTION ON OER

Open Educational Resources – whether full courses, course materials, modules, videos, software, tests or textbooks – allow educational institutions, teachers and learners to access, adopt, adapt and reuse them. However, if there is little or no awareness of availability, open content will not be exploited fully.

As the UN agency responsible for education, and with its network of National Delegations and Commissions, UNESCO is uniquely positioned to take up the challenge of informing Member States of the OER movement and its potential to contribute to improving access to knowledge and to Education for All. The UNESCO International Institute for Educational Planning (IIEP) organized and implemented a two-year initiative with the objective of increasing awareness of Open Educational Resources at the international level, and supporting capacity building and informed decision-making, particularly on the part of potential users and providers of openly available resources.

To meet this objective, IIEP envisioned the systematic creation of an international OER community. Two discussion forums were structured as virtual seminars, with the presentation of a document followed by discussion and debate:

- the first, in 2005, presented OER and some examples of providers and users of OER, their experiences and related issues;
- the second, in 2007, put forward the findings and draft report of a study of OER undertaken by the Organisation for Economic Co-operation and Development (OECD).

In between the two forums, the emerging Community of Interest deliberated on several specific topics:

- a research agenda for OER;
- a Do-It-Yourself/Do-It-Together resource to promote development of OER;
- FOSS solutions for OER, and lessons from the FOSS movement in a joint session with the IIEP Community of Interest on Free and Open Source Software for education.

By mid 2007, an international Community of Interest had been established, with almost 650 members from 98 countries, including 67 developing countries. Not only did members share their interests and experiences, but they had developed the capacity to act as champions of the movement in their own setting, identifying what would be the best and most appropriate action.

5. THE PUBLICATION

The chapters of this book follow the flow of the discussions in the community over the two-year period covered. Each chapter is preceded by a brief comment that aims to give an indication of the structure of the session and the flow of the community interaction. The separate sessions of each forum were informed by a background note that served to launch the interaction with the expert discussants. The topic-related sessions held between the two forums were more informal in format, and two of the three did not have background notes. Preparing the final reports – which aim to give a succinct record of the voluminous interaction – represented a Herculean task. While it may be impossible to capture the energy that permeated the exchange of over 2,000 messages, the gist of the discussion has been set down faithfully by the brave authors of the reports.

6. NEXT STEPS – A COMMUNITY AND A NETWORK

UNESCO has an important role in providing a space for international discussion and debate on issues of interest and concern to its Member States. And the five main functions of the Organization – as a laboratory of ideas, a clearinghouse, a standard setter, a capacity builder in Member States and a catalyst for international cooperation – make it an ideal host for informal international internet discussions and the more formal international Communities of Interest. Such opportunities for interaction make it possible for those who would never otherwise have a chance to meet, to come together to share experience and expertise and to profit from an international discussion and debate. And this has been the case for the OER Community that links so many individuals from so many organizations and countries. It is an exemplary community – thoughtful and reflective, active and productive, and above all, open.

The UNESCO OER Community now constitutes a recognized space for international exchange of information, resources and views. However, discussion has been in one language, and topics have been general (even if discussion may be specific). The next step is to promote local awareness raising and appropriate OER development and use. Certainly the establishment of a decentralized network of nodes will build upon and extend the work of the community. And, perhaps more importantly, nodes will operate in the local language and culture to stimulate and enable development and use of OER as befits local need. The focus of a node may be a geographic locale or a linguistic group, or it may be a specific interest such as teacher education. Although nodes may act largely independently, those active in the node will have experiences and resources to share with the OER Community, which will remain active as a platform for ongoing interaction at the international level. The UNESCO website and the OER wiki will continue to act as a point of reference and a common work space for the international OER Community and the emerging OER Network.

It is to be hoped that, with time, all countries will participate in the OER movement in ways that suit their education and training strategies, and their citizens' needs, as they evolve in time into not only knowledge societies, but 'societies of shared knowledge'.

REFERENCES

The Cape Town Open Education Declaration. 2008. The Cape Town Open Education Declaration. http://www.capetowndeclaration.org/ (Accessed 22 January 2008.)

Gourley, B. 2004. *Moving Open and Distance Learning to Centre Stage.* The Geoffrey Hubbard Memorial Lecture 2004. Cambridge, UK, National Extension College.

Lanvin, B. 2008. *Knowledge 2.0? E-Skills and the Global Sourcing of Talent.* Presentation given at UNESCO, Paris, 18 January 2008.

National Knowledge Commission. 2007. *Report to the Nation 2007.* New Delhi, Government of India.

OpenCourseWare Consortium. 2008. *OpenCourseWare Consortium: about us*. http://www.ocwconsortium.org/index.php?option=com_content&task=view&id=15&Itemid=29 (Accessed 28 February 2008.)

Seely Brown, J. 2000. Growing up digital: how the web changes work, education, and the ways people learn. *Change*, Vol. 32, No. 2, pp. 10–20.

Thierstein, J. and Baraniuk, R. 2007. *Connexions Overview.* http://cnx.org/aboutus/publications/paper.2006-07-12.3619060641/ (Accessed 28 February 2008.)

United Nations. 1948. *Universal Declaration of Human Rights*. New York, United Nations. (Adopted and Proclaimed by General Assembly Resolution 217 A [III] of 10 December 1948.)

UNESCO. 2000. *The Dakar Framework for Action: Education for All – Meeting our Collective Commitments*. World Education Forum, Dakar, UNESCO.

——. 2002. *Forum on the Impact of Open Courseware for Higher Education in Developing Countries: final report*. http://www.wcet.info/resources/publications/unescofinalreport.pdf (Accessed 6 June 2005.)

——. 2005. *Towards Knowledge Societies*. UNESCO World Report. Paris, UNESCO.

——. 2007. *EFA Global Monitoring Report 2008. Education for All by 2015: will we make it?* Paris, UNESCO.

Vest, C. M. 2006. Open content and the emerging global meta-university. *EDUCAUSE Review*, Vol. 41, No. 3, pp. 18–30.

Wales, J. and Baraniuk, R. 2008. Bringing open resources to textbooks and teaching. *San Francisco Chronicle*, 22 January 2008, p. B-7.

Wiley, D. A. 2000. Connecting learning objects to instructional design theory: a definition, a metaphor, and a taxonomy. D. A. Wiley (ed.), *The Instructional Use of Learning Objects: online version*. http://reusability.org/read/chapters/wiley.doc (Accessed 8 February 2006.)

——. 2006. *The Current State of Open Educational Resources.* http://opencontent.org/blog/archives/247 (Accessed 8 February 2006.)

Section 1.

A first forum: presenting the Open Educational Resources (OER) movement

The first forum, lasting six weeks, from late October to early December 2005, was organized to present background information about Open Educational Resources, followed by an examination of the experiences of a number of providers and users of OER, along with several key related issues. The sessions were structured in a 'virtual seminar' format so as to provide a substantial amount of information and promote a focused discussion. Expert discussants were invited to present a number of institutional examples and issues, and to share their experiences with participants. Nearly 500 individuals from 90 countries joined the forum, convening the 'whole world around the table', as one participant noted. Interaction was lively, and email exchanges averaged 100 a week.

Chapter 1

OPEN EDUCATIONAL RESOURCES: AN INTRODUCTORY NOTE

Sally Johnstone

The forum opened with a general reflection on Open Educational Resources. During this first session, the group had an opportunity to discuss the concept, the terminology and the types of projects that have been developed. This overview was intended as background for the presentation and discussion of the specific initiatives and issues that followed.

> OER [Open Educational Resources] champions sharing of knowledge worldwide to increase human intellectual capacity. … UNESCO can encourage the development of OER in education, culture, and religion to enhance mutual understanding for international peace (UNESCO, 2004).

While it is clear that higher education systems and institutions worldwide face unprecedented challenges in meeting the increasing demand for initial and continuing education, it is also clear that there are developments that will increase access, make learning opportunities more flexible and help contain rapidly increasing costs.

As information and communication technologies (ICT) have become more available, those involved in teaching and learning have found that a vast number of resources are available from many sources. However, these resources can be hard to find without a significant amount of searching. Once found, it is hard to know whether they are of high quality. Searching the World Wide Web on a specific topic normally generates too many references – somewhere in the links may be the information sought, but few people have the time to search through them all.

Many university faculty members are using the web in their courses, which means that the amount of course content available in electronic format is growing. Yet, until recently much of this material was locked up behind passwords within proprietary systems. The Open Educational Resources movement aims to break down such barriers and to encourage and enable the sharing of content freely. One can compare the concept of

Open Educational Resources with that of Free and Open Source Software (FOSS). Just as FOSS allows users to modify software as needed, OER allows users to adapt content to suit their own needs. Indeed, academic researchers have long shared their work in scholarly journals, realizing that knowledge in their fields of study will grow more rapidly if scholars are not obliged to duplicate each other's research. OER applies that concept to teaching materials and tools. Through the use of OER, academics worldwide can build on the pedagogy, knowledge and tools created by their colleagues to enhance student learning.

1. OER AND OPEN CONTENT: DEFINITIONS

The term 'Open Educational Resources' was coined in July 2002 at the UNESCO-hosted Forum on the Impact of Open Courseware for Higher Education in Developing Countries. Participants at that forum defined Open Educational Resources 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).

OER is a very broad concept. A wide variety of initiatives and online materials can be classified as educational resources: from courses and course components to museum collections, open access journals and reference works. And, over time, the term has come to cover not only content, but also learning and content management software, content development tools, and standards and licensing tools for publishing digital resources. These tools allow users to adapt resources in accordance with their cultural, linguistic, curricular and pedagogical requirements.

This forum will focus on the open provision and use of course elements and materials only – in other words, open content for courses. This still offers scope to explore a wide variety of projects, from initiatives that seek to develop and provide complete learning programmes, to institutions that publish the materials they use in their own teaching (e.g. syllabi, lecture notes, reading lists, assessments), to sites that gather course elements from many different institutions. Other initiatives support the provision and use of open content through, for example, developing software tools or building communities of use. Open content may be a valuable resource, support and catalyst for teachers and learners, but it is not meant to replace institutionally supported open and distance learning. The use of open content does not imply a credential for the user.

2. UNESCO MEETINGS: EXPLORING THE POTENTIAL

The 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries included representatives of universities from eleven countries, as well as from international and non-governmental organizations (NGOs). The goal of the forum was to examine the possibilities of, and the issues associated with, 'open courseware' (a term that was replaced during the forum with 'Open Educational Resources'). The delegates concluded that the worldwide success of Open Educational Resources would depend upon a community that could – within minimal technical constraints – access, adapt, translate, use, produce and offer the material. This meeting was supported by the William and Flora Hewlett Foundation, which has made OER a major part of its education programme and has supported a wide range of projects.[2]

At the 2004 UNESCO Second Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education, a full session was devoted to Open Educational Resources. Following the presentations, a working group elaborated the list of OER to include:

- learning resources: courseware, content modules, learning objects, learner support and assessment tools, online learning communities;
- resources to support teachers: tools for teachers, and support materials to enable them to create, adapt and use OER, as well as training materials for teachers, and other teaching tools;
- resources to assure the quality of education and educational practices.

The participants in the meeting pointed to a role for UNESCO, as expressed in the quotation at the beginning of this chapter. In addition, they underlined the fact that, although OER have the potential to increase the quality of information and teaching, they also have the potential to contribute to a homogenization of education. OER that is created in only a few countries and disseminated to all the others could constitute a threat to cultural diversity.

3. OER INITIATIVES: SOME DEVELOPMENTS

The OER movement gained considerable visibility in 2001, when Charles Vest, then president of the Massachusetts Institute of Technology (MIT), announced MIT's intention to put all of its course materials online for anyone to use. This decision resulted in the OpenCourseWare (OCW) project,[3]

2 http://www.hewlett.org/Programs/Education/OER/
3 http://web.mit.edu/ocw/

which by October 2005 included over a thousand courses. In addition, open content consortia are being formed in response to MIT OCW, either to widen access to MIT's materials (e.g. China Open Resources for Education[4]), or to develop their own open content projects (e.g. Japan's OCW Alliance[5]).

Several American universities have since followed MIT's example (Johnstone, 2005) but have chosen to focus on specific subject areas to make available as open content (e.g. agricultural engineering, public health, dentistry, instructional technology). While much of the development of open content is coming from universities, there are also initiatives at other levels.

Although MIT's OpenCourseWare is one of the better known and more widely copied models, other important OER projects have taken different approaches, with very different results. The Connexions project[6] of Rice University in Texas has two components. The Content Commons component offers collaboratively developed material that can be modified for any purpose. The second component comprises FOSS tools to help students, instructors and authors manage the information available in the Content Commons. Faculty from all over the world are contributing to and using the materials in the Content Commons, especially in the areas of engineering and music education.

Another approach is exemplified by Carnegie Mellon University's Open Learning Initiative[7] (OLI). Developed by cognitive scientists, experts in human–computer interaction and Carnegie Mellon faculty, it aims to offer 'a new paradigm for online education' (Carnegie Mellon, 2005). OLI's complete courses have innovative features such as cognitive tutors, virtual laboratories, group experiments and simulations. These tools allow academics at other universities to develop their own content in this pedagogically rich environment.

The Creative Commons project[8] seeks to facilitate the development and use of OER by addressing copyright issues. The non-profit organization, developed by lawyers, offers flexible licenses for creative work, with the aim of giving web-content producers other options than the usual 'open to all' or 'open to no one'. Creative Commons hopes to build a layer of reasonable, flexible copyright licenses in the face of increasingly restrictive default rules.

4 http://www.core.org.cn/en/
5 http://www.jocw.jp/sub2.htm
6 http://cnx.rice.edu/
7 http://www.cmu.edu/oli
8 http://www.creativecommons.org

Among the more notable of the many other current OER projects are:

- Wikipedia:[9] an online, community-developed and maintained encyclopedia that by October 2005 contained over 2 million entries, in over 100 languages;
- EduTools:[10] supported by the Hewlett Foundation, EduTools provides course management software product reviews and a decision support tool, in addition to course reviews;
- the African Digital Library;[11]
- the Knowledge Commons;[12]
- the Open Content Alliance:[13] a collaborative effort of a group of cultural, technology, non-profit and governmental organizations from around the world to build a permanent archive of multilingual digitized text and multimedia content.

The OER world is already a rich one, but there is much more to be done.

4. THE OER MOVEMENT: LOOKING FORWARD

Marshall Smith, director of the Education Program of the William and Flora Hewlett Foundation, offers the following vision for the OER movement:

> There is a lot of educational material available on the web, but it is rarely organized in a way that can actually help increase the quality of instruction. Open courseware projects allow a professor anywhere in the world to see exactly how his or her colleagues present a specific body of knowledge to students. This growing set of resources has the potential to increase the quality of teaching worldwide (personal communication, October 2005).

Support for the OER movement is a major component of the Hewlett Foundation's education programme. Indeed, the Foundation has provided support for many of the projects mentioned here. However, sustaining the OER movement will be a complex undertaking, and not all of the issues and variables can be identified in advance.

9 http://www.wikipedia.org
10 http://www.edutools.info
11 http://www.africaeducation.org/adl
12 http://www.edclicks.com/
13 http://www.opencontentalliance.org/

OER began with a small, deliberately diverse group of institutions exploring and developing resources. As more institutions and more materials from more courses are added to the mix, OER will be able to serve a broader group of learners. The initial providers are contributing course content, but other projects are being developed to create library resources, teaching resources and online communities of learners.

To succeed, OER will require many creative people willing to both contribute and make use of the resources. The OER movement can be viewed as a grand, but achievable, undertaking to share intellectual capital. A decade from now, the pioneer providers and users of OER may hardly recognize the movement. If it is to be effective, OER will need to evolve in order to meet the evolving needs of the higher education community.

REFERENCES

Carnegie Mellon. 2005. *Open Learning Initiative: project overview*. http://www.cmu.edu/oli/overview/index.html (Accessed 20 October 2005.)

Johnstone, S. M. 2005. Open Educational Resources serve the world. *EDUCAUSE Quarterly,* Vol. 28, No. 3, pp. 15–18.

UNESCO. 2002. *Forum on the Impact of Open Courseware for Higher Education in Developing Countries: final report*. http://www.wcet.info/resources/publications/unescofinalreport.pdf (Accessed 20 October 2005.)

——. 2004. Workshop Two, Building partnerships: widening access to quality Open Educational Resources (OER): report to the plenary. *Second Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications in Higher Education: globalization and higher education*, Paris, 28–29 June 2004.

Chapter 2

PROVIDING OER AND RELATED ISSUES: AN INTRODUCTORY NOTE

The second session, lasting two weeks, was organized to present four examples of specific institutional approaches in the provision of OER. Different institutions have followed different lines of development, as represented by the four examples presented below.

A new expert discussant joined the virtual seminar table each day for four days. This made for fast-paced interaction, but discussion of the examples continued throughout the session, according to the interests of the group. Participants were encouraged to contribute information on their own institution's approach if they were developing OER, or to identify other initiatives or references.

During the second week, the focus of the discussion shifted to a consideration of some of the issues related to developing OER, with two discussants raising the key issues of faculty experience and copyright.

1. OPENCOURSEWARE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

Anne Margulies

What is MIT OpenCourseWare?

MIT OpenCourseWare[14] (OCW) is a free and open website offering high-quality teaching and learning materials organized as courses. MIT faculty create these materials for their classroom teaching and then offer them for worldwide publication on OCW. For any given course, the materials convey the parameters of the course's subject matter and pedagogy, and ideally represent a substantially complete set of all the materials used in the course.

The purpose of OCW is to advance education by making these materials available to educators, who may draw on them for teaching purposes, and to students and self-learners, who use them to supplement their studies or to enhance their personal knowledge.

14 http://ocw.mit.edu/

MIT OCW was initiated in 2001. In September 2002, it published its first 32 courses, which were built 'manually' using rudimentary web development technology. By October 2005, OCW had grown into a deep and rich website containing 1,100 courses, with work underway to publish an additional 150 new courses and 100 updates. The goal was to publish materials for virtually all MIT courses (approximately 1,800) by September 2007.

Currently, MIT OCW:

- covers every discipline taught at the Institute and represents all five MIT schools and 33 academic departments, in approximately the same proportion as the total course offerings of these schools and departments;
- contains materials contributed by over 2,200 individuals, including 70 per cent of MIT's tenured and tenure-track faculty;
- includes video materials for approximately 75 courses, including 16 courses offering complete videos of their entire lecture series;
- is supplemented by dozens of alternate distribution sites making published course materials more accessible internationally (translators now make selected MIT courses available in five languages besides English).

In addition, there are at least 70 independent websites around the world that 'mirror' OCW, providing a complete copy of the entire OCW publication to regional or local users where internet access is limited.

OCW has begun to resonate with other institutions that share a commitment to open knowledge. To date, over 100 institutions around the world are adopting the OCW model, including 36 domestic and international institutions offering live, publicly accessible OCW sites. Among them they offer about 700 published courses, to date, in addition to MIT's 1,100. These courses largely cover complementary disciplines, representing materials from leading institutions known for their work in their respective fields.

Why is MIT doing this?

Access to high-quality educational materials is too often limited to those who can afford to attend an institution of higher learning or buy published materials outright. Indeed, some educators regard their primary course materials as the 'crown jewels' of the instructional programme – the essence of what they offer to students, the products that generate tuition revenues, and the substance of what they publish in textbooks. As a result, they

sometimes treat these materials proprietarily, guarding them from exposure and use except by registered students and paying commercial publishers.

In contrast, a trend towards *open* knowledge and *free* availability of high-quality teaching and learning materials will equalize access. Educators, including those in less-advantaged areas where resources are at a premium, can capitalize on such materials to enhance their courses and improve their teaching, benefiting many students at a time. Individual students and self-learners may take direct advantage of the materials to develop their knowledge and intellect. At MIT most faculty and academic leaders subscribe to the belief that openly publishing the teaching materials used at the Institute will bring people of all backgrounds together and promote mutual understanding. MIT's OpenCourseWare initiative supports the growing movement towards balancing the legitimate interests of intellectual property owners with society's need for open information sharing, learning and debate. The overarching long-term goals of open sharing of courseware are to:

- create a freely accessible body of exemplary course materials for teaching and learning;
- jump-start higher education in less advantaged parts of the world; and, ultimately,
- raise the standard of education generally.

MIT faculty have a passion for teaching and believe that by contributing their course materials freely to the world they will help to advance education around the globe, further the teaching and public service missions of the Institute, and fulfil their own commitment to the advancement and dissemination of knowledge. Building on these ideals, OCW's dual missions are to provide free access to MIT course materials for educators and learners around the world and to extend the reach and impact of MIT OCW and the OpenCourseWare concept.

What is the usage and impact of OCW around the world?

MIT OCW was visited more than 12 million times between October 2003 and October 2005. During that period, average traffic to MIT content grew to over 20,000 visits per day. About two-thirds of this traffic originated outside the United States (MIT, 2005).

Visitors to OCW fit these profiles: educators 15 per cent, students 31 per cent, and self-learners 48 per cent. About 85 per cent of educators say OCW has improved their courses or their teaching. Some 84 per cent of students say OCW has aided their learning. And 91 per cent of all visitors say

they have been successful in achieving their goals in visiting OCW. Overall, 94 per cent of users indicate they would recommend OCW to others (MIT, 2005). MIT has received thousands of emails from educators, learners and alumni praising OCW and expressing thanks for this resource.

What are the key challenges we face?

In one way or another, all of the challenges relate to ensuring the long-term vibrancy and sustainability of OCW. Key considerations include the following:

- *Financial support*: MIT strives to balance its own investment of limited funds with external funding from organizations interested in the open knowledge and Open Educational Resources movements. As OCW begins to transition to a steady-state operation in 2008, we expect ongoing funding to become even more challenging.
- *Value to worldwide users*: Publication of MIT's course materials is worthwhile only if our users continue to find it useful and usable for their teaching and learning purposes. To this end, we respond to user feedback with continuous improvement to OCW materials and services to maximize relevance and impact. And we maintain a rigorous evaluation programme to ensure that we are fulfilling the OCW mission and meeting user needs and expectations.
- *Value to MIT*: It is vitally important that OCW continue to deliver meaningful value back to the Institute, its faculty and students. By making OCW a valuable internal resource, we will foster continued faculty participation and encourage them to keep their published materials up to date.
- *Staff motivation*: As OCW subtly transitions from a start-up innovation to a steady-state maintenance operation, it will be important to sustain the excitement of the OCW idea and keep staff motivated and challenged.
- *Integration of OCW with MIT's teaching and learning process*: There are three elements to this issue – integration of the concept of OCW into the culture and fabric of MIT, integration of the processes for course and teaching materials development, and integration or interoperation of the technologies that enable this. Right now, OCW runs parallel but separate to the instruction process. We continue to work towards a model in which OCW becomes more and more a natural by-product of the teaching process. This will come slowly, but ultimately will help to reduce costs, simplify processes, and make OCW more transparent to faculty.

2. CONNEXIONS, RICE UNIVERSITY

Richard Baraniuk

Connexions[15] is a unique web-based teaching and learning environment that aims to change the way we develop and use course materials. Connexions is based on a set of intuitions that are shared by a remarkably wide range of academics: that knowledge should be free and open to use and reuse; that collaboration should be easier, not harder; that people should get credit and kudos for contributing to research and education; and that concepts and ideas are linked in unusual and surprising ways.

Connexions: why and when?

The Connexions Project was launched in 1999 in response to my frustrations with the status quo of developing and publishing educational materials, in particular the difficulties related to:

- illustrating the interconnections between ideas and concepts in a curriculum (in spite of research indicating that it is the connections that make much of the education process meaningful),
- engaging students in interactive exploration of concepts,
- building communities and economies of scale for developing and continuously improving educational materials.

As an engineering professor, I was influenced by the burgeoning open source software movement (Linux, for example) and aimed to do a similar thing for books and courses. The key enabling ideas behind Connexions followed immediately from their lead:

- modularize the content (break a course or book into small chunks) so that it can be quickly authored, easily manipulated and updated, pulled into different customized courses, translated into different languages, and so on;
- open up the intellectual property so that anyone worldwide can access, use, and reuse the content.

From the outset, Connexions was intended to be a content project (building a commons of free educational content), a community project (building communities of students, instructors, and authors worldwide), and a software project (building open source tools to help people exploit the commons).

15 http://cnx.rice.edu

While we planned to develop our own open content licenses for Connexions content, we have been fortunate to work with Lawrence Lessig and the Creative Commons since their inception. Today all of our content carries a Creative Commons license. After an incubation phase funded by Rice University and several 'friends of Rice', the project secured major funding from the William and Flora Hewlett Foundation in 2002.

Connexions: where are we?

Connexions has grown tremendously since 1999. Today, Connexions is being used in traditional college, community college, and primary and secondary school settings, in distance learning, and by lifelong learners around the globe. Demand is surging: in the month of September 2005 alone, the Connexions servers handled over 15 million hits, representing 1 million page views from 450,000 users from 157 countries. Volunteers are translating modules and courses into a range of different languages, including Spanish, Japanese, Chinese and Thai.

Connexions content development is grass-roots organized and inter-institutional. Our most active content development areas at present include music, engineering, physics, chemistry, bioinformatics, nanotechnology and history. For example, a vibrant community of electrical engineering faculty – from Cambridge University, Georgia Tech, Ohio State, Rice and Stanford Universities, the Universities of California-Berkeley, Illinois, Michigan and Wisconsin, and the Norwegian University of Science and Technology – is developing a customizable digital signal processing (DSP) curriculum in Connexions. The Texas-based firm National Instruments is contributing DSP training materials, as well as developing a free 'player' version of their popular LabVIEW signal processing tool, which will make the materials come alive with sights and sounds, adding much-needed interactivity to engineering curricula. Cambridge University Press is contributing a number of DSP textbooks to Connexions for free access.

In other content projects, the University of California-Merced is developing their Introduction to Biology and College Algebra courses in Connexions. The National Council of Professors of Educational Administration is developing a Connexions knowledge base in school leadership and administration. They are also developing a community-based peer review process to identify and direct readers to high-quality materials.

Connexions: lessons learned and main challenges

We have learned many lessons along the way that have helped us tune the Connexions vision and toolset:

- *Demand*: There is a great demand from around the world for quality educational content, and it continues to accelerate.
- *Impact*: Many authors are realizing that they can make a bigger impact with their educational materials by open access publishing through a system like Connexions.
- *Reuse*: Many course instructors do not merely want to 'use' Open Educational Resources, but they also want to customize them to their own context (by modifying them, translating them, etc.). Connexions appears to be an ideal repository for these re-contextualized open resources.
- *Cost and ease*: More and more authors, instructors and institutions in the developing world are using Connexions to house their educational materials, as it requires no local infrastructure.

Many challenges remain, however, including:

- *Tools*: It is critical to ensure that our tools are as easy to use as possible. And there is currently a significant need to make open access tools and content interoperate across different repositories.
- *Intellectual property*: How should we best educate potential authors about open access and the Creative Commons licenses? How can we best mingle content with different open licenses, for example Connexions content with MIT OCW content? What do we do with pre-existing content that does not have an open license?
- *Quality assessment*: How do we best peer review and credential open educational content? (In response, we are developing a system of lenses to enable communities to develop their own customized peer review systems.)
- *Access*: How do we ensure that everyone has access to Connexions' content, including those with limited or no internet connectivity? (We are working with several book and CD publishers to reach out to these users.)
- *Sustainability*: How will we develop revenue models to sustain Connexions' free content and open source tools into the future?

3. OPEN LEARNING INITIATIVE, CARNEGIE MELLON UNIVERSITY

Candace Thille

When and why the initiative was undertaken

The Open Learning Initiative[16] (OLI) started at Carnegie Mellon University in 2002, funded by a grant from the William and Flora Hewlett Foundation. OLI is a project devoted to developing 'cognitively informed', openly available online courses and course materials. 'Cognitively informed' means that the course design is based on current theories from the cognitive and learning sciences, and is informed by data gathered from both experts and novices through cognitive science and human–computer interaction methods. The Open Learning Initiative was launched in the hope that online learning environments might constitute an alternative to traditional classroom teaching by promoting greater student–content interaction and by providing students with greater and more frequent feedback on their performance and understanding. The design of OLI courses has been guided by cognitive principles of learning that stress the importance of interactive environments, feedback on student understanding and performance, authentic problem-solving, and efficient computer interface. Unlike other varieties of online education that rely on synchronous or asynchronous learning networks, the OLI courses are stand-alone and do not require the mediation of an instructor for the provision of feedback and evaluation of student performance.

The objectives of the OLI project are to:

- develop exemplars of 'cognitively informed' online courses and course materials that both enact instruction and support instructors;
- document the methods of course development and the assumptions underlying the application of results and methods from the cognitive and learning sciences;
- establish and implement procedures for routinely evaluating the courses and use that formative evaluation for iterative improvement;
- feed information from these evaluations back into the research communities that have postulated the theories on which we have based our designs;
- develop communities of use for OLI courses that contribute to the evaluation, iterative improvement, and ongoing growth of the courses and materials;

16 http://www.cmu.edu/oli/

- explore economic models for the combination of open access and sustainability.

We are working on a model to effectively transfer scientific knowledge developed in research contexts into online learning practices. Course development has been an iterative process in which we have structured many kinds of feedback loops to determine where applications of theory have worked and where alternatives must be tried. The expectation of educational quality stems from close collaboration, throughout the development of the OLI courses, among cognitive scientists, experts in human–computer interaction, and experienced faculty who have both deep expertise in their respective fields and a strong commitment to excellence in teaching. Out of this collaboration, we have developed courses and principles for effective online course design. The result has been a dual focus that incorporates both product delivery in the form of online courses and research on how to make such courses effective in facilitating learning.

What has been, and is being, done

As of the beginning of the first semester of 2005/06, there were seven subject areas for which there were either full courses or substantial course materials available through the OLI website: causal and statistical reasoning, statistics, economics, logic, biology, chemistry and physics. Additional courses were being added in calculus, French, statics, and research methods.

We have developed an integrated technology to deliver these courses and their many highly interactive features. Those features range from online interactive laboratories in causal and statistical reasoning, biology and chemistry, to multi-user market simulations in economics, to intelligent tutoring system in statistics and physics, to scenario-based learning environments in chemistry.

In addition to these more complex features, OLI courses include standard online testing that accommodates both frequent comprehension checks for students and tests to be used for performance assessment. The project continues to develop increasingly robust student performance reports so that instructors who are using OLI courses to support their teaching can easily monitor student progress and focus their instruction on those areas that their students need most.

We have conducted, and are in the process of conducting, several studies aimed at describing the nature of student learning and documenting

the processes of development and implementation of the online courses. Several of the studies substantiate the relative effectiveness of the courses, their underlying pedagogical rationality, the soundness of the assessment strategies and tools, and their unique features. The studies provide usable information concerning the context of teaching and learning, and the socio-cultural conditions that favour an adequate implementation of the courses. Our evaluation process goes beyond a simple validation of the courses' effectiveness, and becomes the telling of an educational experience, for both professional and scientific audiences.

Main challenges and lessons learned from the experience to date

Our current challenges and areas of focus are:

- *Building and supporting virtual communities of learners*: OLI courses are currently being used in two different types of learning environments: (a) instructor-led classes at the high school and college levels, to complement and support the instruction, and (b) individual learners who are not affiliated with any formal learning cohort or institution. It is in this latter environment that we believe we need to focus more of our efforts. OLI courses are highly interactive and the individual learner receives quite a bit of feedback and support from the system in the problem-solving context. The amount and depth of material taught in each OLI course, however, is comparable to a full, fifteen-week semester at Carnegie Mellon or a full-year course at the high school level, and we believe a virtual cohort would provide the support that individual learners need over that extended period of time.
- *Scaling the process for building a community of use and adapting and extending the courses to serve varied populations*: Each summer we host one or two three-day workshops for faculty who wish to use and extend OLI courses and to be involved in our evaluation studies. While the experience is a rich one that often affords faculty an opportunity to participate in a community of practice, it is a process that does not easily scale, so our reach is limited. OLI also provides faculty with tools and support for adapting and localizing the courses, and this process is also quite resource intensive.
- *Creating an economic model for the combination of open access and sustainability*.

4. CENTER FOR OPEN AND SUSTAINABLE LEARNING, UTAH STATE UNIVERSITY

David Wiley

I will describe three projects we are undertaking with the Center for Open and Sustainable Learning[17] (COSL), hopefully exposing different provider perspectives with each. Through our projects we are providing content as well as software tools that add value to our content and others.

When and why the initiative was undertaken

After the launch of MIT OpenCourseWare, we became concerned about how much actual learning a student would be able to accomplish using the MIT OCW materials alone, that is, without access to other students. In 2003 we started work on a new piece of software called 'Open Learning Support' (OLS) with the goal of enabling what we felt were critical social interactions necessary to support learning with MIT OCW materials.

In 2004 we decided to pilot an OpenCourseWare at Utah State University (USU), based on our belief that access to educational opportunity is a key means to the end of improving quality of life. In talks with MIT OCW, we discovered that they were using a proprietary infrastructure to support their project, which they were not really capable of sharing. Thinking that OpenCourseWare should run on an open platform, we also launched the 'eduCommons' project, and – with help and information from MIT OCW – began developing an open source infrastructure, capable of supporting OCW initiatives.

What has been, and is being, done

Our Open Learning Support social software,[18] which allows users to ask and answer questions concerning OCW content, has been integrated with select MIT OCW courses since early 2004. By October 2005, MIT OLS had 1,878 registered users, who had exchanged 450 messages. We have more recently integrated OLS with the Connexions collection at Rice University. OLS is currently being extended with additional features to support interaction in the absence of a teacher or moderator (e.g. a reputation management system).

17 http://cosl.usu.edu/
18 http://mit.ols.usu.edu/

By October 2005, our OpenCourseWare[19] had released fourteen courses from nine academic areas. We are working consciously to ensure that the courses provide content that enables users to build local capacity in key areas, including irrigation engineering, instructional design and agriculture.

Our eduCommons software[20] currently supports the production of USU OCW. Currently, we are also supporting fifteen pilot OCW projects running eduCommons at universities in the United States and Europe. In addition to English and German versions of the software, we are also preparing Chinese and Japanese versions in response to requests from these users.

Main challenges and lessons learned from the experience to date

With Open Learning Support, the main challenge is to understand how to best support informal social interactions, without any mentor or moderator, in order to facilitate meaningful learning with OCW content. These are instructional design and human–computer interface issues. One lesson we have learned is that learning communities without the clear leadership of a teacher or teaching assistant need lots of participants. That is, unlike a normal classroom, the experience improves significantly as you add more learners to the mix.

With OpenCourseWare, the main challenge is integrating the OCW production as far into standard university processes as possible, so as to reduce the cost of producing OCW as much as possible. This is a financial issue. We have learned that being involved in the production of a course from the beginning of the process is an excellent way to lower the costs associated with intellectual property (IP) issues later down the road. We work closely with another centre on campus that helps faculty design online courses (USU is a land grant university[21] that offers over 100 online courses each year). If faculty members can be encouraged to think in terms of IP-clean materials when they design a course for online delivery (rather than assuming fair use of IP-encumbered materials behind password protection), the conversion from formal online course to OCW is mainly a technical (and inexpensive) proposition. Scrubbing IP-encumbered material out of an existing course is personnel-intensive (and thus expensive).

19 http://ocw.usu.edu/

20 http://sourceforge.net/projects/educommons/

21 A public US college or university that has been designated by its state legislature or Congress to receive unique federal support – initially, in 1862, in the form of federal land.

With eduCommons, the main challenge is balancing the desire to make the OCW production process as easy as possible against the functionality needed to provide a robust platform for managing metadata, rights and publication. This is a usability issue. We have learned that when a course is already being offered online from a learning management system, offering tight integration with the system in question makes this balance easier to maintain. For example, Sakai[22]/eduCommons integration is advancing to the point where course content, along with associated metadata (including rights metadata), can be exported from Sakai and imported into eduCommons. Preserving rights metadata across the import/export process means that less personnel time is spent trying to determine the IP cleanliness of any given piece of content.

REFERENCES

MIT. 2005. *MIT OpenCourseWare: 2004 program evaluation findings report*. Cambridge, Mass., MIT.

22 A community source software development project to design, build and deploy a new collaboration and learning environment for higher education. See http://www.sakaiproject.org/.

Chapter 3

USING OER AND RELATED ISSUES: AN INTRODUCTORY NOTE

Having examined institutional experiences in providing OER, the group was invited to turn its attention during the third session to examples of institutions using OER, and to reflect upon some of the attendant issues and concerns.

As in the previous session, the first week was devoted to presentations by four discussants of their experience of using OER in an institutional setting. All four examples outlined in the introductory note were based upon the use of MIT OpenCourseWare. This had the advantage of allowing a comparison between different approaches to using the OER available from a specific institution. But once again, the group was encouraged to identify other initiatives. During the second week, the discussion centred on some of the implications of using OER. Two discussants commented on two specific concerns: learning object repositories to help users find OER, and cultural and linguistic concerns associated with the use of OER from other institutions.

1. UNIVERSITÉ FRANÇAISE D'ÉGYPTE: ADAPTATION OF OER FOR EGYPT

Mohammed-Nabil Sabry

When and why the initiative was undertaken

An initiative to use available Open Educational Resources began in November 2003. The motivation was to empower tertiary education in Egypt to face challenges raised by globalization. There are two main issues to face:

- *Increasing the tertiary completion rate*: New technologies tend to increase the need for tertiary graduates at a rate that greatly exceeds available capacity, both in terms of investment and human resources. The positive impact of a high tertiary completion rate on economic performance and social development as a whole has been proved (Desjardins et al., 2004; Taskforce on Higher Education and Society, 2000). As is the case with many developing countries, the gap between Egypt and developed countries is high. Measures must be taken to increase the offer in tertiary education in order not to lag behind the world's evolving economies.

- *Preserving cultural diversity*: An increasing number of academic institutions are developing e-learning capabilities, with a great imbalance in the distribution between different languages and cultures. The continuous improvements in the quality of the offer in one language (namely, English) should be viewed as a stimulus for other cultures to join the movement and even to innovate in order to preserve their own cultural identity.

What has been, and is being, done

A Memorandum of Understanding was signed between the UNESCO office in Cairo and the French University in Egypt (UFE), which resulted in direct cooperation between UFE and the Massachusetts Institute of Technology (MIT) as a first step. Cooperation was later extended to Carnegie Mellon, Rice, Al Akhawayn (Morocco) and Gamal Abdul Nasser (Guinea) Universities and the University of Mauritius.

In the first stage of the project, four MIT courses were selected from among the courses available through the OpenCourseWare initiative. These courses were adapted for the needs of the UFE. Adaptation included:

- selecting the parts of the OCW courses that fit the corresponding UFE courses,
- translating the selected parts into French,
- adding modules to complete the course, and
- adding graphics and/or animation whenever necessary to clarify some points.

Main challenges and lessons learned from the experience to date

The main advantage of MIT OCW is its comprehensiveness:

- There is a high probability of finding a 'hit' in OCW when looking for a particular course, which is a valuable advantage for both instructors and self-learners.
- The nature of the material offered varies from simple course notes in PDF (Portable Document Format) files (which is important for convincing some professors that it need not be complicated to start), to sophisticated interactive materials (which is stimulating for other professors willing to put in the required effort).

The main issues for improvement are outlined below.

Course modularity

However good a course may be, the fact that it has been designed for a given university means that it will never fit the needs of another university without some modification. Course modularity – in other words, the breaking down of the course into relatively small and independent educational elements (modules) – is an issue that needs to be addressed both in the design phase (module structuring), as well as in implementation (handling of cross links). This is necessary to keep the adaptation of a module for another course down to a manageable effort. In our case, we had to work with large chunks of material (a whole chapter, and sometimes larger), because otherwise the effort needed would have been huge. Inevitably, each part selected contained some elements outside our scope, while each part disregarded contained some useful elements.

Course adaptability

The most time-consuming tasks in course creation are related to figures, equations and tables. In the absence of the source materials (e.g. in cases where the only resources on offer were PDF files), equations and tables had to be redrawn. Figures also usually need to be redrawn since cutting and pasting from a PDF file results in bad resolution, as well as a large file size. Also, figures usually contain annotations, which must be translated into the target language. The only usable part of a PDF document is the text, which is not very useful for us since we need to translate it.

Course ownership

In some cases, course adaptation has involved extensive modification by our professors. Measures have had to be taken to preserve the intellectual property rights of both the original source (OCW) and the adapting professor. Although this issue has been addressed in the literature, we did not have enough time to make a survey. The decision was taken to:

- structure our courses into modules that are as small as possible, and
- for each module, include a list of the sources used to create it.

We hope that discussions will help us to define a better, hopefully standard, approach.

2. AFRICAN VIRTUAL UNIVERSITY: OPEN DISTANCE AND ELEARNING INITIATIVE

Peter Bateman

The African Virtual University's intention is to play a supportive role in the development of appropriate mixed mode or blended Open, Distance and eLearning (ODeL) programmes within its network of partner institutions. Our quest is for the development of delivery modes (traditional residential and distance education, online or computer mediated) that adopt constructivist approaches to student-centred learning, are delivered both on site and online, and that incorporate appropriate instructional technology, design, training and professional development for staff in the partner institutions. For us, this is where the African Virtual University (AVU) can add value in the development of both synchronous and asynchronous teaching and learning, either on or off campus.

Given the increasing number of students in most African universities, it is becoming clear that the development of virtual campuses in Africa is no longer an idea for the future. The paucity of resources and the demands of the learner are now forcing African universities to think creatively about how they can deliver their programmes to an ever-changing student body. It is in this creative tension between vision and reality that the AVU can add value to what African institutions are engaged in, as far as ODeL is concerned. The development and use of OER is a key aspect of realizing this vision.

To support the above, the AVU is involved in four wide-reaching OER initiatives: the MIT OCW pilot, the Development Gateway OER topic page, the eGranary pilot, and the TESSA (Teacher Education in Sub-Saharan Africa) project. I will describe our experiences with the first of these – the MIT OCW pilot.

When and why the initiative was undertaken

Between June and September of 2005, the AVU's Research and Innovation Facility, a unit within the ODeL Initiative, in collaboration with MIT OpenCourseWare and MIT Africa Internet Technology Initiative (AITI) students, undertook a pilot project that sought to increase use of OCW material in African institutions of higher learning. The objectives of the project were to:

- raise awareness of MIT OCW;

- facilitate the use of MIT OCW;
- initiate the process of developing African-based communities of practice for ODeL and OER creation; and
- provide research data on access to, and use of, OpenCourseWare in the context of the African institutions involved.

Two institutions in Kenya and Ethiopia were selected to participate in the pilot phase of this project: the University of Nairobi and the University of Addis Ababa.

What has been, and is being, done

Setting up mirror sites

MIT OCW provided external hard drives, pre-loaded with the MIT OCW site, which included text, multimedia and other enhanced interactive content. MIT OCW also provided software to log and track use of the material.

Sensitization workshops

The AVU facilitated and actively participated in the preparation and implementation of sensitization workshops at the selected institutions. Students from MIT-AITI, an innovative programme started by MIT students to integrate computers and internet technology into the education of students in African schools, were sent by MIT OCW to conduct part of the workshop as a component of their 2005 summer programme. The AVU and MIT-AITI students conducted site visits in order to:

- conduct sensitization workshops for faculty and/or students on MIT OCW material,
- install and configure the mirror sites and train site technical staff,
- provide ongoing technical assistance as needed.

Learning support materials

MIT OCW agreed to work with publishers to collect donated textbooks and learning materials. These were to be made available to the University of Nairobi and Addis Ababa University for selected courses in information and communication technologies (ICT), a discipline that has been identified as having the highest demand in sub-Saharan Africa.

Awareness campaign

The success of the MIT OCW pilot was partially dependent upon a successful communications campaign that:

- spread awareness about the programme, particularly among African educators and students;
- explained the background and purpose of OCW, including what OCW is and is not; and
- guided users on how to use the MIT OCW materials.

Main challenges and lessons learned from the experience to date

Overall, these pilots indicated that there is very high demand for, and appreciation of, the OCW materials in African universities. The AVU has had several enquiries from other partner institutions in its network, requesting a similar deployment of mirror servers. However, there were certainly challenges associated with undertaking the MIT OCW pilots. These are reflected in the following recommendations that the AVU Research and Innovation Facility has made to MIT OCW (and to which MIT OCW has been very receptive):

- The links on the OCW mirrors need to be rechecked so that as much content as possible can be made available and linked from within the mirror site, rather than from the main OCW website on the internet.
- In order to reduce the amount of time needed to set up a mirror site and eliminate problems of compatibility and operating system environments, the content should be shipped in a plug-and-play format, complete with at least an operating system or environment.
- All fundamental software should be bundled together with the OCW content in order to reduce the time required to set up the mirror site and to make it easily maintainable.
- The form of storage of the OCW material (i.e. portable external hard drives) makes it vulnerable to physical loss and damage resulting from constant movement and poor maintenance. A storage media such as an internal hard disk would be a better option, although more care also needs to be taken when handling and shipping.
- Research needs to be carried out to investigate the various modes for updating content and receiving feedback remotely via a cost-effective synchronous channel. This will enable MIT to update the content on the mirror sites from a central, yet remote, location.

- To increase buy-in of the OCW material, the mirror site should be configured so that it is flexible, and so that the web template can be edited in its entirety to match the institution's theme and house styles. We suggest that an easy-to-edit site template be developed for the OCW mirror, and/or a quick guide to changing the look and feel of the mirror site.
- To keep up the momentum of use, localized sensitization of the installed OCW mirror site should be maintained through the constant use of marketing material such as brochures, posters and leaflets.

The scale and scope of existing OER, and the enormous amount of information already available, presents a considerable challenge to those who stand to gain the most from them – learners and educators in the developing world. However, running headlong into the relatively untested OER realm serves neither the learner nor the educator. They risk being submerged by digitized information that may have little or no defined meaning or purpose. As a result of the MIT OCW pilot (and our involvement in the other initiatives listed earlier), the AVU believes that it is necessary to configure a conceptual framework, or OER Architecture, within which information and meaning converge to meet the higher educational demands of those in Africa.

The promise of OER resides not only in the digitized information itself, but also in its effective use and the methodological approaches and mechanisms that manage and ascribe meaning to it. The AVU believes that these challenges are best met through a collaborative partnership that incorporates the four main elements of the OER process: creation, organization, dissemination and utilization of OER. The current development of the AVU OER Architecture seeks to engage OER partners in a strategic combination of these elements that will lead to the development of a dynamic, rational and comprehensive Open Education Resource strategy for African higher educational institutions.

3. UNIVERSIA: TRANSLATION OF OER

Pedro Aranzadi

Universia.net was created by its founding partners to provide leadership in the development of the information society in Hispanic university education. The consortium was founded in Spain in 2000, with the support of Grupo Santander and the commitment of 31 universities, the Spanish Principals Conference and the Higher Council for Scientific Research. The Spanish

portal[23] was introduced on 17 September 2000, providing a range of services and basic content.

Universia.net is now active in ten countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, Portugal, Puerto Rico, Spain and Venezuela. To date, 724 universities have signed agreements with their respective national Universia.net portal, including almost all Spanish universities and 350 institutions in Latin America. In Chile, the first Latin American country portal, the Universia project represents 86 per cent of the university sector. Through these portals, Universia reaches 10 million higher education stakeholders around the world.

Mission and organization

The consortium's mission is to foster a high degree of participation from member universities to encourage educational and technological innovation, the application of new technologies, and the emergence of new communication platforms and information channels. Another key aim is to improve quality standards and the competitiveness of the higher education sector in the new information society.

From the beginning, Universia.net was intended to serve all university stakeholders: students, current, former and future; teaching and research staff; administration and service staff, and companies with an interest in higher education. Portal content is divided into thematic areas, and each area can function as an independent portal. Universia.net is also strongly committed to the creation of virtual communities that will be the first points of reference for the whole Hispanic academic world. The portal therefore incorporates chat, email and forum services, as well as news and events listings.

Universia and MIT OpenCourseWare

On 30 September 2003, the day that the Massachusetts Institute of Technology published the 500th course in OpenCourseWare, MIT and Universia announced that they had entered into a formal agreement to translate OCW courses into Spanish and Portuguese. Universia announced that it would translate a first offering of 25 courses, and that it was committed to expanding its translated OCW courses over time. By 5 May 2004, 55 courses had been translated, and, by October 2005, 105 courses

23 http://www.universia.es

in the OCW catalogue were available on the Universia OCW portal.[24] The portal also offers information about OCW in Spanish and Portuguese, translated versions of MIT's monthly OCW newsletter, information about Creative Commons licenses, and an online discussion forum for Spanish-speaking OCW users.

For Universia, participation in the OCW initiative underlines its own commitment to the internet as a vehicle for open knowledge through access to free and open materials. Universia seeks to increase the reach, accessibility and impact of MIT OCW, by providing millions of users in Latin American countries with materials translated into their own language.

4. CHINA OPEN RESOURCES FOR EDUCATION: TRANSLATION OF OER

Derrick Tate

When and why the initiative was undertaken

China Open Resources for Education[25] (CORE) was established in October 2003, and the programme was initiated in April 2004. China Open Resources for Education is a consortium of universities that began with 26 International Engineering Technology (IET) Educational Foundation member universities and 44 China Radio and TV universities. As of 2005, it had a membership of 100 universities, through which it could reach out to 5 million students.

Higher education has become more internationalized and has been moving towards increased open sharing of educational resources. Inspired by these developments and having received generous support from MIT, the William and Flora Hewlett Foundation and the IET Foundation, Fun-Den Wang, a Chinese-American Professor Emeritus of the Colorado School of Mines, brought together representatives from MIT, the Hewlett Foundation and the 26 IET Educational Foundation member universities (which include Peking University and Tsinghua University), with the presidents of 67 distance education pilot universities, and administrators from 44 China Radio and TV universities. On the basis of this forum, CORE was founded to promote the development of open sharing of educational resources in China.

CORE was formed to upgrade the content and delivery of higher educational services in China, and to make available to other countries the

24 http://mit.ocw.universia.net/
25 http://www.core.org.cn/en/index.htm

world-class educational material generated in China. CORE's objective is to enhance the quality of higher education in China, through introducing advanced courseware from MIT and other top-ranked universities from around the world, and by using the latest information technology, teaching methodologies, instructional content and other resources. At the same time, CORE aims to share advanced Chinese courseware and other quality resources with universities around the world. Through these efforts, CORE strives to realize the true open sharing of resources among universities at a global level. CORE's endeavours advance the available knowledge base beyond its current state by selecting and translating leading OCW and making it available to a broad range of users.

What has been, and is being, done

CORE seeks to make high-quality Open Educational Resources from MIT and other institutions available to Chinese universities. The member universities, with the leadership of CORE and a group of selected lead universities that share CORE's vision, select the courses most relevant to higher education in China. They translate that material into Chinese, review the translation and ensure its quality. The universities then use this OCW, in both Chinese and English, in teaching and research, and act as leaders to encourage other universities and the interested public to also use the materials. Quality Chinese courses and educational and scholarly materials are made available for sharing globally. Advanced teaching technology and software will also be made available in the hope that Chinese universities will use them to form OCW-enabled campuses.

The status of CORE's activities can be described in three categories:

- *Introducing and promoting the use of OCW by universities across China:* CORE has built a membership of universities across China that wish to use open courseware in their teaching. CORE first introduced courseware from MIT to these universities, followed by quality courseware from other international universities. Universities that join CORE will use an increasing amount of open courseware in their teaching.
- *Translating OCW:* CORE is translating more than 100 MIT OCW courses into Mandarin for use by Chinese universities. Member universities are also helping in this effort. CORE will also translate quality open courseware from other top international universities. Universities have free access to these translated courses via CORE's website. CORE has hired trained translators, such as professors and

bilingual volunteers with expertise in the subject areas being translated. Experts from CORE's discipline and subject committees supervise translation quality and, if necessary, adjust courses to reflect actual user needs and respond to feedback. Chinese universities will also contribute quality open courseware, and CORE will translate these courses into English or other user languages. As of October 2005, 450 quality Chinese courses were available – in Chinese – through CORE's website.

- *Launching CORE's website:* CORE's website is the only platform in China that accommodates the open-sharing needs of Chinese universities. Currently, universities can access open courseware and other important information on the site. In the near future, CORE member universities will be able to access live lectures by academics in other countries, contribute quality open courseware, and access lists of faculty who wish to engage in international exchange. As of 2005, CORE's website was receiving an average of 7,000 visitors per day.

Main challenges and lessons learned from the experience to date

There are three major outcomes which CORE wishes to achieve. The first is the selection of relevant OCW, educational and scholarly material for its programmes. The second is the translation and quality assurance of these selected materials. The third is the actual use of that translated OCW in teaching and research. CORE will have achieved its objectives when quality courseware is translated and used in teaching and research.

The obstacles to accomplishing these objectives include the reluctance of universities to use course material not generated within that institution, the difficulties of translating and ensuring the quality of the translations, and the inertia that must be overcome in getting professors to change to new and better course materials.

REFERENCES

Desjardins, R., Garrouste-Norelius, C. and Mendes, S. 2004. *Benchmarking Education and Training Systems in Europe: an international comparative study.* Stockholm, Institute of International Education, Stockholm University.

Taskforce on Higher Education and Society. 2000. *Higher Education in Developing Countries: peril and promise*. Washington, DC, World Bank.

Chapter 4

DISCUSSION HIGHLIGHTS

Paul Albright

As the forum drew to a close, the rapporteur was faced with the formidable challenge of synthesizing six weeks of fast-paced and thought-provoking discussion. The resulting report captures as much as possible the to and fro of the interaction among the participants. Furthermore, it highlights the main threads of the discussions over the course of the sessions, and identifies a number of the issues that would continue as a leitmotif throughout the ongoing interaction of the international Community of Interest on OER that was coming into being.

1. AN INTRODUCTION TO OPEN EDUCATIONAL RESOURCES AND OPEN COURSE CONTENT: THE IMPORTANCE AND BENEFITS OF OER

The OER movement is breaking down barriers that have blocked access to academic content. Until recently, most electronic course content was locked up behind passwords within proprietary systems, noted the forum's initial discussant, Sally Johnstone. OER represents a major step towards sharing teaching materials, methods and tools, just as academics have long shared their work in scholarly journals. The result is to augment teaching resources while expanding knowledge opportunities for learners and faculty members.

Throughout the forum, a forthright exchange of views stimulated thought and generated ideas that could advance the cause of OER. Participants stressed the importance of providing open, accessible and superior higher education content for a global community of teachers and scholars, students and lifelong learners. Whether OER is categorized as 'open access' or 'free content', it promotes autonomy and self-reliance within the learning community. Without the constraints of time or geography, education has the potential to combat economic, social and cultural obstacles. Through independent, self-determined learning and open academic content, the individual is able to grow intellectually beyond previous personal, institutional or local boundaries. Other benefits range from developing valuable work skills to engaging in life-enriching, lifelong learning.

Distinct – but not incompatible – visions of the function and purpose of OER were apparent early on in the forum discussions. These visions ranged along a spectrum, from OER as disparate educational materials, to scholarly sharing among academics, to publication of complete courses, to distance education leading to a qualification. OER advocates agreed they were all on the same path but acknowledged they were positioned at various points along a developing continuum.

David Wiley proposed a useful way to reflect on OER:

> We must view the vast body of Open Educational Resources as 'content infrastructure'.… Instead of thinking about Open Educational Resources as being the educational opportunity we are trying to share with people (the end of our work), we should think about them as the basic resources necessary for doing our job (a means to the end of our work). A vast collection of Open Educational Resources is, of course, the first milestone in our work, not the end of our work.

What is required for the future is vision and enterprise on the part of those who produce and consume Open Educational Resources, allied with a collective motivation to enlist governments, educational institutions and organizations in supportive, collaborative arrangements.

2. CHALLENGES FOR OER PROVIDERS

A primary purpose of the OER movement – which can be seen as developing out of the open source paradigm – has been to make educational materials widely available to a broad-based population of learners and teachers. A major session of the International Institute for Educational Planning (IIEP) forum described, discussed, and reflected on, the escalating growth of the movement and identified some key issues relevant to the development of OER.

OER initiatives were presented by Anne Margulies (MIT OpenCourseWare), Richard Baraniuk (Rice University Connexions), Candace Thille (Carnegie Mellon Open Learning Initiative) and David Wiley (Center for Open and Sustainable Learning, Utah State University).

The institutions illustrated several different approaches to OER development. MIT OpenCourseWare (OCW) – the publication on the web of course materials used in MIT classroom teaching – is perhaps the best-publicized and most copied institutional OER model. MIT OCW aims to provide a snapshot of how a particular course is taught at a particular time.

Although students and independent learners can and do use MIT OCW, a major goal of the project is to make MIT's teaching material available to other educators so that they can draw on it for their own teaching, use it as a curriculum and course planning tool, or be inspired by it to initiate their own open content initiatives.

Utah State University is one of the institutions to have adopted the MIT course publication model, although OCW is just one component of the University's OER activities. Its Center for Open and Sustainable Learning (COSL) has developed a social software tool – Open Learning Support – to support learner communities using OCW, and also an OCW development tool, eduCommons.

The other two institutions have developed very different models. Rice University's Connexions project attempts to bring the three strands of content, communities and software together in one intuitive and dynamic teaching and learning environment. Unlike the MIT model, Connexions is not a static institutional publishing initiative; anybody, anywhere in the world, is free to contribute course materials, and the modular content structure is designed to promote re-mixing and reuse in different contexts.

Carnegie Mellon's Open Learning Initiative (OLI) represents yet another approach. Carnegie Mellon set out to develop online learning environments with rich media support. The result is courses that are highly interactive and stand on their own, without need for classroom teaching, practical lab work in the case of science subjects, instructor mediation or external evaluation. OLI is more explicitly learner oriented than the other models; indeed the project can be seen as a testing ground for exploring how best to use available technologies to improve learning outcomes.

During the discussion, forum participants made helpful comments and described other OER developments with which they were familiar.

It was clear through the dialogue that a number of challenges confront those who develop and make available education resources for sharing. There are challenges that are specific, such as:

- finding suitable technologies to convey OER in a feasible, useable, effective and economically viable way;
- devising a compatible infrastructure so that there is ready transferability between the provider and the user;
- collaborating to develop models and new approaches that are educationally relevant and in an appropriate context for the user;
- fashioning OER that can be scaled up or down to adequately meet education requirements.

Some of the challenges are more fundamental:

- exploring how learning takes place within the framework of OER;
- determining how best to use OER so that learning outcomes are improved;
- establishing communities of support to assist self-directed learners and to maximize the effectiveness of OER;
- exploring how much content is needed for an educator at another institution to replicate at least some part of a course published as an OER;
- evaluating the quality of present and future open course offerings;
- sustaining the economic viability of OER in the long term so that it remains freely available in an open marketplace.

One participant observed that there seemed to be 'a tension between the desire to provide rich digital learning materials – which usually demand more complex technologies – and the desire to make learning materials as widely available as possible – which often demands much simpler technologies'.

Resolving or at least moderating this tension is a test for the academics and institutions engaged in developing and disseminating OER. One provider advocated dealing with the challenge this way:

> You can't create educational materials that function effectively in every single context any more than you can write software that runs on every single platform. … [W]e should focus on solving specific instructional problems, and make sure that our solution at least works for someone. Then other developers can 'port' our materials to their 'platform', or, in other words, other instructional designers can adapt our materials to solve local instructional problems.

An alternative view was that OER should be created and tested locally before advancing to the global stage. In this approach, OER would first develop in a local or community context before being offered as a global resource. It was argued that 'an education resource community is akin to any marketplace; there tends to be a domestic marketplace first and if the product is good then that quickly extends beyond borders'.

While it was clear from the discussions that OER is perceived as having great potential value for individuals, the benefits to institutions and faculty members were less apparent and less understandable. The main challenge to widening access to OER lies in overcoming reluctance and uncertainty within the academic community. Although participants reported a growing awareness

of OER, many emphasized the need to explain and promote the institutional benefits, and to provide incentives for faculty members to become actively involved.

Benefits and barriers within the institution

A major test for providers is to gain (and sustain) support for the development of OER within their own institutions. All four presenters stressed that for an OER initiative to succeed in the long term it must have support from both the academic staff and the administration. More importantly, OER must be perceived to be of value within the institution itself. Although MIT OCW was principally intended for an external audience, a significant amount of site traffic comes from within MIT itself. Students, for example, use OCW to preview and review courses, and prepare for exams. At Carnegie Mellon, students go one step further and take OLI courses for credit. The feedback they provide informs the further development of the online environment and even informs classroom instruction; the system tracks how the students learn and highlights areas where instructors should target their efforts.

The forum was reminded that the four provider cases discussed are all exceptional in the support they have received from their university communities. While a number of institutions may have committed to the development of OER, there have also been situations – as some participants described – where institutional support and encouragement were less forthcoming. Cost-conscious, risk-averse institutions are not eager to make course materials available without reimbursement or controls. The economic reality may be that they cannot afford to invest significant amounts of time and money in giving away their resources for free. In addition, if content is available free of charge, there is a risk that it will be seen as being of low quality, a belief (however erroneous) that does little to advance the OER cause within the academic community.

The impact of the growing commercialization of higher education – as contrasted with the openness of OER – generated considerable debate. There appears to be a growing tension between the 'ethical push' to promote open access to knowledge and the need for university managers to maximize income from their key assets. How can OER fit into this increasingly commercial, financially and intellectually competitive framework for higher education?

Cost reduction was identified as an ongoing challenge for institutions involved in OER development. For the MIT-type course publication model, solving intellectual property and copyright issues has proved to be one of the most costly stages of the process, in terms of both time and resources.

Moreover, the per-course cost rises with the development of more 'cognitively informed' and interactive materials. Developing web-based lessons that are as good as or better than the traditional face-to-face variety requires substantial resources. Costs include the time of the team that designs, tests and iteratively improves the courses, as well as development costs for effective simulation and feedback systems.

The key to cost-effectiveness might reside in improving the scalability and transferability of the development process. None of these initiatives would have been possible without substantial contributions from external funding sources, such as the William and Flora Hewlett Foundation, but long-term economic sustainability models need to be explored.

User support and experience

There is a paucity of data and research on the user experience with OER. Forum participants emphasized the need to implement systematic data collection mechanisms to track user expectations against experience. It would be helpful to have information on:

- which user support systems are in place, and what their level of effectiveness is;
- what the levels of student/teacher and student/student interaction are in online courses; and
- which online tools might best hone learners' practical skills, so as to enhance their employability.

Participants agreed that user support systems are needed, although the level, source and type of support would depend on the OER model adopted. Participants viewing OER as 'academic publishing' (rather than e-learning) emphasized the importance of the development of self-supporting online user communities. Those created around courses in Utah State University's Open Learning Support are one example of this sort of community. Users may also have the possibility of asking questions or requesting clarification from the course instructor through email or discussion forums, although many large-scale, institutional course publishing initiatives, like MIT OCW, do not encourage this (e.g. email addresses for course instructors are not published alongside materials).

Where Open Educational Resources are designed specifically for online teaching and learning, user support systems may be built into the resources themselves. For example, Carnegie Mellon's OLI courses are designed to simulate much of the feedback traditionally provided by an instructor, and

when Carnegie Mellon students use the courses as part of their programme of study, their actions are logged and the information fed to the instructor. The rationale is to gain insight into learning methods and identify areas where additional student support might be required.

Several participants indicated plans to undertake further studies on the user experience of OER, and to experiment with new support mechanisms, such as virtual cohorts of learners.

Standards, quality assurance and accreditation

Should OER be subject to the formal (or even informal) quality assurance and accreditation processes that prevail in traditional higher education settings? If so, how would that be achieved? Would accreditation constrain the development and the use of open content for the delivery of higher education?

Some participants contended that there would be more confidence in and acceptance of OER if assessments were made for quality assurance, perhaps using internationally established standards applied by a global accrediting body. Another approach could be for university consortia (rather than international governance) to set and maintain quality standards. It was argued that it is in the self-interest of content providers to respond to accreditation, certification and quality concerns so as to establish their offerings as standards in the field and as sources of customization for OER users.

Quality assurance is perhaps of greatest concern to the users of 'grass-roots' OER initiatives – open collections that welcome content from anyone who wishes to contribute (e.g. Rice University's Connexions and many learning object repositories). Many such initiatives have adopted peer review and reputation management systems, to give users a guide to the quality of the materials on offer. Measuring quality, however, is far from straightforward; 'high quality' materials in one context may not be considered 'high quality' in another. Connexions has addressed this issue by developing 'lenses' through which materials can be viewed. A user – be it an individual, an institution or an organization – sets up their own review process, then selects the modules and courses that meet their quality standards. When Connexions is accessed through that user's lens (or portal), only the materials they deem 'high quality' may be viewed.

It is clear that these issues of standards, quality assurance and accreditation will grow in significance as the OER movement becomes more established, and as the volume of content, and the number and range of users increase.

3. FACULTY MEMBERS AND OER

Two sensitive areas relating to OER in higher education concern:

- the involvement of faculty members in creating and sharing open content; and
- the appropriate use of that material with acceptable credit and recognition, and within the legal parameters of copyright law.

The key component of OER is the educational content, and the essential source is the instructor who provides that content and agrees to make it freely and openly available. Whether OER is driven by 'top-down' institutional systems or 'bottom-up' individual or community initiatives, the creation of the educational substance depends upon faculty members.

Securing the backing and involvement of faculty members is therefore a major priority for institutions involved in OER development. There was widespread debate about the level of staff participation needed to ensure broad subject area provision, up-to-date material and a comprehensive curriculum. The quality, relevance and amount of OER content are in large part a function of the time and effort devoted by the faculty member to the course.

The greatest concern is the time that is required from academics to prepare elements of a course that will be available, monitored, maintained, updated and perhaps re-formulated for new settings and different uses. Open content enthusiasts may be prepared to devote time to creating and adapting materials to a form suitable for open distribution. However, in the case of a large-scale institutional initiative that engages the majority of the teaching staff, any substantial time commitment would be a major barrier to participation. Many faculty members at MIT, working at full capacity and wary of taking on a project that could detract from teaching and research commitments, backed the OCW initiative on condition that it not add significantly to their workloads.

In the case of the MIT model (where the open content is comprised of materials faculty members use in the classroom), once an instructor consents to distribution of the material, his or her involvement is generally confined to providing updates as needed and responding to the occasional content query that cannot be handled by OCW staff. An advantage to this minimalist approach is that faculty members are more willing to contribute their materials to the expanding worldwide catalogue of OER offerings. Some participants questioned whether this was setting the bar for participation too low; offerings may be rudimentary or have little application beyond a specific classroom setting. In these relatively early stages of the movement, should the drive be

to produce exemplary OER, at the risk of excluding potential contributors, or to welcome all contributions and focus on creating a 'critical mass' of OER? Ultimately, where one thinks the bar should be set depends on the particular OER philosophy one ascribes to – OER as course publication or OER as distance education.

Providers, working with interested institutions and academics already involved with OER, can help to enhance staff awareness of the benefits, practical aspects and potential complications of OER development. Two major approaches were advanced to attract more faculty members onto 'this visionary OER bandwagon' and to show the way for enhanced quality of the OER offerings in the long term:

- collaboration and joint content development among academics, and
- incentives for faculty members to contribute high-quality material to the worldwide body of OER.

Joint content development

While there are examples of collaboration among academics in developing joint content (see, for example, the digital signal processing curriculum in Connexions), the largest proportion of existing OER materials originate with an individual faculty member. Increasing the pool of available expertise and resources would lead to the production of better teaching and learning materials.

One approach would be to create 'communities of scholars' in each specific discipline, with the members collaborating to develop and share their scholarship. This should lead to higher-quality OER, since faculty members would be sensitive about meeting the academic norms of their discipline. If OER materials are going to be judged by their peers, the developers are likely to devote more time and effort to producing a quality output. Making institutions and academics aware that a large audience around the world is scrutinizing these products helps to create an internal quality control.

'Authorship, attribution and authority are the cornerstone of scholarly communities', noted one participant. 'The key to moving to "open" content online is to ensure these norms are respected and preserved'.

Incentives for faculty members

Very few institutions have implemented incentive programmes for instructors to either produce or use OER, mainly due to institutional reluctance and a deeply entrenched academic culture. In part, this may be related to mounting

pressure from universities to claim ownership of staff research in order to generate profit and enhance institutional competitiveness.

Incentives – especially financial incentives – were viewed as particularly important for academics in developing countries. In situations where salaries are very low, the preparation of materials can be a valuable additional source of income. Moreover, the prevalent research climate, which links career advancement to publication in 'international' journals (i.e. those published in developed countries and with generally restricted access), does not give priority to the development of locally published, open access materials.

With little or no institutional or peer recognition or encouragement, there is little incentive for faculty members to take on the extra burden of developing and refining OER content. Further staff involvement in the OER movement could be stimulated through the existing recognition and reward systems of the higher education community. Various incentives were suggested, including:

- adding OER to portfolios that are presented for academic promotion and tenure;
- giving awards for outstanding development, production and dissemination of OER materials;
- incorporating the concept of open content and production of OER into scholarly training and practice for both academics and managers;
- adopting institutional policies that encourage opening educational content, and valuing the creation of such materials.

'We should evaluate and value the creation and provision of open materials just as we do textbooks or other work that improves education', asserted one participant. The creation of OER should be viewed not as an additional burden but rather as an integrated part of the scholarly endeavour that is useful, first and foremost, to a faculty member's own teaching, scholarship and career.

4. INTELLECTUAL PROPERTY AND COPYRIGHT ISSUES

The issues surrounding intellectual property and copyright can be some of the thorniest areas for faculty members and institutions taking their first steps in the OER movement. One participant suggested that the issue of copyright and ownership of material is 'the root cause [of] slow development in this field', inhibiting some faculty members and institutions from making more educational content available to the online community.

Many academics incorporate copyrighted third-party content in their teaching materials – a practice permissible under educational 'fair use' guidelines in some countries. Penalties for contravening these guidelines – for instance, by making such content available to the general public on the internet – can be strictly enforced. Faced with this risk, many institutions have preferred to restrict access by locking away course materials behind firewalls and in password-protected pages, rather than devoting scarce time and resources to creating 'clean' versions, free of copyrighted elements. Institutions may also be reluctant to see the creative and scholarly work of their own staff made available without due compensation for the costs involved. Some believe institutions are less willing to share knowledge than the scholars who create it and who wish to work in an open academic community.

One faculty member in the forum stated the academic staff perspective directly: 'We as faculty are not afraid of others using our material in their academic work, but we are profoundly afraid of someone taking our work and claiming it as their own, and perhaps even copyrighting it … themselves'. Another participant argued that, rather than focusing on copyright infringement, a more helpful approach for faculty members offering OER might be to enforce good behaviour through promoting scholarly values and norms. In practice, an academic may not have the means to pursue someone through the law, and if someone is found to be appropriating another's material, the academic community is more likely to react against the breaking of the scholarly norms of attribution and respect for authorship than the infringement of copyright law.

The intellectual property rights of open content creators do need to be protected, however. Default copyright law is too restrictive, and customized open licenses remain a complex and expensive option. Creative Commons was developed to provide an alternative. This non-profit organization offers a number of different intellectual property licenses, with a range of restrictions to use, designed to facilitate the open use of knowledge and creative works.

> For the creators, it provides some assurance that their work will be acknowledged by anyone using the open resources they have created. For users, it provides a degree of assurance that they can draw upon open educational resources without fearing subsequent litigation about copyright as long as they adhere to the terms of the license.

Lawrence Lessig described Creative Commons licenses, which are used worldwide in increasing numbers, as 'legal tools to further enable the collaborative process in education, and elsewhere, that the technical tools

of the internet now beg us to advance'. One of the key features of the licenses is that their terms come in a 'human-readable' version, written in plain, non-legalistic language. This makes it easier for the creator to define the terms on which their content can be used, while making it harder for the user to claim that they broke those terms because they couldn't understand them.

There was a general agreement, however, that many are unfamiliar with copyright options, or they do not understand them fully. To address the perceived confusion and difficulty surrounding copyright issues and open licensing, 'marketing' materials are being prepared by the Center for Open and Sustainable Learning for teachers and academics concerning copyright and the potential benefits and risks of sharing through OER. 'The focus of these materials will be to (1) encourage educators to engage in open sharing, (2) help them to understand the terms of the Creative Commons licenses, and (3) help them to understand the risks and benefits of openly sharing educational materials'.

5. CHALLENGES FOR USERS OF OER

The spread of Open Educational Resources through digital technology offers a substantial educational opportunity. How best to utilize that opportunity was a focus of the third session of the forum, with an array of examples presented and discussed by Mohammed-Nabil Sabry (Université Française d'Egypte), Peter Bateman (African Virtual University), Pedro Aranzadi (Universia) and Derrick Tate (China Open Resources for Education).

All four initiatives utilized MIT's OpenCourseWare, allowing for comparison between the different approaches that were adapted to various settings, cultures and users – both individuals and organizations. Mohammed-Nabil Sabry described the experience of the Université Française d'Egypte with adapting four OCW courses for use in Egypt, while Peter Bateman highlighted some of the key challenges of introducing OER in Africa. Universia and CORE both came to OER through translating OCW courses; they have subsequently expanded their scope to promote the creation of original OER in their respective regions (see preceding chapter on OER users and issues related to use).

It was argued that OER could be improved most effectively by shifting from a 'provider-user' model to one that employs collaborative development. There was a consensus that OER could be more useable and more relevant if the entire education community – not just providers – were engaged in

developing modules and adapting them to new situations. Volunteers were perceived as valuable in this regard to help transform content into relevant educational resources and to be trainers and online facilitators.

Creating such an environment of collaboration and volunteerism are just two of the challenges that face OER users. Others include language differences, cultural barriers, local relevance of materials, access concerns, and the availability of adequate technical resources (infrastructure).

Access issues and infrastructure

Open Educational Resources need to be accessible to those who need or want them. Lack of an adequate information and communication technology (ICT) infrastructure is, especially in less developed countries, an obstacle to the dissemination and use of all OER, and especially those that offer more than just basic textual content. There is a need to collaborate to make virtual environments more accessible to underserved groups.

As one provider put it: 'There is a trade-off between using the latest technologies that provide rich virtual environments, simulations and robust feedback that we believe will deliver a more effective learning environment but that require high bandwidth and limiting the environment to low bandwidth forms of delivery (text).'

The challenge is to build effective OER in areas where bandwidth and technology are limited. Some expressed the view that a low technological threshold encourages materials from all cultures, leading to new OER that is richer and more diverse. In the longer term, however, advocates of OER must address the political, economic, and technical problems that hamper the distribution of sufficient bandwidth, and not be content with downgrading educational offerings to their most basic levels.

Some technical difficulties are being overcome in developing countries. More teachers, students, professionals and others are able to access OER and adapt it effectively for their local circumstances. For example, the AVU established pilot OCW 'mirror sites' (i.e. local server storage) at institutions in Kenya and Ethiopia to widen access in areas where low bandwidth would make it difficult to fully utilize the MIT website. These mirror sites can be updated remotely. In some parts of the developing world, the challenge has shifted from obtaining the essential technology to managing the array of available educational resources so that they are of maximum benefit to young scholars.

It was pointed out that whereas African academics are using and producing educational materials, in many cases these remain inaccessible to new users, partly because of poor infrastructure, but also because of a lack

of familiarity with, or confidence in, technology. Training and support for new users were felt to be vital to the success of OER in developing countries. Participants were reminded that the success of this forum has depended on their own computer skills – skills that many faculty members in developing countries may lack, or may not feel comfortable using. As a consequence, the development of support structures for potential users (and providers) is a central feature of the AVU's OER strategy.

Learning object repositories

Beyond technological hurdles, users must be able to locate and work with the increasing amount of open content information that is available. As noted by Susan D'Antoni, 'open resources are not much use if they cannot be found'. Using a regular search engine generates too many references, most of which are likely to be irrelevant. For this reason, OER must be 'tagged' – metadata must be attached to each resource to enable more directive searches (e.g. searching by academic subject, level of education, type of resource) and to help users understand the educational context for which the materials were originally created. Participants agreed that identifying, tagging and organizing resources for easy retrieval and reuse should be a priority of the OER community.

Learning object[26] repositories are one way of organizing educational resources. The example presented was MERLOT,[27] which by late 2005 had almost 13,000 online teaching and learning materials identified in its repository. This free and open resource is designed primarily for faculty members and students in higher education, with links to online learning materials and annotations that include peer reviews and assignments.

Peer review is an important element that serves to assure users about the quality of the content of online OER. MERLOT, for example, established editorial boards within each discipline to assess OER content quality, its ease of use, and its potential effectiveness for teaching and learning.

The MERLOT model also attempts to engage the user community in shaping the open content to apply to varied educational objectives. 'Within MERLOT, one person can author the content, someone else can find it and contribute it in MERLOT, other people can write different assignments for using the materials in courses, different people can write comments,

26 David Wiley (2000, p. 7) has defined a learning object as 'any digital resource that can reused to support learning'.

27 http://www.merlot.org/merlot/index.htm

and another set of different people can create "personal collections" that get shared', noted Gerry Hanley of MERLOT. 'Everyone does a little bit, and, collectively, you can create a rich teaching/learning resource'. Such an unfettered community-building technique is not without its difficulties, however, since content variations may abound. Once again, repositories look to original contributors, peer reviewers and the user community to keep online catalogues updated, fresh and vibrant.

Forum participants contrasted the learning object repository approach with the structured course-based approach that has been traditional in higher education. While there are advantages and disadvantages to each, the course publication method tends to be more static than the adaptable learning repository approach.

Language and cultural barriers

Open Educational Resources are cultural objects as much as educational ones, in that they give users 'an insight into culture-specific methods and approaches to teaching and learning' – a practical exposure to the way that courses are 'done' in another country or by another instructor. Language is clearly intertwined with culture in this dynamic. At present, English-language content dominates OER provision – content that tends to be based on Western learning theory. This limits the relevance and accessibility of OER materials in non-English, non-Western settings. There is a risk that language barriers and cultural differences could consign less developed countries to the role of OER 'consumers' of – rather than contributors to – the expansion of knowledge.

To illustrate, several discussants indicated that faculty members at their institutions expressed reservations about content produced by a foreign institution. According to Peter Bateman, 'while most were clearly appreciative of being able to access such a wealth of resources so easily now, some African academics expressed a resentment of these "imported" materials, asking "Why can't we produce these materials here?"' There was some concern that institutions in developing countries would become dependent on externally generated content, rather than the content serving as a catalyst for the production of new, local OER. Some of this tension may be resolved through progress in moving towards collaborative development models.

The conditions under which OER are created, the languages used, and the teaching methodologies employed result in products that are grounded in and specific to the culture and educational norms of their developers. This may be remote from the understandings of other cultures and lead to (1) dysfunctional education, and (2) a reduced potential for developing

countries to contribute research, training, experiences and understanding that invigorate the value and scope of OER.

Language translation offers at least a partial solution to this two-pronged problem. Partial, for as Mamadou Ndoye, Executive Secretary of ADEA, observed, 'if the full benefits of these resources are to be realized, it is necessary to have a real capacity for the adaptation of language – rather than mere translation – to the needs and modes of understanding of local contexts'.

Both Universia, a consortium that maintains higher education portals for Spanish- and Portuguese-speaking countries, and CORE began their involvement with OER by translating MIT's OCW courses, with the aim of making high-quality content available in their respective regions. Both organizations have also addressed issues of cultural 'sensitization' and local content generation. Universia has shifted its focus away from translation to helping member universities to publish their own OER. CORE, while continuing to support the translation of materials, also works to promote the OER movement in China and to bring Chinese content to the rest of the world.

Some participants championed translating OER content into the mother tongue of learners in order to allow understanding and utilization as well as the 'collective ownership which is the bedrock of the OER success'. The importance – and difficulties – of the translator's job was discussed. Localizing OER material is not only a question of language but also of culture. It is important to be aware of cultural and pedagogical differences between the original context of use and the intended new use of the material. Even translators who are native speakers and are living in the country may find it difficult to provide context for an unknown audience, leading to quality-control problems. In addition, translators are not necessarily instructors, and may not have the pedagogical background needed to contribute new content effectively. It was suggested that a database of academics who could also function as translators be created for the OER community to assist non-academic translators. Another solution would be to develop partnerships with local academics and institutions, or to embed volunteer translators within OER service communities. Further refinement of presently inadequate translation software could lessen this need for a multitude of human translators, although it is doubtful whether automatic translators could ever be sophisticated enough to produce a truly meaningful translation. The creation of a multilingual platform that supports knowledge sharing between different parts of the world was also identified as a necessary step if OER is to be a democratic and inclusive movement.

Multilingual platforms and dynamic collaborative environments, in which multiple users can come together to create and edit material, are undoubtedly desirable. However, they pose particular problems for translators: if material is constantly changing and a stable version is not available, how can a translator, first, keep track of the changes and, second, decide at what point a new translation becomes necessary? While acknowledging this difficulty, it was suggested that the provider-user communities, aided by volunteer translators, could track changes or respond to user requests.

It was suggested that a modular approach to content development could facilitate local adaptability and reusability, although several participants noted that this might be too unstructured for some users. The translation of materials was generally reported to take place at the individual modular level, as this enables the ongoing modification of material to be incorporated as the translation is being prepared.

Several participants appealed for a shift away from the 'top-down' approach to OER content creation. Rather than attempting to create OER that can function in every context (and risking that it be useful in none), the emphasis should be on developing material that meets a particular instructional need in at least one context. The idea would then be to enable other institutions to adapt these materials to meet their specific institutional and local needs. 'User' institutions could take responsibility for adapting those courses that are locally relevant and meet market demands.

It was suggested that the translation of OER into users' mother tongues could also prevent the loss of languages now threatened with extinction. A cautionary note in this discussion of language and culture, however, was that students most likely need new languages to thrive in a global society. 'In a world that is becoming more and more global, adopting a localized approach to knowledge and learning will ultimately reduce opportunities for those who do not access … language other than the mother tongue', argued one participant. 'This will definitely widen the gap between the haves and have-nots'.

Some advocated a balanced approach as more productive in the long run. They acknowledged the necessity of translating OER, but argued that it should be matched with new-language training, and improved teaching skills and teaching materials. The teacher is the key here – making use of information in a foreign language, adapting it to native tongues, cultures, and contexts, and then conveying it to others. On a practical level, it was suggested that few people will learn a new language if it is only needed to acquire more knowledge, whereas they may do so if it offers the chance to improve their livelihood or quality of life.

6. SEEKING GLOBAL BALANCE IN OER

For open educational content to realize its full potential, it must be available and relevant to the developing countries of the world. That cannot be a one-way street with developed countries responsible for producing OER and the less developed countries confined to consumption. In short, global balance is required.

A troublesome imbalance now exists between the provision of OER on the one hand and its utilization on the other. Participants were quick to identify this imbalance and exchange views throughout the forum on how best to remedy the 'poverty of educational opportunity' that exists across the world. As COSL states on its website: 'When educational materials can be electronically copied and transferred around the world at almost no cost, we have a greater ethical obligation than ever before to increase the reach of opportunity' (Muramatsu, 2006).

Significant obstacles must be overcome before lower income countries are able to fully participate in the development and use of OER. As noted earlier, those barriers include poor connectivity, inadequate infrastructure, funding constraints, local resource shortages, technical inadequacies, lack of training and support, and linguistic and cultural differences.

The technical and programmatic dominance of developed countries could undermine the potential for developing countries to build on their own knowledge and research. 'The development of OERs against this background is necessarily compromised', it was argued. 'Where is the body of locally relevant knowledge that can be drawn upon to build educational resources? Where are the readings and data sets that lecturers and students can draw upon? Where are the case studies and records of local experience that can inform the development of assignments?'

There was acknowledgement, however, that 'something is better than nothing and that the OER resources that are being developed are an extremely valuable resource'. Indeed, others argued that there is a wealth of multicultural and multilingual educational resources in Africa just waiting for the structures and resources to transform them into OER. That does not negate the need to develop new and original OER in, and on behalf of, Africa, South America and Asia. Significant efforts are underway in all of those areas to create OER that is culturally sensitive, educationally and locally relevant, technically feasible and accessible.

A major challenge is to build instructional design capacity in the developing world. Lacking this, a handful of international 'brands' will

dominate. The support of instructional designers would allow authors to become more active in OER production and to adapt content to meet their specific individual and institutional needs. On a related note, partnerships between countries could promote capacity building and training of local staff in OER production and use.

The forum was advised of one such collaboration: an initiative of the Commonwealth of Learning to foster OER development among 22 small states of the Commonwealth.[28] The Virtual University for Small States of the Commonwealth is designed to build a network that will allow states with limited resources and technology to develop a capacity for online and distance learning. OER will be developed in areas of shared need, including life skills, business and management, and professional development in education.

As the forum was underway, the William and Flora Hewlett Foundation, which supported this IIEP forum, made announcements at the World Summit on the Information Society (Tunis, Tunisia, November 2005) concerning new initiatives to connect the world's citizens to high-quality educational materials on a free basis. The Development Gateway Foundation's Open Educational Resources portal 'aims to equalize access to education and help people in developing countries improve their chances for a better life' (William and Flora Hewlett Foundation, 2005). The Foundation also announced that it would provide funding to train teachers in sub-Saharan Africa with open content resources in literacy, numeracy, science, and life and health skills. The project will be led by the AVU and the UK Open University.

7. PROMOTING THE OER MOVEMENT

The objective of the IIEP forum was to increase awareness of current developments and the future potential of Open Educational Resources. By the conclusion of the forum it also had acted as a catalyst for stimulating collaboration among individuals, institutions and organizations interested in refining and intensifying the OER movement. A desire to assemble communities of common interest and purpose was a clear outcome from the six weeks of intense and productive email dialogue. To this end, various suggestions were advanced, including:

- creation of a broad-based international community on the expanded development and use of OER;

28 In this context 'small states' were defined as having fewer than 4 million people.

- communities of interest to invigorate OER in less developed parts of the world;
- interest groups focused on increasing OER within specific academic disciplines;
- groups to analyse the uses and the effectiveness of OER, to identify gaps in the knowledge base, to raise research questions, to refine methodologies, and to propose guidelines for further OER development;
- new studies of user experiences with OER, and experimenting with new user support mechanisms;
- the identification of best practices and collaborative successes that result in effective OER offerings;
- an association of university and college teaching staff who produce or may be interested in producing online teaching.

In stressing increased collaboration among and between providers and users, the forum endorsed the concept of shifting the philosophical underpinning of OER from 'knowledge for all' to 'construction of knowledge by all'. 'If we can get away from the "provider"–"user" paradigm and move towards a collaborative model for OER creation, organization, dissemination and utilization, we will have achieved much', one participant noted.

Proposing a role for UNESCO

In reaction to the varied ideas put forth for developing, promoting and using OER, a number of participants urged UNESCO and its International Institute for Educational Planning to supply an overarching 'canopy [for] the different groups without caging their potential or particular approaches'.

Specific suggestions espoused for IIEP and UNESCO included:

- sponsoring future discussions that focus on OER effects in developing countries and how these nations might participate in and contribute to the open source movement more fully;
- assisting (upon request) in constructing some of the various communities of interest that were proposed during the forum's discussions;
- moderating and managing repositories of OER information on the internet;
- spearheading a flexible but reliable mechanism for international accreditation of OER offerings; and
- coordinating a database of translators for OER materials, and establishing standards for this multilingual resource.

8. NEXT STEPS

The immediate next step is to form an international Community of Interest to support ongoing information sharing and an exploration of the most important issues related to the provision and use of open course content, as identified during and at the conclusion of the forum.

A second forum will be held in late 2006 to share and discuss the draft report of a study on OER in tertiary education from the Centre for Educational Research and Innovation (CERI) of the Organisation for Economic Co-operation and Development (OECD).[29] The purpose of the study is to map the scale and scope of current OER initiatives, and to address four questions, concerning:

- the development of OER initiatives;
- the development of sustainable cost/benefit models;
- intellectual property rights; and
- improving access to, and the usefulness of, OER.

Following that forum, it is anticipated that an international Community of Practice will be formed to link practitioners from around the world to work together, and to continue sharing information and experience.

REFERENCES

Muramatsu, B. 2006. *About the Center for Open Sustainable Learning*. http://cosl.usu.edu/about/index_html (Accessed 13 December 2007.)

William and Flora Hewlett Foundation. 2005. *Free online 'open content' initiatives announced*. News release: 16 November 2005.

Wiley, D. A. 2000. Connecting learning objects to instructional design theory: a definition, a metaphor, and a taxonomy. D. A. Wiley (ed.), *The Instructional Use of Learning Objects: online version*. http://reusability.org/read/chapters/wiley.doc (Accessed 15 January 2006.)

29 This study is also supported by the William and Flora Hewlett Foundation. For more information see Section 3 of this volume.

Section 2.

Ongoing discussion

During the final week of the forum of 2005, participants were invited to identify the most important issues to be addressed in order to enable and promote OER. The intention of this polling exercise was twofold:

- *to begin to build a comprehensive list of issues and concerns related to the advancing of the OER movement,*
- *to identify topics of highest interest for a more informal discussion in the community in early 2006.*

The need for research was one clear area of interest, and thus the subject was proposed to the community for a more leisurely interaction than that which the tightly organized forum had permitted. However, the energy and enthusiasm of the community remained high in this and subsequent sessions, and it could hardly be described as 'leisurely'. During the first session on research, another topic was put forward – the importance of developing a 'Do-It-Yourself' resource. In turn, this second discussion identified the topic of the third – Free and Open Source Software for OER.

Although the ongoing discussion was indeed less highly structured than that of the first forum, the reports on the three topics are indicative of the high level of debate that was maintained.

Chapter 5

A RESEARCH AGENDA FOR OER: DISCUSSION HIGHLIGHTS

Kim Tucker and Peter Bateman

It was clear from the discussion in the 2005 forum that Open Educational Resources are recognized as having an important role to play in increasing access to knowledge worldwide. However, it was also clear that more study and information is needed to understand how to best produce, share, adapt and use such resources. In the first session of 2006, the community deliberated on a research agenda for OER. As a large international group with broad geographic representation, the community was ideally placed to work together on this rather daunting task. Furthermore, the range of positions of participants ensured a rich diversity of perspectives.

Over 100 research questions were put forward during the wide-ranging discussion, and a priority list of 25 was suggested. However, arriving at a consensus on a definitive research agenda would require more reflection and interaction. A wiki was created to provide a common work space for ongoing development by interested members of the community.

1. BACKGROUND

The diverse nature, scale and scope of many current OER initiatives presents a considerable challenge to those who stand to gain the most from the movement: learners, educators and researchers in the developing world. All would benefit from an exploration of the issues that most concern them. Research would inform their involvement in the OER movement and make their first steps more comfortable and assured.

It is important for those participating in the OER movement to be clear that the delivery of resources should not be mistaken for provision of quality education. Research activities that locate the OER movement within the broader challenge of creating effective education systems will ideally lead educators to consider their own pedagogical practice and how it might be improved. In doing so, they will also need to consider the complex nature and diverse contexts of these systems, with varying knowledge needs, abilities, and access to appropriate technologies and resources. This is the reason for seeking to develop a research agenda for OER: to support resource development and use in the most effective manner possible.

This report provides an overview of the discussions aimed at developing such an agenda. More than 100 questions were proposed and, from these, members were asked to identify their priority research questions. This proved more difficult than expected, either because many of the questions had significant and interdependent value for the many, very different members of the OER community, or perhaps because there were too many questions from which to choose! After further discussions, an attempt was made at categorization of the questions. These categories may serve as a basis for the OER research agenda.

2. RESEARCH QUESTIONS, CATEGORIES AND PRIORITIES

Questions and categories

The discussion opened with the facilitators asking participants to suggest priority research questions. In response, participants proposed a total of 107 questions,[30] which were categorized initially by the facilitators as follows:

- background research,
- economics,
- methodology (research),
- creation,
- quality assurance,
- dissemination,
- finding,
- using,
- localization,
- interventions,
- scenarios,
- policy.

The categorization elicited some comment from the group and prompted one participant to suggest a possible alternative with only five categories:

- *OER creation*: independent or collaborative development, quality assurance, iterative processes and localization (including translation), interoperability and standards compliance, and capacity development for OER creation;

30 The full list of questions is presented in the first appendix to the original report, which can be downloaded from http://oerwiki.iiep-unesco.org/index.php?title=OER_research_agenda. The list is also available in wiki version (http://oerwiki.iiep-unesco.org/index.php?title=OER_research_questions_longlist), so that it may be further refined and enhanced by the community (Editor).

- *Organization*: governance and management schemes, intellectual property rights and licensing issues, tagging and metadata systems, classification methodology and searchability;
- *Dissemination*: awareness raising and delivery methods, particularly for low-bandwidth situations;
- *Utilization*: mechanisms and business models for use and reuse;
- *Interventions*: localization, actors, messages and lessons learned, best practice, learning patterns and scenarios.

A keen observer noted that policy seemed to be missing from this second system, and questioned whether any 'interpretation' (through categorization) of the list, though reasonable to the interpreter, might take something away from the original. This point notwithstanding, the original questions and categories served as the basis of most of the discussions that followed.

Prioritizing research questions

Following the initial development of the listing, participants were asked to identify their top priority research question. This resulted in a shortlist of 25 questions.[31]

Very few questions received more than one vote, making it clear that there was no consensus on the priorities. This is indicative of the diverse nature of the community – the wide range of backgrounds, perspectives and interests represented and expressed may make it difficult to achieve consensus, but this is precisely what makes this community so interesting and important.

Some participants expressed reservations about selecting just one priority from so many, arguing that the questions are interdependent and all have some significance for the OER movement. Alternative suggestions included taking a more formal approach to identifying research questions, adopting a decision-making process similar to that used by the IMS learning technology standards group,[32] and splitting into working groups to address each research category. Others argued that the community should be moving towards action, for example community building to address access issues, rather than focusing on research.

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31 Presented in Appendix 2 in the original report, the shortlist can be downloaded or accessed in wiki version at http://oerwiki.iiep-unesco.org/index.php?title=OER_research_agenda (Editor).

32 See http://www.imsglobal.org/background.html, for more information on IMS.

3. DISCUSSIONS BY CATEGORY

Background research

Discussions on this topic focused on what we already know about OER. The aim is to understand current OER practice: user needs, usage levels among various user groups, characteristics of organizations successfully using OER, the importance of standards, describing and classifying resources and initiatives, contextual factors (e.g. low bandwidth), effectiveness of OER, and learning from other open initiatives.

Economics

Some discussion dwelt on how OER development could be financed in a sustainable manner. Participants recognized a need to define economic and business models and made the following points:

- Although OER offers significant opportunities for innovation in education, there is a need for *long-term funding* to realize that potential.
- The imbalance between developing and developed countries in the use of technology for education means that there is a need for economic models that promote *equality in access, production and use* of open content, irrespective of geography or social and ethnic background.
- OER provides an opportunity for open dialogue; previously unheard voices can ask questions, contribute ideas and break the restrictive mould of traditional academic structures. *Social equity and open access* are therefore vital, but academic powers could seek to marginalize them in the name of economic protectionism.
- *Content development costs* are enormous for conventional textbook publication. Open textbook content would be a less costly option.

Methodology

Participants chose to examine some of the characteristics of effective research, rather than looking directly at research methodology. It was generally agreed that research should be oriented towards discovering what works, what does not work, how to improve learning processes, and what new features learning resources need. Localization questions, collaboration, learner support, stakeholders and roles, best practice, and learning patterns and scenarios should all be considered.

The wide range of research areas and questions suggests recourse to an equally wide variety of research methods, which would need to be considered carefully on a project-by-project basis. Surveys and traditional research methods could play a major role in background research in most of the areas listed. Anthropological research techniques, for example, could be especially well suited to studying OER communities and online collaborative initiatives, or cultural issues connected to adapting and using materials in new contexts. Research on interventions and scenarios, however, may require variations on action research, or design, development and constructive research.

Creation

Insights on creating OER abounded throughout the discussions. A key part of this theme was an exploration of 'collaborative authoring' – the need to develop a culture that will promote collaboration and that is supported by appropriate licensing, formats and standards. Another debate contrasted the relative merits of authoring by professional peers and authoring by learners.

The idea of a 'Do-It-Yourself' (DIY) OER portal was put forward in response to a question on how to involve a wider range of OER stakeholders in the creation process. Much of the discussion on the creation of OER (as well as several other topics) had this DIY OER portal in mind. The idea of a portal is explored further below.

Quality assurance

Quality touches everything and is central to most research areas – OER creation, commons-based peer production (Benkler, 2002, 2006), technology investigations, dissemination, learning patterns, etc. It was noted that quality OER is the result of quality OER development processes, and that quality OER practice is a fertile area for research. The discussion touched on tools and methods for supporting quality OER development. Participants expressed a need for guidelines that set out quality and interoperability criteria. The following quality issues were also discussed:

- *Ensuring high-quality translation of resources*: Massachusetts Institute of Technology (MIT) indicated that they have set up a rigorous evaluation process for prospective translation partners. Quality and localization was a natural extension of this discussion.
- *Facilitating the discovery of good-quality OER*: Participants observed that quality is subjective, and that quality standards for one situation might not be applicable to another. Relevance is therefore a key component

of any measure of quality. There is a need for consistency in the way that OER descriptions and metadata are formulated, so that a user can understand the original context of creation and use of a resource, and can find and select the most suitable resources for use in their own situations.

- *Learning from open source software development and other open content initiatives*: Participants questioned how easily the ideas that 'many eyeballs tame complexity' (Raymond, 2001), and that interaction among users and developers will eventually result in error-free code or encyclopedia entries (Giles, 2005; Wikipedia, 2006) could be applied to OER.
- *Assessing the expertise of OER contributors*: In the case of collaborative development initiatives, it was suggested that all contributors should have a verified level of subject matter or instructional design expertise. A review team could define assessment criteria and place a submission approval form online. If the application were self-selecting in this way, only those with the appropriate knowledge and skill could be approved to submit content. This process is rigorous but would be the best, over time, to assure quality content.

Dissemination

The main issues raised regarding OER dissemination were:

- awareness raising about OER;
- delivery methods, especially for low-bandwidth communities.

Finding OER

How do educators and learners access, identify and select OER that meet their needs? And what barriers exist to doing so? These issues were also raised in the context of quality assurance (see above). A key part of an OER portal could be provision of a resource for those looking for 'quality-assured' materials that are suitable for adaptation to their own teaching and learning environments.

Localization

Translation and localization issues (i.e. adaptation of OER to new teaching and learning contexts) were discussed. Participants stressed that it is important to localize not only content but also the learning process. The work should be a collaborative effort between educators, content experts, learning scientists

and instructional designers so that the resulting materials are enriched by expertise in the subject area and in learning design.

Interventions

In the developing world there are many projects and initiatives to promote access to information and communication technologies (ICTs). Examples include installing computer laboratories in schools and access points in community centres. Participants identified a need for research on how best to augment ICT interventions with relevant and appropriate OER. The research on interventions would also be geared towards how OER initiatives are structured and the key decisions required for implementation. Suggestions included:

- building a research programme around interventions to introduce ICTs, including Free and Open Source Software (FOSS) and OER; the aim would be to develop a framework for research that is flexible enough to be tailored to local situations and projects;
- identifying ICT training needs (e.g. learning to use a mouse, keyboard, office software, email, web browser and course management system, how to edit text and graphics, how to create and share multimedia resources), plus effective approaches and success factors for such interventions;
- focusing on activities related to the use of OER (e.g. using OER for self study or to enrich existing learning resources, using OER to learn how to improve living conditions in a community or get a qualification for a job), which may suggest new learning design patterns;
- engaging with communities (including learner communities), and assessing their needs and goals;
- establishing multiple interventions at various levels – in formal education systems and in informal learning contexts (i.e. at any place with access to ICTs and extending to reach those places without).

Scenarios research

The discussion on future scenarios focused on developments that best promote and use the dynamic, interconnected and self-organizing aspects of OER practice, notably social software and other technologies facilitating social interaction for knowledge exchange. The participants interested in scenarios research had a preference for activities in which learners are active in the design of curricula and syllabi, and in the creation of knowledge.

If users are to develop OER themselves, an interactive approach is ideal. Technologies are available to facilitate this, such as Web 2.0[33] technologies and peer-to-peer environments, where users can access multimedia resources (text, video, audio, etc.).

Policy

Although several policy issues emerged, the challenges with regard to copyright and licensing received the most attention. Participants discussed the choice of licenses available from Creative Commons. It was suggested that OER projects should use the most open, 'Attribution' license,[34] which places the fewest restrictions on the user (notably, allowing commercial use). It was argued that this license ensures that resources have the broadest possible impact, unlike those Creative Commons licenses that carry a 'non-commercial' restriction and are used by many OER projects.[35] For example, under the terms of the Attribution license, institutions can create books and CD-ROMs from online resources and distribute them to learners, even (if need be) charging a fee to cover costs. This is a key consideration for institutions operating in many parts of the developing world with limited internet connectivity. In addition, resources can be used by institutions without having to pay or obtain permission from the content creator, and can be 'remixed' easily with resources under other open licenses.

In defence of the non-commercial restriction, some participants argued that the potential license compatibility problem is not insurmountable. Users just need to obtain permission to combine restrictively licensed and more open resources. The question is, is this an unacceptable level of friction and a significant disincentive to the use and reuse of resources? Members were also reminded that the use of more restrictive licenses is far greater than that of the very open licenses; the non-commercial restriction in particular can be the key to broad faculty participation in new OER initiatives. Therefore, is it better to have more resources published with at least some degree of freedom for users, or a much smaller body of truly open resources?

33 'Web 2.0' refers to the idea that the internet is evolving from a collection of static pages into a vehicle for software services, especially those that foster self-publishing, participation and collaboration, such as wikis, blogs and social networking sites. For more information see http://en.wikipedia.org/wiki/Web_2.0.

34 http://creativecommons.org/licenses/by/3.0/

35 The 'Attribution-NonCommercial-ShareAlike' license (http://creativecommons.org/licenses/by-nc-sa/3.0/) is a particularly popular choice.

Finally, it was argued that although the Creative Commons Attribution license is undoubtedly the least restrictive, it cannot be considered the most 'free'. Under the terms of the license, there is nothing to prevent a third party from creating derived works (e.g. translations, adaptations) and releasing them under a closed license – in effect locking up the content and not respecting the spirit of freedom intended by the original author.[36] With OER, the aim is to maximize impact through remixing and reuse, resulting in the creation of adapted or entirely new resources. For this reason, the 'Attribution-ShareAlike' license[37] may be the most appropriate choice, since it promotes a culture of continued sharing by guaranteeing the freedom of future derived works.

4. ADDITIONAL DISCUSSION TOPICS

The DIY OER portal

The need for developing countries to become active participants in the OER world, adapting and using existing resources, and generating OER of their own, sparked a lively discussion regarding the possible creation of a 'Do-It-Yourself' OER development portal. A DIY site could popularize and promote the effective use of OER, introduce freely available technologies and software, and share good practice, as well as practical information on how to set up new OER initiatives and how to attract funding.

Considerable attention was given to the context of Africa, which is lagging behind the rest of the world both economically and technologically. Such a portal could also have a positive effect on the OER movement: the portal's significant wider use in the developing world could promote acceptance of OER by even the most traditional institutions and could help break down barriers to knowledge sharing, promoting a truly democratic sense of access and ownership. Through this, participants argued, the OER movement could lead to significant changes in the global imbalances in economics, education and the applications of technology and science.

36 The Libre Manifesto (http://communities.libre.org/about/manifesto) suggests the 'the spirit intended', as does the free knowledge definition (http://communities.libre.org).

37 http://creativecommons.org/licenses/by-sa/3.0/

FOSS in support of OER

There was also discussion of the general trend towards openness through the Free and Open Source Software, Open Access and Open Educational Resources movements. It was suggested that these various open initiatives be explored for possible synergies. However, it was felt by some that drawing direct comparisons with other open initiatives risks imposing false parameters on the OER movement. Despite the shared emphasis on collaboration in both OER and FOSS development, it should not be assumed that what has worked for FOSS should automatically work for OER. Establishing a solid, research-based body of knowledge about OER may provide a better point of departure, before looking for synergies between the various open initiatives.

The argument for learning from other open initiatives attracted a lot of support, however, and the following areas of synergy were suggested:

- developing a knowledge-sharing culture – comparisons with FOSS communities;
- governance and management schemes for OER, including copyright and licensing;
- storage systems and portals;
- classification, tagging and metadata systems to improve interoperability and searchability;
- implications of a collaborative development approach for capacity development, productivity and workflow planning.

It was suggested that in fully open situations, where learners may be both OER users and contributors, the benefits and commonalities are greatest, and issues of scalability and sustainability are more easily handled.

5. CONCLUSION

Throughout, the discussions were vibrant, well informed and extremely valuable. However, it was difficult to conclude that the main objective of the discussion was actually reached, in that the community did not agree on a specific research agenda. It seems that further discussion would be necessary to produce a research agenda with specific priority areas and questions.

On the other hand, the community's 'strength in diversity' was evident throughout the discussion – diversity in terms of the members, their perspectives, interests, activities, offerings and contributions. The dynamic[38]

38 On account of being on the OER community wiki – the list of priority questions is 'alive', that is, evolving with input from contributors.

list of questions is a reasonable reflection of the research needs of the OER movement, and it was compiled by people with a need for answers, or a desire to address these issues. Rather than a final product, the agenda is therefore an ongoing process of communication and networking, to facilitate self-organizing, community-guided research and action, drawing on collective knowledge, guided by collective wisdom, and powered by the energy and enthusiasm of the community.

Whether the research agenda is viewed as 'product' or 'practice', the actions suggested during the discussion are relevant. A structure is proposed, consisting of 'formal' and 'informal' activities. Formal activities would require an individual or group to set aside resources to make them happen. Informal activities are ongoing support functions that would take place within the community.

Formal activities include:

- articulating a formal research agenda via a formal process;
- conducting reviews of OER, FOSS and open access research, with a synthesis indicating similarities, differences and mutual learning opportunities;
- conducting a workshop for OER and FOSS experts to brainstorm current and future learning opportunities, and publishing the proceedings;
- convening a joint discussion between the IIEP FOSS and OER communities.[39] This may include a discussion of the proposed OER, FOSS and open access research reviews and inspire the DIY OER portal design and development process;
- further exploring the DIY OER portal idea;[40]
- identifying champions to sustain the OER research community (perhaps) via the portal, wiki and discussion lists.

The informal activities boil down to community support and active participation in the formal activities. Informal activities are characterized as 'just-do-it' and 'libre learning' (Tucker, 2007) activities, whereby the community learns, functions, and adapts via unstructured, dynamic processes, using all resources available, and sharing knowledge freely to enhance global OER practice. For example, the OER community could be involved in the proposed research

39 A joint discussion was organized and took place in October 2006. For more information, see Chapter 7 (Editor).

40 In fact, the DIY portal was chosen as the focus of the very next discussion in the community. See Chapter 6 (Editor).

reviews via online discussions, participate in the joint FOSS/OER discussion forum, contribute to the development of portal and wiki content, and generally continue to share and engage in community discussions with characteristic enthusiasm.

Without doubt, these initial discussions have made a useful contribution to the nascent OER movement. Ideally, the future activities of the OER community will expand on these ideas with the overall goal of improving global OER practice.

REFERENCES

Benkler, Y. 2002. Coase's penguin, or, Linux and the nature of the firm. *The Yale Law Journal*, Vol. 112, No. 3, pp. 369-446.

——. 2006. *The Wealth of Networks: how social production transforms markets and freedom.* New Haven, Conn., Yale University Press.

Giles, J. 2005. Special report: internet encyclopaedias go head to head. *Nature*, Vol. 438, pp. 900–901.

Raymond, E. S. 2001. *The Cathedral and the Bazaar.* http://www.catb.org/~esr/writings/cathedral-bazaar/ (Accessed 7 June 2006.)

Tucker, K. 2007. *Say 'Libre' for Knowledge and Learning Resources.* http://communities.libre.org/philosophy/saylibre (Accessed 11 October 2007.)

Wikipedia. 2006. *Why Wikipedia is So Great*. http://en.wikipedia.org/wiki/Wikipedia:Why_Wikipedia_is_so_great (Accessed 7 June 2006.)

Chapter 6

A 'DO-IT-YOURSELF' RESOURCE FOR OER: DISCUSSION HIGHLIGHTS

Boris Vukovic

During the first forum of 2005, one of the issues debated was that of language and culture. Adapting content, including translating it into the local language, could counter concerns about linguistic and cultural hegemony associated with the prevalence of English-language Open Educational Resources. However, it was noted that a global balance must be sought, wherein countries both produce and use OER. The main challenge in achieving this goal was seen to be the need for strengthening capacity, particularly in developing countries, in order to support such balanced development of OER worldwide.

As the community deliberated on a research agenda for OER, this idea resurfaced in the guise of a 'Do-It-Yourself' (DIY) OER development website. The OER movement is based upon both creating materials and sharing them, and adopting or adapting those shared by others. It was felt that those interested in creating their own materials would benefit from a resource that would help them do it themselves. The session was organized around four topics: the profile of the intended user, desirable content and services, the structure and organization of the resource and, finally, the underlying technology.

1. THE CASE FOR A DIY RESOURCE

The central argument for a 'Do-It-Yourself' resource is the need to ensure access and opportunities for developing nations to benefit from, contribute to, and take ownership of Open Educational Resources. The community specifically cautioned against a model in which marginalized people and communities are seen largely as consumers of imported educational resources. The message expressed by some stakeholders from existing projects in African countries, for example, is clear: global efforts to advance OER must create opportunities for local content production and distribution. To this end, a DIY resource would need to include development guides, technological solutions and community support to assist individuals and projects in regions currently under-represented in the global OER movement. The pioneering OER projects generally originated in large, prestigious institutions; what is needed now are more sustainable solutions, models and resources for, and from, small-scale, local initiatives.

The resource base could also serve to build capacity for use and reuse of educational content. One definite conclusion reached in the community discussions is that there can be no 'one size fits all' approach to OER. One of the functions of a DIY resource would therefore be to showcase the diversity of OER initiatives and formally identify project 'attributes', such as type of content, choice of technology and licensing, funding model, and so forth. A directory of existing projects, with descriptors, would allow prospective creators and users to make informed choices, but also facilitate innovative derivative works and minimize unnecessary replication, especially with respect to technological solutions.

The initial conversation on a DIY resource moved forward with the community voicing their hope that UNESCO and the International Institute for Educational Planning (IIEP) would take on a leadership role in exploring the issue further. This is a proposition well aligned with the UNESCO mandate to act as a clearinghouse and to facilitate international discussion. The challenge was taken up by IIEP. Over eight weeks, in May and June 2006, the community was invited to generate ideas about a DIY resource, considering guiding questions in four key areas:

- potential users,
- content and services,
- structure and organization,
- underlying technology.

The summary of the discussions below constitutes a draft blueprint for further development of this DIY resource project.

2. POTENTIAL USERS

A DIY resource needs to serve a variety of learners and those who enable learning, from traditional to self-directed students, from teachers seeking professional development to university professors interested in cross-cultural approaches to instruction.

Emphasis should be placed on pedagogically sound design, use and adaptation of educational resources. One of the main criticisms voiced by educators is that too often educational materials distributed online lack pedagogical value (e.g. an assignment without an evaluation scheme). This makes such materials unusable in their original format and difficult to adapt to new contexts of use. A DIY resource could provide guidelines and community support to help users make materials accessible for their specific teaching and learning needs. The production of innovative and creative works, derived from

original material, will increase the overall quality of the current OER corpus. And the process of adaptation of OER can, in and of itself, present a great opportunity for learning to take place.

Development efforts must take into account users in poorly resourced and remote areas with low (or no) bandwidth. To this end, a DIY resource should promote materials that are also designed for offline use, whether on CD-ROM, USB (Universal Serial Bus) flash drive, or other portable media, including print-friendly formats. This aspect is one of many that emphasize the role of a DIY OER resource in mapping a more equitable global progression of the OER movement.

The potential of a DIY resource for community-building was captured nicely by a suggestion that it could be better characterized as a 'Do-It-Together' resource. This emphasizes opportunities for collaborative work among experts from diverse professions and localities. It also communicates the capacity of the resource to support novices and newcomers to OER. The 'Do-It-Together' (DIT) dimension of the project could be envisaged as a bazaar of resources in which all those with an interest in OER converge around subject area 'stalls' with offers of materials, tools, and ideas for sharing, innovation and support.

Finally, in respect to the question of potential users, the community cautioned against focusing too heavily on whom specifically the DIY/DIT OER resource should target, and argued for the necessity of being inclusive. The challenge is not to profile a likely audience, as much as it is to develop design parameters that will be flexible enough to accommodate as many learners and educators as possible (where 'flexible' refers to technology, licensing, support, etc.). Outlining distinctive groups of users to be targeted by the resource runs a risk of bias and exclusion, as a function of community members' own backgrounds and affiliations. This is particularly important to consider since the present landscape of OER is dominated by projects from the world's most developed nations. Striving to maintain a culturally balanced perspective while planning for a DIY/DIT resource, it is impossible to envision all those who may benefit from OER initiatives in the long term, especially given the rapid transformations in internet communication and online educational resources.

3. CONTENT AND SERVICES

In considering the content that the DIY/DIT resource should have, the community came up with a very pragmatic question: How can users in poorly resourced areas even begin to imagine what OER could bring to

their work if they do not know what is already out there? So, first and foremost, a DIY/DIT resource should present information about existing OER projects and approaches, and the tools and services that support OER creation, organization, dissemination and use. It is the consensus of the community that the resource itself should not host OER available elsewhere or serve as a repository for future resources. Rather, detailed information and links could be collected and catalogued into an OER directory, which should be editable by community members in a wiki. A DIY/DIT resource could also showcase established methods and services, ranging from listings of technologies to contact information for relevant interest groups.

In the planning and development stages, it is important to avoid replication, and to build on what is already available. Hence, over and above the existing variety of resources, the project could contribute community support and expertise to guide current and potential OER users in their decision-making and development efforts – an OER matchmaking service, as one participant characterized it. A DIY/DIT resource would bring together an informal consortium of OER practitioners to facilitate collaboration and broker partnerships. Although there are now many OER initiatives around the world, what seems to be missing is a mechanism to network them together to promote sharing of resources, experiences and expertise.[41] It is hoped that the project could serve that purpose by facilitating collaboration and partnerships through the strength of its community.

The community established an ambitious objective for a DIY/DIT resource: to educate. The intent is to take advantage of collective knowledge and experience to promote best practices in the way that Open Educational Resources are developed, shared and used. Many steps in the process are new to learners and educators wishing to capitalize on available materials. Quick-start guides and development models could provide the necessary know-how for selecting and using appropriate technology, project planning, pedagogically informed design, choosing licenses, translation and localization of resources, etc. There are also many free tools and services not necessarily specific to OER that could nevertheless be of benefit (e.g. Flickr, Google Video, Google Maps). It is important to evaluate these resources and promote their effective use for OER development and adaptation. In an effort to

41 The continuing support through UNESCO of the work initiated by IIEP is promoting the development of an OER network (Editor).

educate and endorse best practices, it has also been suggested that sharing stories of user experiences, positive and negative, would enable a better understanding of the function and effectiveness of OER.[42]

Lastly, it is hoped that a DIY/DIT resource, through its community and initiatives, would inspire and generate more research and literature on Open Educational Resources. This is seen as one of the most important factors in building the critical mass needed to drive the OER movement and secure recognition of its value to the global educational enterprise.

4. STRUCTURE AND ORGANIZATION

The underlying structure and organization of the resource should be simple and intuitive. This should be reflected in the navigational hierarchy, the search engine and the website map.

A DIY/DIT resource should be inclusive and committed to ethical practices. It must, therefore, be compliant with the web accessibility standards from the World Wide Web Consortium's (W3C) Web Accessibility Initiative. Compliance with other W3C standards, such as CSS[43] and XHTML,[44] is also encouraged, as well as consideration of some of the learning management system standards, such as AICC and SCORM.[45]

Ideally, users should have the ability to collect and organize content through personal user spaces and profiles. One goal is to create a flexible environment, capable of serving a diverse population of learners and educators. Allowing users to personalize content and services to suit their needs would be an effective way to make the resource more inclusive. The key to reaching as many users as possible would be to design a multilingual environment that offers mechanisms for users to translate content themselves.

As noted in the discussion on potential users, the content available through a DIY/DIT resource should be available for download to portable media (disks, USB devices, etc.), without any loss in quality. Colleagues from

42 Stories have since been developed on the OER wiki, at http://oerwiki.iiep-unesco.org/index.php?title=OER_stories (Editor).

43 CSS (Cascading Style Sheets) is a W3C-endorsed style sheet format for HTML documents (web pages) that gives site developers and users more control over how pages are displayed. Using CSS, developers can create formatting and layout for a website independently of its content.

44 XHTML (Extensible Hypertext Markup Language) is the successor to HTML as the W3C standard language with which all web pages should be created.

45 AICC and SCORM are both collections of specifications that enable interoperability, accessibility and reusability of web-based learning content.

countries in the South underlined the importance of well-organized print materials, which may be the most usable media for learners and educators in remote areas. It is therefore important to incorporate mechanisms for easy conversion of content into printer-friendly formats. Audio cassettes should also be considered as an alternative to optical media for storage and dissemination of multimedia content, as many people in rural areas do not own computers or audiovisual equipment aside from cassette players. Even where computers and internet connectivity are available, use, as well as bandwidth, may be limited. This is something to consider when developing DIY/DIT resource content. Lowering bandwidth demand can be accomplished by using CSS, separating templates from text, and taking advantage of server-side caching.

Lastly, it is hoped that the resource architecture would allow users to contribute and collaborate on content easily. Wiki and blog structures are examples of best practice. It is imperative to the success of a DIY/DIT resource to involve its community in content development. Taking responsibility and ownership of the content should solidify the user base and ensure growth.

5. UNDERLYING TECHNOLOGY

The conversation on technological solutions for deployment and management of a DIY/DIT resource naturally followed from, and built on, the many ideas put forth under the previous three topics of potential users, content and organization.

The ease of use and contribution of content referred to above means that users should be able to access and add to the resource through a variety of ways, which may include some or all of the following: support for multiple web browsers and operating systems, the choice of high- or low-bandwidth versions, syndication of content through RSS feeds,[46] including podcasts, built-in text editors and ways to import RTF[47] documents. An intuitive interface design would improve the quality of the user experience by reducing the steps necessary to engaging with, and contributing, content. Metadata also facilitate effective content use. Ideally, metadata should be assigned at

46 RSS (Rich Site Summary, or Really Simple Syndication) is a format used to aggregate and distribute short descriptions of web content (e.g. news headlines or blog posts), together with a link to the full version of the content.

47 RTF (Rich Text Format) is a common file format used to transfer files between different word-processing programs, while preserving most of the formatting of a document.

the point of content creation and automatically harvested by the resource engine itself.

The sharing of content is a core element of OER practice, and it should be enabled on several levels. In an ideal scenario, a DIY/DIT resource would connect to existing repositories and portals for educational materials. This function, however, is dependent on the technological setup of such sites; so, as part of planning and promotion, the OER community would need to take on a leadership role in encouraging implementation of sharing protocols and services across the OER web landscape. Once a sharing standard has been agreed upon, content could be distributed through well-established peer-to-peer networks, such as Gnutella and BitTorrent. A less daunting objective is to enable searching of external collections of educational materials by way of metadata. There have been suggestions to work with major search engines, such as Google, on tagging educational content and offering a filtered search to that effect.[48]

In respect to offline use, one suggestion would be to enable delivery of the complete DIY/DIT resource on a CD-ROM. As the content is expected to grow and change, such a solution would need to incorporate an update engine or make it easy to download and integrate new materials. This could also work the other way round, allowing contributions from learners and educators in remote areas to be delivered on portable media and easily uploaded to the resource wherever internet access was available.

The community aspect has already been emphasized as central to development, collaboration and support. There are many technological solutions that support the creation of communities, and they should all be examined to determine which ones would best suit the needs of the DIY/DIT resource. Some of those needs are noted in the previous sections, such as setting up bazaar-style subject area 'stalls' and an OER matchmaking service. Effective mechanisms for managing shared documents are central to facilitating collaborative work, or a help-desk type of service, 'staffed' by volunteers, to facilitate support delivery. In the context of community development, it is important to understand the different kinds of communities, from theme-specific social hubs, such as IRC[49] chat rooms, to genuine communities of practice. Understanding how different types of communities deliver value to

48 In fact, the William and Flora Hewlett Foundation is working with ccLearn (the education division of Creative Commons) and Google to build an 'open education web-scale search' (ccLearn, 2007) (Editor).

49 IRC (Internet Relay Chat) is a system that allows internet users to conduct online, text-based conversations with one or more other users in real time.

their members will facilitate the incorporation of a variety of methods for interaction and collaboration into a DIY/DIT resource.

In conclusion, acknowledging the 'open' aspect of OER, the community insisted on the use of existing free and open source technologies. There are many, and community members have already identified quite a few.[50] Nevertheless, the community still needs help in evaluating the ideas and suggestions outlined above, most specifically with regards to technological viability. For this reason, the OER community wishes to engage in discussion with their colleagues in the IIEP FOSS community, hoping that both groups can work together to make a Do-It-Yourself/Do-It-Together OER resource a reality.

REFERENCES

ccLearn. 2007. *Open education search*. http://learn.creativecommons.org/projects/oesearch/ (Accessed 12 October 2007.)

50 References to specific technologies can be found in the summary discussion log, at http://oerwiki.iiep-unesco.org/index.php?title=DIY_Resource#How_should_the_DIY_resource_be_housed.2Fsupported.3F.

Chapter 7

FREE AND OPEN SOURCE SOFTWARE (FOSS) AND OER

In 2004, the International Institute for Educational Planning (IIEP) opened a discussion of Free and Open Source Software (FOSS) for education. The group elected to stay together as an informal Community of Interest and shared information on issues of interest from time to time as they arose. Because both the FOSS and the OER movements relate to the concept of open access, it could be expected that bringing the FOSS and OER communities together would result in a fruitful exchange.

First, the FOSS community was invited to reflect on lessons that they could pass on to the OER community and to identify FOSS applications that could be of use for OER. A four-week discussion ensued, and a report was prepared as a background note to share with the OER community. The discussion also resulted in an organized list of FOSS tools for OER development, management and dissemination that was made available on the OER wiki.

Next, the two communities were brought together for a discussion of the background note. About 200 members belonged to both the FOSS and OER groups, but the ensuing discussion assembled 700 individuals for the exploration of the topic over a two-week period.

PART I – AN INTRODUCTORY NOTE

Boris Vukovic with Claude Martin

1. WHAT IS FOSS?

Free and Open Source Software programs are programs distributed under terms that allow users to use, study, modify and redistribute the software in any manner they see fit, without requiring that they pay the author(s) of the software a royalty or fee. Products such as the GNU/Linux operating system, Apache web server, Mozilla Firefox web browser, PHP programming language, MySQL database system and the OpenOffice productivity suite are all well-known examples of this kind of software. The FOSS movement grew out of the 1960s and 1970s 'hacker' culture, in which software code was passed freely among members of the computer science community, and as a reaction against the increasingly restrictive and proprietary nature of software development in the late 1970s and 1980s (Rasch, 2000).

FOSS is an umbrella term for two different but complementary philosophies: 'free software' and 'open source'. The former is championed by the Free Software Foundation, which was founded by Richard Stallman in 1985 to promote the rights of software through protecting four user freedoms:

- the freedom to run the program, for any purpose (freedom 0);
- the freedom to study how the program works and adapt it to your needs (freedom 1); access to the source code is a precondition for this;
- the freedom to redistribute copies so you can help your neighbour (freedom 2);
- the freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3); access to the source code is a precondition for this (Free Software Foundation, 2007*a*).

For followers of the free software movement, protecting these freedoms is a moral and ethical imperative. The 'open source' philosophy, however, is rather more pragmatic: the term was introduced in 1998 in a bid to better market free software to the business community (Raymond, 1998). Open source advocates – notably the Open Source Initiative – emphasize the economic and technical benefits of making source code freely available:

> When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing (Open Source Initiative, 2004).

While the Free Software Foundation prefers a term that explicitly refers to freedom, the Open Source Initiative believes that the dual meaning of the English word 'free' (*gratis* and *libertas*) is confusing. Instead they place the focus on the availability of the source code, without which it would be difficult and inefficient – not to say practically impossible – to study, modify and improve the software.

More detailed, formal definitions for the terms 'free software' and 'open source' are maintained by the Free Software Foundation and Open Source Initiative. The definitions are substantively identical, however, and the decision to use one term over the other is generally ideological rather than functional. Stallman (2004) characterizes the free software and open source movements as two political camps within the same community. While the motivation of each of these two camps may be different, in practice they

occupy similar ground and often work together. For this reason it is helpful to have a common term – in our case, FOSS.

Is FOSS really free?

There are two senses in which FOSS programs are free: they have zero direct cost to the user, and they provide the freedom to study, modify and redistribute the source code. Most FOSS advocates emphasize the latter: 'free' means 'free as in "free speech," not as in "free beer"' (Free Software Foundation, 2007*a*). The importance of 'free' in FOSS is that software is 'unfettered' by copyright restrictions.

The FOSS model

FOSS is more than just a set of terms of distribution. It is also, perhaps primarily, a collection of tools and processes with which people create, exchange and make use of software and knowledge. And it is these tools and processes – the FOSS model, described by many as revolutionary – that may be of most interest to the OER movement.

2. LESSONS FROM THE FOSS MOVEMENT FOR THE OER MOVEMENT

During the discussion of FOSS solutions for OER, the FOSS community highlighted a number of important points of convergence, as well as some distinct differences between the two movements. The FOSS movement benefits from many years of experience and practice, and the community put forward the following 'lessons' for the younger OER movement.

OER and FOSS are complementary

The fundamental principle underlying both FOSS and OER is the freedom to share knowledge – whether this takes the form of making software code open for collaborative modification and improvement, or allowing unrestricted access to learning resources.

The objective of widening access to educational materials by means of technology brings OER and FOSS into a complementary and potentially mutually beneficial relationship. It is the conclusion of the FOSS community that this relationship manifests itself on two levels:

- development of FOSS software tools to support OER,
- development of OER content following the principles of FOSS.

The following comments were made:[51]

> Definitely, in my view, free content cannot be developed in the absence of FLOSS[52] technologies. The reason being that free content must adhere to the principles of the free content definition – namely the freedom to use, distribute and modify the resource. The freedom to modify free content includes the requirement to be able to modify the resource with free software tools. We must also respect the choice of users to use proprietary tools for the modification of resources as long as these [are] saved using open standards.

> Many people have realized that higher education and the FLOSS movement share many values such as community work fostering the open development and exchange of ideas, peer review, etc. It came about that higher education might use an open source (FLOSS) metaphor or model when integrating technology for content development, management and delivery.

OER development can mirror and take advantage of the FOSS collaborative model

The Open Educational Resources movement holds undisputed potential. Although it may have significant advantages over FOSS, it also faces significant challenges in aiming to achieve the same degree of success:

- Contributions to OER can be made by a much broader and more varied community of educators, in contrast to smaller groups of software developers for FOSS.
- On the other hand, due to a more diverse population of contributors, the OER movement will face greater challenges in attaining the standards of efficient, structured, peer-reviewed, and self-organizing collaborative work that is characteristic of FOSS.

> The new frontier for OER development is to look for excellence through team-structured, peer-reviewed work, in collaboration, online, adopting/adapting methods and tools used for FLOSS development.

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51 Each of the indented paragraphs below and throughout the remainder of this chapter is a quote from an individual participant.

52 The acronym, FLOSS (Free/Libre Open Source Software), is preferred by some open source proponents; 'libre' avoids some of the ambiguity of the word 'free' in English (Editor).

> I expect that the uptake of collaborative authoring of free content will be revolutionary when compared to FLOSS – simply because there are more people that can participate. In the case of FLOSS, this is limited to people who have the necessary programming skills.

FOSS can promote creation of OER content in developing countries

In considering the software tools available for creation of open content, it is argued that developing countries in particular may play a leading role in promoting the integration of FOSS and OER development. Furthermore, FOSS projects supporting computer literacy (such as the International Computer Driver Licence[53]) open up opportunities for wider participation in OER development from poorly resourced areas.

> Many of the contributions from developing countries seem to suggest that, for large-scale, widespread usage in a country with not much funding, Microsoft is not within their budget – so they can only use those FOSS programs that are relatively low tech.

> Having main donors and development organizations using FOSS and implementing FOSS in developing countries should be a priority. We are not seeing enough engagement in that area. If big institutions were adopting FOSS, it would directly invite and convince local/national partners and official institutions to do the same.

OER developers should commit to open licenses

The success of FOSS can, in part, be attributed to an ongoing commitment to free licenses, which are essential for unrestricted collaboration and sharing, and lead to progressive development of the movement.

Faced with recent developments in digital rights management and patent submissions on learning management systems, the community wishes to stress more then ever the necessity of becoming informed about open licenses, such as those offered by Creative Commons. Open Educational Resources will be well served by licenses that provide legal support to the objectives of free and open access to educational materials through the provision of appropriate and realistic standards for their use, modification and distribution.

53 http://www.acs.org.au/icdl/

> However, exponential growth of free content will require an unashamed commitment to free 'copyleft'[54] licenses. This is something we have learned from the FLOSS experience – namely the essential freedoms that are protected. Deviations from these freedoms will stall growth of the free content movement.
>
> There is an increasing awareness among participants of the OER initiative of the importance of choosing a license that meets the requirements of the free content definition (http://freedomdefined.org/Definition). This is a sign that the OER movement in education is maturing, because not all resources that are 'open' are free for reuse, modification and distribution.

Managing OER content design and editing is easier than FOSS programming

Unlike FOSS, the structure of OER content is more flexible and accommodating to a diversity of approaches. Contributions to open content can be accomplished with far fewer steps, compared to those of open source software. Wikipedia is a prime example of a content development platform that facilitates contributions without excessive reliance on technical expertise.

> Free content is less demanding than the requirements of central control for maintaining the main code branch of a FLOSS development. Content is also far more tolerant of 'errors' – the application won't break because of a grammatical error. It is far easier to manage the versioning of content, as successfully demonstrated by the Wikipedia project.

More inclusive formats for document exchange should be used

Some practical advice was offered with respect to the production of open content using desktop publishing applications. OER developers now have more options for document production and exchange, with increasing interoperability among different formats. The open source OpenOffice.org

54 A play on the word 'copyright', 'copyleft' is a form of licensing used to modify copyright to protect a user's freedom to modify and redistribute software or any creative work, including all future versions of that work: 'Copyleft says that anyone who redistributes the software, with or without changes, must pass along the freedom to further copy and change it' (Free Software Foundation, 2007*b*) (Editor).

(version 2)[55] is a step in that direction with the development of the OpenDocument Format (ODF) recently approved by independent standardization bodies.

> Frequently PDF is a more appropriate format than either [Microsoft] Office or ODF. The exception would be documents that you actually want the receiver to edit. You might use RTF [Rich Text Format] here.
>
> RTF is a proprietary format, but the format is documented and seemingly in the public domain. … Thus it might claim a role in OER if there is a need that other, more truly open, formats cannot fill.
>
> Another future solution is being visible through Web [2.0] solutions, such as Writely, which is a free tool enabling you to edit documents online, even in parallel.

FOSS can support better searching of OER

In anticipation of the proliferation of OER on the web, the FOSS community can provide recommendations and solutions for locating learning resources. The impact of OER is dependent on its visibility and accessibility on the web. Streamlining content development and distribution is one way that the FOSS and OER communities can work together to contribute to a more inclusive and open web landscape.

> The potential value of free content is enormous, but the problems of finding good, usable material are often overwhelming, and this is where innovative structures are urgently needed.
>
> Comment has already been made on finding and using learning objects – and the necessity for excellent search strategies so teachers can find existing stuff. That coexists with the challenge of the 'rate of content development': it doesn't necessarily follow that, because content is available free of charge, teachers will use it.

FOSS can ease concerns over perceived technical demands of OER development

The FOSS community acknowledged the wide-ranging technical skills of OER contributors, but recognized that many educators remain intimidated

55 http://www.openoffice.org/

by computer environments and are sceptical about the value of technology to education. Recent FOSS developments, however, especially those grouped under the label of Web 2.0, offer increasingly accessible solutions for web-based content production and collaboration. Thanks to a more transparent production process and more flexible software that allows for innovation and creativity, new FOSS solutions may contribute to changing attitudes about the relationship of web technologies and education, thereby furthering the progress of the OER movement.

> There is a perception where I work in Australia that open source belongs to 'techos'; teachers would be interested in Open Source if it provided them with functionality or particular aids to learning that were not readily available, or more easily accomplished, with proprietary software.
>
> With the advent of social software, the entry barriers to participation are lowered. In comparative terms free content does not require a very high level of technical skill (for example, you can publish on the web using a wiki without the need to become proficient in XHTML mark-up).

There are differences between OER and open source software

FOSS and OER may share an underlying philosophy rooted in freedom of knowledge and education, but the nature of their content is distinctly different. In part, those differences are due to the largely subjective notion of the 'value' of an educational resource, as a function of its learning objectives, context, or subject matter. The establishment of quality standards for OER content is considerably more complex than for FOSS products. For OER practitioners, this can present a major obstacle to modelling the principles of FOSS development.

> The key distinction between open source software and open content is that the underpinning dynamics are very different. Open source software, if meeting a need, attracts a community which then fine-tunes and extends the code. It is possible for an application with, say, 20,000 lines of code to be reduced to 10,000 lines of code but have increased functionality. … In contrast, our human tendency with content is to not be so ruthless with a purge and replace approach. We simply add to it; and this, I believe, is a major challenge to the OER movement. How many repositories have you been to where you've searched through so much dross to find the good 'nuggets' that you've simply given up in despair?

3. FOSS TOOLS FOR OER DEVELOPMENT, MANAGEMENT AND DISSEMINATION

The discussion in the FOSS community generated a large number of suggested tools for OER. These were grouped in the following categories, progressing from the most elementary to the most advanced:

- FOSS tools to design, edit and publish OER;
- FOSS tools to implement learning technology standards in OER;
- FOSS tools to design and implement learning object repositories;
- FOSS tools to design and implement virtual learning environments/ learning management systems;
- FOSS online collaborative environments to design, edit and publish OER.

Under each of these categories is a list of suggested software for OER identified in the FOSS group discussion and reference information:

- a brief description of the software (usually taken from the site),
- the direct link to the site.

As this is a very long document and intended as a reference, it is available on the OER community wiki.[56]

PART 2 – DISCUSSION HIGHLIGHTS

Boris Vukovic

1. BACKGROUND

The premise of the joint FOSS and OER community discussion was that both movements share a common conviction that access to resources, whether software code or learning materials, should be free and open for use, modification and sharing. It was also hoped that the more mature FOSS movement would have valuable lessons to pass on to the newly developing field of OER. The organizers were not disappointed. Informed and inspired by the report of the FOSS community discussion, the participants enjoyed a rich exchange of ideas that produced several important threads of conversation.

56 http://oerwiki.iiep-unesco.org/index.php?title=Appendix:_FOSS_tools_for_OER_development%2C_management_and_dissemination

These have been summarized below, under the following headings:

- comparable demands of development,
- development models,
- learning design standards,
- mechanisms for quality assurance,
- consideration of licensing choices,
- certification of competencies,
- levels of expertise and motivation to learn,
- the role of new generations of participants,
- learner-centred OER,
- print publication of OER.

2. COMPARABLE DEMANDS OF DEVELOPMENT

During the discussion in the FOSS community, it was suggested that OER content management presents fewer technical demands than FOSS development. Responding to this in the joint discussion, some participants argued that, although the demands of educational resource development are of a different nature than that of FOSS, they are nevertheless comparable in their degree of complexity. Instructional design issues and production standards, such as adherence to learning design specifications, ensuring a high level of 'granularity',[57] and separation of content from presentation, present challenges that are equally demanding from the development perspective.

In fact, since the OER movement is still in its infancy, it is likely that many of the finer points are not yet fully understood by practitioners. In this respect, OER development may be a more difficult undertaking than following the now well-established path taken by FOSS developers. However, comparisons between the two movements have little practical use if conceived only in terms of the demands placed on their respective practitioners. It may be more helpful to examine the qualitative differences in the nature of each practice.

> I'm not sure it's necessary to determine whether things are 'easier' or 'harder' in the FLOSS or OER worlds, but as the previous messages … illustrate, there are differences, and understanding those differences will

57 The term 'granularity' refers to the size of an educational resource (Wiley et al., 2000). The more granular a resource, the smaller the chunk of information it contains. For example, a single learning object, such as a graphic, is more granular than a complete course presented in a format that prevents its being broken down into its composite elements.

> be important to applying lessons learned in the FLOSS community to OER. … In OER more significantly than in FLOSS, the production and distribution aspects of open sharing can be disaggregated. … Typically in a FLOSS project production and distribution are … tightly intertwined. The open distribution is what supports iterations (and thus production) by a wide community. There are certainly great examples of this happening in OER as well – Connexions comes to mind – but open sharing and open production need not necessarily occur together in OER.

3. DEVELOPMENT MODELS

> At the end of this forum, it may be beneficial if the forum summary included an outline of different development models for open-source educational resources, and comments (benefits, challenges, situations suitable for the approach, etc.) with each model. This information could be based on the various discussions that have taken place during this forum. Forum participants may want to add to this summary by identifying projects that use a specific approach so that those contemplating a project will have a person or organization they could contact for additional information.

The short time available and the large number of topics discussed meant that this suggestion was not acted upon. However, the joint community did identify two major approaches to OER development, termed 'cathedral' and 'bazaar.'[58]

A 'cathedral' model for OER development involves a highly organized, top-down structure that may require paid teams of experts to lead the development. OER projects such as MIT OpenCourseWare[59] and Open University OpenLearn[60] are some of the examples of this approach.

In contrast, in a 'bazaar' model, a basic FOSS architecture and tools are made available to potential OER developers with the expectation that the development will be driven by need and facilitated by support from the emergent community. Rice University's Connexions project[61] is one example of a grass-roots approach such as this.

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58 After Raymond (1999).
59 http://ocw.mit.edu/index.html
60 http://openlearn.open.ac.uk/
61 http://cnx.org

In reality, it seems that most projects fall somewhere in-between these two models, with institutional structures and staff in place to support development efforts, and plenty of room for spontaneous growth as a function of dedicated and innovative content developers.

4. LEARNING DESIGN STANDARDS

The open nature of educational resources that are intended for modification and reuse stands in apparent conflict with the issue of standards for learning design. For this reason, the emphasis on pedagogical neutrality and flexibility of standards (such as that advocated by IMS) is noteworthy. IMS Learning Design[62] includes a set of specifications for describing the elements (including resources) and structure of any unit of learning. In fact, an awareness of standards is very important for OER developers, since they facilitate the transfer and reuse of educational resources across different systems.

Both the FOSS and OER communities recognized the importance of such efforts and raised the question of implementation of design standards for OER. The Learning Activity Management System (LAMS[63]) was singled out as a promising FOSS solution that allows for standardized development of collaborative learning activities. Its functionality and value to OER can further be extended through direct integration with Moodle,[64] a popular FOSS course management system.

> Pedagogic neutrality – as highlighted in IMS Learning Designs – is very much a necessity especially in the context of the changing perspectives on learning. In a teacher-centric mode of schooling … even if an individual teacher tries to go beyond the given framework, he or she is expected to then fall in line with yet another defined line of thinking – a beaten path. … LAMS seems to be a powerful and exciting tool especially for the teachers and facilitators of learning.

5. MECHANISMS FOR QUALITY ASSURANCE

Quality assurance in OER is a complex issue. FOSS developers rely on technical operability as proof of the quality of their product. Educational content, however, may often be used in spite of any faults that it may have, such as inaccurate information or dubious pedagogical value. It is hoped that

62 http://www.imsglobal.org/learningdesign/
63 http://www.lamsinternational.com/
64 http://moodle.org/

collaborative development and peer review could contribute to assuring the quality of OER content. In this respect, a high level of participation by all stakeholders, from learners to educators and administrators, is considered an important mechanism for quality assurance – an important lesson to be taken from the FOSS movement. At the same time, the group cautioned against efforts to regulate the quality of OER too strictly. It was feared that over-regulation and setting the quality bar too high could reduce levels of participation, effectively minimizing one of the mechanisms for quality assurance.

Those that support the self-regulation of OER took a different view on the issue of quality. They argued that quality resources would eventually rise to the surface of the OER pool thanks to global recognition of their educational value and as a result of their continued use, adaptation and modification. In this pragmatic model of OER development, quality assurance is less of a primary concern: high-quality resources will be those that withstand the test of time.

It should be noted that each of these approaches assumes a central role for the users of OER, who improve the quality of resources through the process of selecting, adapting and contributing them back to the global community:

> I agree quality is a strategic priority for those of us grappling with the promotion and sustainability of OERs. An interesting thought – I would far prefer access to a poor-quality free resource, which I have the freedom to modify and improve for the benefit of my community than for example, a high-quality PDF file that's locked down with a NC [non-commercial] restriction!

6. CONSIDERATION OF LICENSING CHOICES

The above quote illustrates the strong emphasis that the joint FOSS-OER group placed on the critical importance of open content licenses, as well as their practical relevance to other aspects of OER, such as quality assurance. Licensing was also singled out as one of the areas in which the newer practice of OER can learn the most from the experience of the FOSS movement.

> Our students (and faculty) can now find a vast array of information (both high and not-so-high) quality on the web. But they cannot reuse most of these resources without getting permission from the author. Most faculty will not go through the effort to do this. While it doesn't solve all the problems, having an appropriate CC [Creative Commons] license on most content would go a long way towards encouraging the development/improvement of content.

Developers of OER content need to carefully consider licensing options and their implications, including those offered under Creative Commons.[65] It is through licensing choices that the future success of open content distribution, sharing and modification will be determined. As some advocates have argued, selection of a particular license clearly demonstrates the content distributor's commitment to the fundamental 'open' principles of the FOSS and OER movements. Not all license options support equally the notions of free and open content, such as is the case with the 'no derivative works' and non-commercial restrictions available from Creative Commons.

7. CERTIFICATION OF COMPETENCIES

Once content has been developed via FOSS tools, structured according to learning design standards, peer-reviewed to ensure quality, and made open for further improvement with an appropriate license, stakeholders may begin to question whether OER should be used for accreditation of learning. This issue produced a heated debate, with the outcome being a clear distinction between certification of competencies and certification of content.

Certification of competencies is an area of growing interest, particularly in the domain of information technology. There are efforts to provide FOSS-based programmes in response to some of the leading commercial initiatives, such as the European Computer Driving Licence.[66] Such programmes provide certification of basic computer skills and software application specialization, and are seen as a promising alternative for poorly resourced areas. OER can be used to provide the content for training and testing and may therefore be considered an integral part of the certification of competencies based on FOSS.

In contrast, on the issue of certification of content, it was the consensus that this is both difficult to accomplish and highly ambiguous in principle. Participants argued that fluidity is a fundamental property of OER content, subject as it is to continuing adaptation and modification. This fluidity makes certification of content impossible in practice. Furthermore, certification was criticized as a bureaucratic practice that can be seen as evidence of little more than temporary familiarity with the specific requirements of the test taken, rather than any lasting knowledge or competencies. Taken further, it was argued that OER content should not be designed specifically for measuring business-centred competencies based on a limited set of skills.

65 http://www.creativecommons.org
66 http://www.ecdl.com/

However, some participants presented examples of circumstances that do bring the issue of content certification to the forefront:

> In our OER project, we are developing courseware and assessments specifically designed for the New Zealand curriculum. There is a quality assurance process to ensure suitability; so, in that sense, it is certified content. … The original material is 'certified', which addresses return on investment issues with the funding body and our business need.

> In some contexts, the issue of accreditation of OERs will arise. For example, several African universities will be making use of resources that have been either co-developed (among themselves) or adapted from existing OER collections for use in their formal academic programmes. In cases like these, the university accreditation bodies will need to accredit the programmes (as they do any other).

In conclusion, a focus on the accreditation of programmes, rather than the resources themselves, was considered key to the resolution of the discussion on certification. It was also recognized that accreditation procedures are the domain of institutions. This suggests a possible issue for future discussion: the determination of institutional policies on the certification of OER-based education programmes.

8. LEVELS OF EXPERTISE AND MOTIVATION TO LEARN

Development of educational resources in the form of digital learning materials requires a certain degree of technical skill and familiarity with the various FOSS tools available. Often, FOSS advocates assume that OER practitioners possess a reasonable level of technical expertise. However, for many potential content producers this may not be the case:

> Sometimes, working in the e-learning field, we can forget that many people have no knowledge of these tools and what use they might be for researchers and project development. We also forget that installing software – even modern, easy to use, web software – lies outside the experience of many users.

FOSS producers focus on software as the end goal of their work, while, in OER, content development software is a tool only. Clearly, the level of technical knowledge and proficiency demanded in these two contexts are very different.

In their initial debate, the FOSS community discussed the complementary nature of the relationship between the two movements. Some participants in the joint debate, however, expressed concern over their capacity to contribute to and benefit from such a relationship. It was suggested that potential OER developers should place themselves on an 'expertise continuum' and then seek the appropriate levels of technical training and support. Others argued, however, that technical familiarity could and would be acquired as part of the process of OER production, rather than through formal professional development. From this perspective, the issue is less about acquiring skills and more about motivation for continuous professional development and learning. Here the group stressed the need to uncover the motivational factors that contribute to the progress and success of long-running FOSS projects.

9. THE ROLE OF NEW GENERATIONS OF PARTICIPANTS

Related to this issue of motivation was the observation that younger people, with their enthusiasm and capacity for innovation, are often the driving force behind many FOSS projects. The communities that form around FOSS initiatives often appear to be largely composed of young people. In contrast to traditionally more experienced commercial software (or educational content) developers, these developer/user groups contribute collectively to the progress of the project through testing, feedback and code modifications. Clearly, such communities change the nature of project development in FOSS by shifting the focus from individual professional expertise to a community's pooled knowledge and contributions.

The joint FOSS-OER group questioned whether and how the same generation of participants could be attracted and recruited for OER development:

> How welcome do we make most young learners (formal and informal) to participate in our current OER processes, especially as improvers/ creators of learning material?

These learners, aptly referred to as 'digital natives' (Prensky, 2001), show tremendous skill in both using and creating with technology. If their abilities are not utilized as part of the OER community's efforts to take advantage of digital resources for education, new generations of learners could be further alienated from formal education. Greater involvement of young learners in the production of OER could have an additional benefit: it was suggested that the

FOSS and OER approach to content and software licensing could reduce levels of piracy and help to legitimize peer-to-peer sharing and distribution.

While the group acknowledged the potential benefits of attracting more young participants, it also stressed the importance of lifelong learning and warned against discriminating against older generations.

> I would like to add that age should not be a hindering factor in the concept of learning communities, and it has not been our experience that it is. Just a month ago, the Indian State of Kerala (my home state) completed a project of introducing computers to the elderly women from the rural – agricultural farming – areas. These new learners – mostly above 60 years – were not even literate in English. All of them were positive and were of the view that the training inputs will be useful to them.

10. LEARNER-CENTRED OER

In line with current pedagogical thinking, OER developers need to place the learner at the centre of the educational process. It was argued that traditional didactic teaching practices do not work in the new digital age, with its increasing variety of media available to stimulate creativity and engagement. Instead, constructivist approaches to learning better reflect a reality of knowledge construction through the engagement between novices and more experienced users in communities of practice.

In terms of OER development, this approach means that learners themselves need to be given opportunities to contribute to learning resources. While the teacher was recognized as an important facilitator of this process who, by virtue of professional experience, can provide scaffolding and guidance, the students should play a key role in shaping classroom materials and learning resources. It was expected that the value of OER would increase through genuine student use and modification. The FOSS movement may contribute to this process of real-world OER validation by providing tools for student expression.

> Yes there is always a role for lectures and seminars, and teachers have an important role in supporting learning. But the focus should be on tools for learners, not just platforms for teaching, to express themselves in whatever media they feel comfortable in – including blogs and wikis, podcasts and videos – and to collaborate and share their stories.

11. PRINT PUBLICATION OF OER

The educational publishing industry is another domain in which the OER and FOSS movements can facilitate a change in established practices. Strong arguments were made in favour of developing and using Creative Commons-licensed learning materials as an alternative to commercial textbooks, which are becoming less and less affordable, even to learners in developed countries. In addition to the financial advantages to the learner, so-called 'open' textbooks give teachers the freedom to customize the material to better fit their own course design and teaching situation. This also resonates with the constructivist pedagogy mentioned in the previous section. In contrast to the course coverage being determined by, and following, fixed and segmented subject matter in a commercial textbook, an open textbook can be continuously modified to accommodate changing classroom and learner dynamics.

At the same time, it is likely that such a change will face great political opposition from the publishing industry. Strong advocates will be needed. However, it is hoped that educational publishers will realize the necessity for change as traditional textbooks lose their formerly privileged position as key sources of factual information. Web-based projects – such as Rice University's on-demand academic publishing initiative, delivered through Connexions[67] – may be in their early days, but they are gaining much publicity.

> FLOSS and open content movement are slightly shaking the boat of the educational publisher. There is a real fear that the role of the publisher in the value chain will change. It looks that what is left for the publishers is the editorial work and marketing, as the actual content creation and distribution will be done online (Leinonen, 2005).

12. GENERAL CONCLUSIONS

The joint FOSS and OER group addressed a number of issues by drawing on the experiences of the FOSS movement and examining their relevance and value for emerging OER practice. From these deliberations, some general conclusions can be made in the form of lessons learned from FOSS and best practice for OER development:

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67 See http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=8672&SnID=90828 for more information and http://cnx.org/content/col10376/latest for the first book delivered through the service.

- Development structure is characterized by both top-down and grass-roots approaches, each with unique roles – the former contributing institutional support and infrastructure, the latter providing the impetus for creative growth and progress through innovation.
- Communities are hubs for collaboration and project sustainability, driven by enthusiasm from novices, and by the knowledge and maturity of more experienced members.
- Project development is meticulously documented and quality is ensured through modular peer review, facilitated by the high granularity of content.
- Standards exist not to prescribe development, but to ensure interoperability and exchange.
- Innovation is a response to a need, a personal 'itch' that transforms into a collective undertaking.
- Licensing choices ensure commitment to the principles of openness and freedom of knowledge and resources.

While the OER movement will certainly face unique challenges in the future, the knowledge and experience shared by FOSS practitioners is of undisputable value. The joint FOSS-OER group discussion produced a number of important conclusions as outlined above, covering most aspects of OER practice, from content development and learning standards to the questions of quality and expertise through community participation. It is hoped that the FOSS and OER movements will utilize the potential of existing and developing technologies, to collaborate closely to make education more accessible worldwide. By bringing together hundreds of professionals from around the world to deliberate on issues of importance to both movements, this internet-based discussion was a strong affirmation of this conviction.

REFERENCES

Free Software Foundation. 2007*a*. *The Free Software Definition.* http://www.fsf.org/licensing/essays/free-sw.html (Accessed 27 November 2007.)

——. 2007*b*. *What is Copyleft?* http://www.gnu.org/copyleft/copyleft.html#WhatIsCopyleft (Accessed 29 November 2007.)

Leinonen, T. 2005. Baking cakes with the pope of e-learning. *FLOSSE Posse,* 12 November 2005. http://flosse.dicole.org/?item=baking-cakes-with-the-pope-of-e-learning (Accessed 29 October 2007.)

Open Source Initative. 2004. Open Source Initiative homepage. http://www.opensource.org/ (Accessed 12 May 2004.)

Prensky, M. 2001. Digital natives, digital immigrants. *On the Horizon*, Vol. 9, No. 5. http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf (Accessed 29 November 2007.)

Rasch, C. 2000. *A Brief History of Free/Open Source Software Movement.* http://www.cisnet.com/glennmcc/foss/brief-open-source-history.html (Accessed 18 November 2005.)

Raymond, E. S. 1998. *Goodbye, 'Free Software'; Hello, 'Open Source'.* http://www.catb.org/~esr/open-source.html (Accessed 27 November 2007.)

——. 1999. *The Cathedral & the Bazaar: musings on Linux and open source by an accidental revolutionary.* Sebastopol, Calif., O'Reilly & Associates, Inc.

Stallman, R. M. 2004. Why 'free software' is better than 'open source'. J. Gay (ed.), *Free Software, Free Society: selected essays of Richard M. Stallman*, 2nd edn Boston, Mass., GNU Press, pp. 57–62.

Wiley, D. A., Gibbons, A. S. and Recker, M. M. 2000. *A Reformulation of the Issue of Learning Object Granularity and its Implications for the Design of Learning Objects.* http://www.reusability.org/granularity.pdf (Accessed 31 October 2007.)

Section 3.

A second forum: discussing the OECD study of OER

A major study of OER was undertaken by the Centre for Educational Research and Innovation (CERI) of the Organisation for Economic Co-operation and Development (OECD). From the planning stages of both the UNESCO and OECD activities, it was foreseen that there would be fruitful collaboration between the two organizations. This was indeed the case. As the CERI study was being prepared for publication, some of the findings were shared with the International Institute for Educational Planning (IIEP) community, both for their information and to get their reaction. For this discussion, the community was joined by members of the OECD expert group on OER and others interested in the study.

The forum was organized in three week-long sessions on the following topics:

- *What do we know about users and producers of Open Educational Resources?*
- *What are the incentives for individuals and institutions to use, produce and share OER, and what are the barriers to their doing so?*
- *What are the policy implications and the most-pressing policy issues – on institutional, regional and national levels – emerging from this study?*

The community engaged in a thoughtful discussion of the findings of the CERI study, exploring issues and providing commentary that was useful in the finalization of the eventual publication, Giving Knowledge for Free *(OECD, 2007).*

Chapter 8

MAPPING PRODUCERS AND USERS

Jan Hylén

One of the important exercises undertaken as part of the CERI study was the effort to identify and map OER initiatives, largely in OECD countries. The OER movement has been gaining ground, and this overview of the nature and scale of the initiatives constitutes a valuable snapshot of the shape of the movement in 2006. The findings were presented to the community in a background note, and members were invited to identify studies and research, as well as additional OER activities.

1. BACKGROUND

There are many critical issues concerning the access, quality and cost of information and knowledge available on the internet, as well as the provision of content and learning material. As it becomes clearer that the growth of the internet offers real opportunities for improving access and transfer of knowledge and information from universities and colleges to a wide range of users, there is an urgent need to clarify these issues with a special focus on Open Educational Resource (OER) initiatives. There is also a need to define technical and legal frameworks, as well as business models, to sustain these initiatives. That is the background to the OECD-CERI study, which has aimed to map the scale and scope of OER initiatives in terms of their purpose, content and funding, and to clarify and analyse four main questions:

- How can sustainable cost/benefit models for OER initiatives be developed?
- What are the intellectual property rights issues connected with OER initiatives?
- What are the incentives for universities and faculty staff to deliver material to OER initiatives, and what are the barriers to their doing so?
- How can access and usefulness for the users of OER initiatives be improved?

The study combined desk research, commissioning of expert papers, and expert meetings, with surveys and a series of site visits. A final report –

presenting the main findings, the expert papers, and recommendations to policy-makers – was published in early 2007 (OECD, 2007).

2. MAPPING OER INITIATIVES

Although we are still in the 'early days' of the OER movement, the number of initiatives seems to be growing fast. Side by side with large institution-based or institution-supported initiatives, numerous small-scale activities have been initiated. Building on Wiley (2006), the following brief overview can be given of the OER movement in post-secondary education.

In late 2006, there were over 2,500 open access (or open courseware) courses available, from over 200 universities.

- In the United States, 1,700 courses had been made available, by 7 university-based projects.[68]
- In China, 451 courses had been made available, by 176 university members of the China Open Resources for Education (CORE) consortium.[69]
- In Japan, 350 courses had been made available, by 10 universities participating in the Japanese Opencourseware Consortium.[70]
- In France, 178 courses had been made available, by 11 member universities of the ParisTech open courseware (OCW) project.[71]

More OER projects are emerging at educational institutions in: Australia, Brazil, Canada, Cuba, Denmark, Hungary, India, Iran (Islamic Republic of), Ireland, the Netherlands, Portugal, the Russian Federation, South Africa, Spain, Sweden, Thailand, the United Kingdom, the United States and Viet Nam.

There are also a number of projects underway to make these higher education-based materials available in multiple languages, including Universia's Spanish and Portuguese translations,[72] CORE's simplified Chinese translations,[73] Opensource Opencourseware Prototype System's (OOPS) traditional Chinese translations,[74] and Chulalongkorn University's

68 http://ocw.mit.edu/, http://cnx.rice.edu/, http://ocw.jhsph.edu/, http://ocw.tufts.edu/, http://www.cmu.edu/oli/, http://ocw.nd.edu/, http://ocw.usu.edu/
69 http://www.core.org.cn/cn/jpkc/index_en.html
70 http://www.jocw.jp/
71 http://graduateschool.paristech.org/
72 http://mit.ocw.universia.net/, http://www.universiabrasil.net/mit/index.jsp
73 http://www.core.org.cn/OcwWeb/Global/all-courses.htm
74 http://www.myoops.org

Thai translations.[75] In October 2006, these translation projects represented approximately 52 per cent of all open courseware-style courses.

Figure 8.1. Categories of OER providers

Scale of operation		Institution	Community
	Large	**QUADRANT I** **Large-scale, institution-based** MIT OpenCourseWare UK Open University OpenLearn	**QUADRANT III** **Large-scale, community-based** Wikipedia Connexions MERLOT WikiEducator
	Small	**QUADRANT II** **Small-scale, institution-based** OpenER (Open University of the Netherlands) University of the Western Cape Free Courseware Project United Nations University OCW Klagenfurt OCW	**QUADRANT IV** **Small-scale, community-based** OpenCourse Free Curricula Center LeMill
		Provider type	

Source: Adapted from OECD, 2007, p. 45.

The number of available non-course Open Educational Resources – such as articles, individual curriculum units, modules, and simulations – is also growing at a terrific rate. By October 2006: the English-language Wikipedia[76] contained over 1,300,000 articles; Math World[77] contained 12,632 entries; Rice's Connexions project hosted 3,461 open learning objects available for mixing and matching into study units or full courses; Textbook Revolution[78] contained links to 260 freely available, copyright-clean textbooks; MERLOT[79]

75 http://mit-ocw-thai.eng.chula.ac.th/
76 http://wikipedia.org/
77 http://mathworld.wolfram.com/
78 http://textbookrevolution.org/
79 http://www.merlot.org/

offered almost 15,000 resources; and European based ARIADNE[80] offered links and federated searches in several networks and repositories. UNESCO-IIEP created a wiki containing a listing of 'OER useful resources' with links to portals, repositories and open content projects.[81] Even more difficult than to list the number of initiatives would be to estimate the quantity of available resources, even with a narrow definition of OER. On top of the resources accessible through initiatives like those listed above, many more can be found by using search engines like Google or Yahoo.

At the moment it is impossible to give an accurate estimate of the number of ongoing OER initiatives. What can be offered is a draft typology of different repositories. As already mentioned, there are both large-scale operations and small-scale activities. It is also possible to distinguish between different providers – institution-based programmes and community-based, bottom-up activities. In both cases, there are all kinds of in-between models forming a continuum, as shown in Figure 8.1.

In the upper left corner of Figure 8.1, large-scale and institution-based or -supported initiatives would be placed. A good example is the Massachusetts Institute of Technology (MIT) OCW programme. It is large scale in the number of resources provided and the number of people involved. It is completely institution-based, in the sense that all materials originate from MIT staff. In the upper right corner, large-scale, non-institution-based operations would be placed. Perhaps the best example of such an operation would be Wikipedia – one of the internet's real success stories. Another example would be MERLOT. In the bottom left corner of the figure, an example of a small-scale but institution-based initiative is given: the University of the Western Cape, South Africa, which announced in October 2005 that they would launch a 'free content and free open courseware strategy' (Grant, 2006). Finally, in the bottom right corner, we have an example of a small-scale, community-based initiative: OpenCourse. OpenCourse[82] is 'a collaboration of teachers, researchers and students with the common purpose of developing open, reusable learning assets (e.g. animations, simulations, models, case studies)' (OpenCourse, 2006).

A third factor to consider is whether the repository provides resources in a single discipline, or whether it is multidisciplinary. While

80 The Alliance of Remote Instructional Authoring and Distribution Networks for Europe (http://www.ariadne-eu.org/)

81 http://oerwiki.iiep-unesco.org/index.php?title=OER_useful_resources

82 http://opencourse.org/

single-disciplinary programmes do exist (e.g. the Stanford Encyclopedia of Philosophy[83] and Planet Math[84]), the multidisciplinary approach remains the most common.

3. USERS AND PRODUCERS OF OER

Not much is known about who is actually producing and using all of the available OER. Of course, institution-based initiatives, like the OCW programmes at different universities, use their own staff to produce their material; and some of them, such as MIT, try to continuously evaluate who their users are. But, as a whole, very little is known about the users and producers. To correct this deficiency, the OECD project launched two web-based surveys during spring 2006, one targeting institutions and one aimed at individual teachers and researchers. The first received only a very small number of answers, although over 1,800 emails were sent to universities in the 30 OECD member countries. The emails were sent to the rector or vice chancellor's office, and the poor result may be a sign that OER is still mostly a grass-roots phenomenon. Many staff at the managerial level of an institution are not involved in, nor even aware of, the activities of research groups or individual faculty members.

The survey for individuals was answered by 193 people, from 49 different countries, covering all parts of the world. Although the geographical spread is interesting, there was a clear bias towards teachers from English-speaking countries (perhaps due to the fact that the questionnaire was only available in English). The majority of respondents work at institutions with 10,000 students or less; approximately one-third are at institutions with 11,000 to 50,000 students. More than half of the respondents work in the area of education, while two-thirds represented publicly funded institutions. A small group (twelve people) work for private for-profit universities. The small number of replies calls for caution in the interpretation of results.

A majority of the respondents said they were deeply involved in OER activities, mostly as users of open content and only slightly less as producers. About half of them experienced good support from management in their use of open content, but somewhat less support for producing content and using open source software. About one out of four experienced good support

83 http://plato.stanford.edu/
84 http://planetmath.org/

from the management level in their production of open source software. The majority of respondents said they were engaged in some sort of cooperation regarding production and exchange of resources, at the regional, national or international level. Overall there were no, or only small, differences in the replies from the respondents from OECD versus non-OECD countries.

As part of an extensive study on use and users of digital resources in California, thirteen OER providers were interviewed (Harley et al., 2006). All sites were developed for broad educational purposes – for instance, to provide supplementary materials for students, to assist instructors in teaching, or to provide general course materials to support any type of learning. All of them target post-secondary instructors as their primary audience, together with students and the general public. Although most interviewees claimed that their resources are intended to reach a broad audience, even those sites with broad outreach missions recognized that their materials are often most useful for faculty preparing new courses. Although good usage data are rare, anecdotal evidence suggested that the actual audience varied significantly from the target audience in only a few cases.

Other findings regarding OER users result from individual projects. In 2005, some 8.5 million visits were recorded to MIT OCW content, an annual increase of 56 per cent (MIT, 2006). The traffic seems to be increasingly global: 57 per cent of visitors came from outside the United States. Twenty-one per cent came from Western Europe, 15 per cent from East Asia, and 6 per cent from South Asia. The remaining 15 per cent of the traffic originated in Eastern Europe, the Middle East, Africa, the Pacific, Central Asia and the Caribbean combined. In 2004, the bulk of MIT's traffic was made up of self-learners, typically with a bachelor's or master's degree (47 per cent), followed by students (32 per cent) and educators (16 per cent) (MIT, 2005). Higher percentages of educators used the site in developing and transition regions, such as East Asia, Latin America, Eastern Europe, and the Middle East and North Africa. Self-learner percentages continued to be highest in North America, East Asia and Western Europe.

In their user survey, Tufts OCW reported that half of the respondents identified themselves as self-learners, while 43 per cent were faculty members or students. Over half had master's degrees or higher (Tufts OCW, 2006).

Johns Hopkins University's Bloomberg School of Public Health started an OCW initiative in 2005 and reported a growth in the number of visitors by 111 per cent during the first year. Nineteen per cent of the visitors indicated

their status as health-care professionals, 23 per cent as self-learners, and 7 per cent as educators. A total of 13 per cent reported that they were students, 3 per cent of whom were Hopkins students. Sixty-four per cent of the visits came from the United States (Phelps, 2006).

An increase of resources in different languages seems to result in an increase in the number of visitors to a site; it also has an impact on where the visitors come from. MIT OCW-affiliated translation sites accounted for the most dramatic increase in traffic during 2005: 3.4 million visits were recorded to their four translation sites. ParisTech OCW, offering resources mostly in French, reported 30,000 to 35,000 unique visitors per month. Two-thirds came from Europe (predominately France), about 10 per cent from Africa, and 5 to 6 per cent from North America.

About two-thirds of the respondents to the OECD questionnaire said they were involved in the production of open content, either to a large or a small extent. When asked to rank nine possible barriers to involving other colleagues, lack of time ranked highest, followed by the lack of a reward system to encourage staff members to devote time and energy to producing open content, and a lack of skills. The lack of a business model for open content initiatives was also perceived as an important factor with negative impact. The least significant barriers were felt to be lack of access to computers and other kinds of hardware, and lack of software.

When asked what license they use on resources they have produced, more than half of the respondents said that they did not use any license at all. Twenty-five per cent used some kind of Creative Commons license, while the rest used other open licenses. Although the use of Creative Commons licenses is growing, this finding indicates a need for even more awareness-raising activities regarding copyright and the need for open licenses – a conclusion strengthened by several observations during the series of site visits carried out as a part of the OECD study. Furthermore, results from the survey suggest that instructors use open content as a complement to other learning resources. Two-thirds of respondents said they used open content to some or a limited extent in their teaching. Also, it seems as if smaller chunks of learning material are used more frequently than larger ones: almost 80 per cent reported they used learning objects or parts of courses rather than full courses in their teaching. More than half of respondents said they used content they produced themselves. Forty per cent used content produced within their own institution, 30 per cent used resources originating from cooperation with other institutions and about 25 per cent used content produced by publishers.

To sum up, the typical OER user seems to be a well-educated self-learner, likely to live in North America, or a faculty member. But this picture would probably be nuanced if more data were available from repositories, rather than OCW initiatives, and from more language areas. OER users typically use these resources to complement other kinds of learning materials. OER producers often seem to be enthusiasts, working with some support from the institution management. Most of them also seem to be involved in the exchange of resources with other institutions.

REFERENCES

Grant, L. 2006. Open university courseware trend comes to SA. *Tectonic*, 21 February 2006. http://www.tectonic.co.za/view.php?id=879 (Accessed 8 November 2006.)

Harley, D., Henke, J., Lawrence, S., Miller, I., Perciali, I. and Nasatir, D. 2006. *Use and Users of Digital Resources: a focus on undergraduate education in the humanities and social sciences.* Berkeley, Calif., Center for Studies in Higher Education, University of California, Berkeley.

MIT. 2005. *MIT OpenCourseWare: 2004 program evaluation findings report.* Cambridge, Mass., MIT.

——. 2006. *MIT OpenCourseWare: 2005 program evaluation findings report.* Cambridge, Mass., MIT.

OECD. 2007. *Giving Knowledge for Free: the emergence of Open Educational Resources.* Paris, OECD.

OpenCourse. 2006. OpenCourse.org homepage. http://opencourse.org/ (Accessed 8 November 2006.)

Phelps, M. 2006. *Johns Hopkins University, Bloomberg School of Public Health: a case study of the production of OpenCourseWare.* Paris, OECD.

Tufts OCW. 2006. *Quarterly Newsletter*, Vol. 1, No. 2. Boston, Mass., Tufts University.

Wiley, D. A. 2006. *On the Sustainability of Open Educational Resource Initiatives in Higher Education.* Logan, Utah, COSL, Utah State University.

Chapter 9

WHY INDIVIDUALS AND INSTITUTIONS SHARE AND USE OER

Jan Hylén

Having considered the mapping of OER initiatives, the community turned its attention to a second background note and explored the rationale for individuals and institutions to use, produce and share OER. The discussion focused on incentives for, and barriers to, becoming involved in the creation or use of OER, for both institutions and individuals.

1. BACKGROUND

The first and most fundamental question that anyone arguing for the free and open sharing of software or content has to answer is: 'Why?'. Why should anyone give away anything for free? What are the possible gains in doing that? Advocates for the Free and Open Source Software (FOSS), Open Access (OA) and Open Educational Resources movements all have arguments in favour of their specific cause. But there are also general arguments that apply to all three. These can be divided into 'pull' arguments, which list the gains that can be made by open sharing of software, scientific articles and educational materials, and 'push' arguments, which register the threats or negative effects that might appear if software developers, scientists and educationists do not share their work openly.

Starting with the push side, it is sometimes argued that if universities do not support the open sharing of research results and educational materials, traditional academic values will be increasingly marginalized by market forces. The risk of a software monopoly if everyone is using Microsoft programs, or a combined hardware and software monopoly by too many using Apple's iPod music player and iTunes software, is often used as a reason to support the FOSS movement. The same is true regarding the risk of monopoly ownership and control of scientific literature, according to opponents of the large-scale, commercial scientific publishing model. The possibility for future researchers to keep a seat at the table in decisions about the distribution of research results is sometimes said to be at risk. Increased costs and vulnerability, increased social inequality and slower technical and scientific development are other concerns.

On the pull side, a number of positive effects from open sharing have been put forward. For example, free sharing means broader and faster dissemination, thereby involving more people in problem-solving, which in turn means rapid quality improvement and faster technical and scientific development; decentralized development increases quality, stability and security; and free sharing of software, scientific results and educational resources reinforces societal development and diminishes social inequality. From a more individual standpoint, in addition to invoking the pleasure of sharing with peers, open sharing is claimed to increase publicity and reputation.

2. ARGUMENTS FOR INSTITUTIONAL INVOLVEMENT IN OER

From an institutional point of view, there are numerous reasons for OER involvement. Charles Vest, former president of MIT, has given five reasons for MIT's decision to 'give away all its course materials via the internet' (Vest, 2004). The overall intention of the initiative was said to be to advance education and widen access, but other benefits included greater opportunity for MIT faculty to see and reuse each others' work, a good record of materials, increased contact with alumni, and a way to help MIT's own students become better prepared.

Since MIT is a campus-based institution, it has been argued that its OCW initiative did not threaten its core business. It would be much riskier for a distance-teaching institution to undertake something similar. Thus, it is still more interesting to look at the reasons given by the UK Open University for choosing to launch its OpenLearn initiative.[85] McAndrew (2006) lists eight motivations, among which were that the philosophy of open content matches the Open University's mission, and that, since the OER movement is quickly developing, the Open University should join sooner rather than later. McAndrew also notes the risks for the institution in doing nothing when technology and globalization issues need to be addressed, and that the initiative could be a route for outreach beyond the existing student body. Furthermore, it is seen as a chance to learn how to draw on the world as a resource and as a testing ground for new technology and ways of working. It is also seen as a means of demonstrating the quality of Open University materials in new regions, and a way to work with external funders who share similar aims and ideals.

85 http://openlearn.open.ac.uk/

The province of British Columbia in Canada has launched an OER initiative as a part of their BCcampus, which is an inter-institutional collaboration between twenty-six public post-secondary education institutions.[86] At the time of writing, this is a unique initiative, in so far as it has governmental support, both politically and financially. Stacey (2007) describes the benefits and value propositions associated with its approach:

- allowing intellectual property and copyright to be held by the developer;
- leveraging an initial investment of public taxpayers' dollars many times over by allowing for free sharing and reuse among public post-secondary educators in British Columbia;
- establishing a policy for online learning resource development that supports free sharing of content within the public post-secondary system, while still retaining commercialization potential outside (developers are offered two license options, Creative Commons or BC Commons, giving them the choice of sharing their resources globally or locally);
- eliminating the weeks and months it can take to seek permission to use existing digital materials by tagging the asset with explicit terms defining rights to use (educators can use the asset immediately, without having to go through a permission-seeking process);
- allowing others to reuse and modify original work, providing a means for continuous improvement of online learning resources by a collective of professional peers;
- optimizing learner experiences by generating high-quality online learning resources over time;
- tracking use and reuse, which creates a form of market research (significant reuse of a resource signals its potential value in other academic domains or jurisdictions; high use data is invaluable for launching commercialization scenarios requiring investment based on the demonstrated market potential of a resource);
- moving development of educational content from being closed and exclusively in the control of a single educator to open and shared with others (when professional peers can see and contribute to a work there is increased pressure to develop quality work in the first place and the means to improve it quickly if needed);

86 http://www.bccampus.ca/

- leveraging a unique aspect of digital assets – the marginal cost and effort of making copies and distributing online learning resources over a network; and
- building the reputation of developers through attribution.

To summarize, there seem to be six main arguments for institutions to be engaged in OER projects. One is the altruistic argument that sharing knowledge is a good thing to do and also in line with academic traditions, as pointed out by the Open Access movement. Openness is the breath of life for education and research. Resources created by educators and researchers should be open for anyone to use and reuse. Ultimately this argument resonates with the Universal Declaration of Human Rights, which states: 'Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages' (United Nations, 1948, Art. 26, para. 1).

A second argument is also close to the claims of the OA movement – namely, that educational institutions should leverage taxpayers' money by allowing free sharing and reuse of resources developed by publicly funded institutions. To lock learning resources behind passwords means that people in other publicly funded institutions sometimes duplicate work and reinvent things instead of standing on the shoulders of their peers. It might be seen as a drawback for this argument that it does not distinguish between taxpayers in different countries: learning resources created in one country may be used in another, sparing taxpayers in the second country some money. But, as pointed out by Ng (2006), free-riding of this kind may not pose so much of a problem since the use of a learning resource in a foreign country does not hinder the use of the same resource by domestic teachers. Instead, 'allowing free-riding may be necessary for the growth of a good community as they help draw new members by words of mouth. Also, free-riders themselves may learn to value the community more over time, so much that some of them may share eventually' (Ng, 2006).

A third argument is taken from the FOSS movement: 'What you give, you receive back improved.' By sharing and reusing, the costs for content development can be cut, thereby making better use of available resources. Also, the overall quality should improve over time, compared to a situation where everyone always has to start from the beginning.

A fourth argument for institutions to be engaged in OER projects is that it is good for public relations and it can function as a show window, attracting new students. Institutions like MIT have received a lot of positive attention for their decision to make their resources available for free. Other

institutions could do the same. Thirty-one per cent of the freshmen at MIT in 2005 became aware of MIT OCW prior to making their decision to apply to MIT; and, of those, 35 per cent indicated that the site was a significant influence on their choice of school (MIT, 2006). Furthermore, Johns Hopkins OCW reports that, during their first year of operation, 32 per cent of visitors indicated their status as prospective students (Phelps, 2006). A variation of this argument is the wish to reach out to new groups, to people without access to, or prior knowledge of, higher education.

A fifth argument is that many institutions face growing competition as a consequence of the increasing globalization of higher education and the rising supply of free educational resources on the internet. In this situation, there is a need to look for new business models, new ways of making revenue, such as offering content for free, both as an advertisement for the institution, and as a way of lowering the threshold for new students, who may be more likely to enrol – and in many cases pay for tutoring and accreditation – having had a taste of the learning on offer through open content.

Finally, a sixth argument is that open sharing will speed up the development of new learning resources, stimulate internal improvement, innovation and reuse, and help the institution to keep good records of materials and their internal and external use. These records can be used as a form of market research if one is interested in the commercial potential of individual resources.

It is hard to say to what extent these incentives function as driving forces behind OER initiatives, other than those mentioned above. More research is needed. It should also be emphasized that several of the motives listed here are likely to be in play simultaneously, both altruistic motives and economic incentives.

3. MOTIVES FOR INDIVIDUALS

So far, the incentives for individual researchers, teachers and instructors to share learning resources are less comprehensively mapped and less well known than the motives for OA publishing or participation in FOSS projects. The motives for individuals to become engaged in OER, however, are probably similarly complex. Building on Fitzgerald et al. (2006), we can make a list of motivating reasons for people to share digital content, similar to that for institutions:

- altruism;
- a desire to sponsor or stimulate innovation;

- a wish to share with others for creative, educational, scientific or research purposes; the pleasure of being involved in peer production;
- creating an open content version of material (e.g. a draft or a chapter) may be a strategy for enhancing a final, commercial version of the content;
- a desire for publicity, 'egoboo' or an enhanced reputation within the open community;
- 'What is junk to one may be gold to another': the offcuts or digital junk of one person may be the building blocks of knowledge and creative genius for another.

This list takes in reasons both from the FOSS and OA movements. As far as we know, no study has yet been published on why people develop and share Open Educational Resources. Findings from the OECD questionnaire to teachers and researchers involved in OER activities suggest that, when presented with a list of potential benefits of using OER, the most commonly reported motive was to gain access to the best possible resources and to have more flexible materials. More altruistic ambitions, such as assisting developing countries, outreach to disadvantaged communities, or bringing down costs for students, seem to be somewhat less important. At the same time, however, the least important factor for respondents was personal financial reward.

When asked about the most significant perceived barriers to colleagues using OER in their teaching, respondents identified lack of time and skills, together with the absence of a reward system. A perceived lack of interest in pedagogical innovation among colleagues was also mentioned. The barriers described correspond with lessons learned from an Australian evaluation of an institutional learning environment, which included a learning resource catalogue (Koppi and Lavitt, 2003). The authors concluded that: 'The issue of reward for publicising teaching and learning materials is of paramount importance to the success of a sustainable learning resource catalogue where the teaching staff themselves take ownership of the system.' To establish a credible academic reward system that includes the production and use of OER might, therefore, be the single most important policy issue for a large-scale deployment of OER in teaching and learning.

REFERENCES

Fitzgerald, B., Fitzgerald, A., Perry, M., Kiel-Chrisholm, S., Driscoll, E., Thampapillai, D. and Coates, J. 2006. *Creating a Legal Framework for Copyright Management of Open Access within the Australian Academic and Research Sector*. Brisbane, Queensland University of Technology (OAK Law Report No. 1.).

Koppi, T. and Lavitt, N. 2003. Institutional use of learning objects three years on: lessons learned and future directions. D. Lassner and C. McNaught (eds), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003.* Chesapeake, Va., Association for the Advancement of Computing in Education, pp. 644–48.

McAndrew, P. 2006. *Motivations for OpenLearn: the Open University's open content initiative.* Paper presented at the CERI Second Closed Expert Meeting on Open Educational Resources, Barcelona, Spain, 26–27 October, 2006.

MIT. 2006. *MIT OpenCourseWare: 2005 program evaluation findings report.* Cambridge, Mass., MIT.

Ng, W.-Y. 2006. Rational sharing and its limits. *First Monday*, Vol. 11, No. 6.

Phelps, M. 2006. *Johns Hopkins University, Bloomberg School of Public Health: a case study of the production of OpenCourseWare.* Paris, OECD.

Stacey, P. 2007. Open Educational Resources in a global context. *First Monday*, Vol. 12, No. 4.

United Nations. 1948. *Universal Declaration of Human Rights*. New York, United Nations. (Adopted and Proclaimed by General Assembly Resolution 217 A [III] of 10 December 1948.)

Vest, C. 2004. Why MIT decided to give away all its course materials via the internet. *The Chronicle of Higher Education*, 30 January, 2004, p. 20.

Chapter 10

DISCUSSION HIGHLIGHTS

Alexa Joyce

The discussion in the second forum was extremely active; and it easily broke the record of the highest number of messages per day, with 62 messages being passed in a single day during the first week. In all, more than 400 messages were exchanged, many of which were long and substantive. This level of engagement was indicative of the importance of, and interest in, the information conveyed and the issues raised by the Centre for Educational Research and Innovation (CERI) study.

Any reporting of such intense activity can convey but the gist of the discussions, and only hint at the energy of the dialogue and contributions of the group. Nonetheless, the discussion highlights capture the main threads of the conversation and include the models for mapping initiatives put forward by the group.

The OER community and those who joined it for the forum were able to contribute to the finalization of the OECD publication, making the format an excellent model for sharing advance findings with an international group.

1. INTRODUCTION

In late 2006, the International Institute for Educational Planning's (IIEP) international Community of Interest on OER was joined by members of the OECD expert group on OER and other interested individuals to discuss the initial findings of OECD-CERI's twenty-month investigation into Open Educational Resource initiatives in tertiary education. The specific aims of the forum were to:

- identify additional OER studies and research activities, as well as projects not included in the original draft of the report;
- obtain feedback on the motivations of institutions and individuals involved in the production of OER;
- understand institutional policies geared to removing barriers to OER production and use;
- identify and classify responses to policy issues by level – from the institutional to the international level.

2. MAPPING OF OER

The background note for the first week's discussion[87] conveyed the range of post-secondary Open Educational Resources now available around the world:

- Over 2,500 open access courses are available from over 200 universities, following the 'open courseware' model popularized by MIT. They include courses from seven institutions in the United States, the 176 members of the China Open Resources for Education consortium, the ten universities participating in the Japanese OCW Consortium and the eleven member universities of the ParisTech OCW project.
- Non course-based OER – from individual learning objects to open access textbooks and journals – are also available through an ever-growing number of online communities, portals and repositories. Notable large-scale examples include Wikipedia, Math World, Rice University Connexions, Textbook Revolution, MERLOT and ARIADNE.
- Organizations are seeking to translate English-language resources (which, at the moment, account for most of the worldwide corpus of OER) into other languages, including Spanish, Portuguese, Chinese and Thai.

Participants were invited to add to the list of initiatives identified by the OECD study.[88] This exercise highlighted the different understandings among participants of what constitutes an Open Educational Resource. For example, some of the initiatives identified could not be accepted as truly 'open' by some in the group. The following characteristics attracted the most frequent criticism:

- *Preconditions to access*: Some projects require users to fulfil certain requirements to access the materials, such as membership of a specific organization or residency of a particular region or country.
- *Restrictive licensing*: Some so-called open materials are legally restrictive in terms of adaptation, reuse and redistribution. They may be released

87 See Chapter 8, pp. 127-134.

88 All of the links to OER initiatives and research shared during the forum can be found in the weekly discussion logs, which can be accessed at http://oerwiki.iiep-unesco.org/index.php?title=OER:_Findings_from_an_OECD_study.

under normal copyright, for example, or be licensed under Creative Commons with the 'no derivatives' restriction.

- *Closed media formats*: There is widespread use of file formats based on proprietary, closed standards which cannot be easily edited or reused elsewhere.

One limitation of the OECD's list was the over-representation of English-language resources due, in part, to the online survey and discussion of findings being organized in English. It was suggested that future work in this area should focus on resources in other languages in order to reach out to a wider community.

In addition to providing examples of OER projects, the background note put forward a simple, two-dimensional model for mapping OER initiatives (see Figure 8.1, page 129). The model locates providers along two axes based on the scale of their operation (from small to large) and the style of organization (from bottom-up and community-organized, to top-down and institution-led). Some participants questioned the need for this sort of approach, as the movement is growing and changing so rapidly that any mapping exercise undertaken at this present time must be quickly out of date. Mapping, however, can be useful in that it identifies a variety of approaches to making educational resources openly available. This in turn can provide inspiration for institutions and planners looking to transfer and replicate or adapt methodologies to new contexts.

During the discussion, participants explored two different approaches to mapping OER:

- mapping initiatives,
- mapping individual resources.

Mapping initiatives

Taking the OECD model as their point of departure, participants shared and developed more elaborated models. Peter Bateman shared the African Virtual University (AVU) matrix for mapping the typology of OER projects (shown in Table 10.1). The AVU started by identifying the basic 'elements' of creating and using OER, which they listed down the side of the matrix. They then identified the key pieces of 'scaffolding' needed to support those elements – the headings along the top. This relatively simple structure (which has since been elaborated) enabled the AVU to map who in the OER community was doing what. This information helped the AVU in its own strategic thinking on OER.

Some participants pointed out a number of limitations to the OECD model, in particular noting that there are many other dimensions to consider when dealing with OER projects. Paul Stacey responded by suggesting a five-dimensional model of the key attributes, or structural components, used to define OER: policy, legal, business, technology and academic/socio-cultural (Figure 10.1a). He then elaborated this by identifying the issues that constitute decision-making points for an institution, organization or individual getting involved in OER provision (Figure 10.1b).

Table 10.1. AVU matrix of OER initiatives

	Collaboration	Sensitization	Capacity enhancement	Technological infrastructure	Policy development	Research
Organization	OCW Consortium website	Development Gateway	–	OU OpenLearn portal	–	OECD
Dissemination	SAIDE (Thutong)	Development Gateway	–	Partnership for Higher Education (bandwidth)	Creative Commons (licensing)	IDRC
Utilization	MIT OCW (Africa pilot)	–	USU COSL	UWC (KEWL)	–	OECD
Creation	AVU/OU TESSA project	Hewlett Foundation	COL	OU OpenLearn portal	UWC	–

Notes: SAIDE = South African Institute for Distance Education; IDRC = International Development Research Centre; UWC = University of the Western Cape; USU = Utah State University.
Source: AVU, 2006.

In general, it was agreed that the number and type of elements for mapping OER should be extended. Participants proposed a number of dimensions that should be added to the initial, two-dimensional model, most of which are captured in the OER attributes model above, and which are important descriptors of a project:

- *Scope*: how focused the OER project is in terms of disciplines covered, levels of education catered for and intended audience. For instance, a narrow project might focus only on providing physics materials to support in-class, tertiary-level teaching, whereas a broad project may aim to share teaching and learning materials for a variety of levels and subjects with both educators and students.
- *Authorship*: whether the resources are the product of one content creator working alone, or the result of a collaborative community effort.

Figure 10.1a OER attributes model

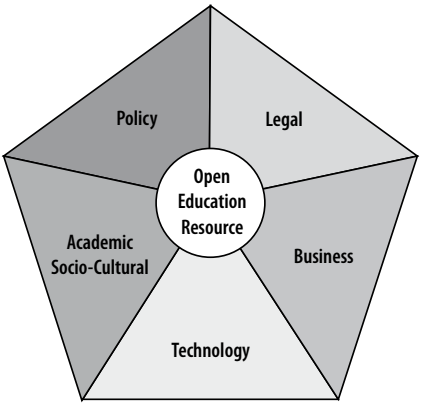
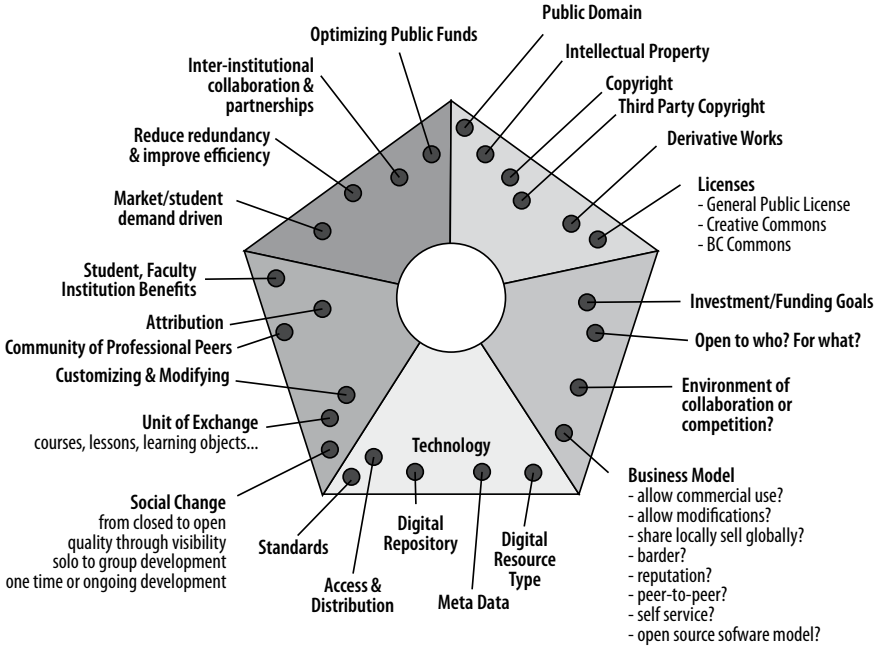


Figure 10.1b OER attributes and decision points



Source: P. Stacey, 2006.

- *Licensing*: there being many licensing options for OER projects, and not all equally free and open. Since the choice of license will affect the degree to which materials can be mixed with other OER or reused in other contexts, it is an important piece of information to capture in any mapping exercise.

- *Granularity*: What is the size of the educational resources produced? The more 'granular' a resource, the smaller the chunk of information it contains. However, this dimension has limitations as a mapping element for OER initiatives, as it is feasible for a project to propose both highly granular content (i.e. learning objects or individual learning assets) but low granularity (i.e. providing a whole course module) at the same time.
- *Teaching duration*: information about the teaching time needed for use of the materials (i.e. from a full course that may take a whole semester or term, at one extreme, to a learning object for use in a single class, at the other).

Mapping individual resources

A number of participants suggested an alternative approach to mapping OER initiatives, focusing on metadata for classifying the individual resources themselves. They proposed that researchers should identify a core set of OER 'attributes' in order to survey OER provision and use. To qualify as OER, it was argued, a resource should have the following characteristics:

- *License*: The license under which an OER is released should mention precisely what is authorized in terms of adaptation and reuse.
- *File format*: OER should be published in a format that everyone can open, copy and paste from, and edit content in, without needing to install proprietary software.
- *Granularity*: To be easily reusable, OER should be released in small chunks, or be easily separable into smaller chunks.
- *Searchability*: OER should be easy to search for and find. This means that resources should be described using standards-compliant metadata, to enable federated searching across a variety of search tools.
- *Efficiency*: OER should be efficient (i.e. well designed and of high quality) for teaching and learning.

Tools and technical aspects

Participants also looked at a number of issues connected to tools for OER production and distribution, and other related technical issues, including:

- tools for customizing the level of access to educational material according to user profiles,
- the relative openness of a variety of file formats,
- the difference between 'programmatically open' and 'educationally open' resources.

A need was expressed for more tools that allow educators to choose how open they make their materials, and to define different degrees of openness for different user groups. For example, both restricted copyright material and OER might be viewable by registered students at a university, while the general public would be able to view only the open parts of the educational materials. It was noted that Moodle (a commonly used open source learning management system) has released a module that allows customization of access according to varying rights.[89]

The issue of file formats also elicited debate, with some participants questioning whether resources in closed, proprietary file formats could really be considered as OER. For instance, some OER are released in non-editable formats, such as protected AAC (Advanced Audio Coding) files used by iTunes. Other participants argued that if closed-format materials were discounted, it would leave very few resources in the pool of existing OER. Furthermore, even non-editable formats can be made open in educational terms: there is a difference between 'programmatically open' and 'educationally open' resources. Editable source files (i.e. programmatically open resources: for example, an editable MP3 file rather than a protected iTunes file) are mainly of importance to programmers and other OER producers (e.g. graphic designers). Educators, on the other hand, primarily need educationally open resources – materials that can be reformatted and reused for teaching and learning. It was pointed out, however, that the extent to which resources can be reused depends on the degree of programmatic openness. For example, changing annotations on an animated diagram in Flash would require access to the original .fla file or the use of specific software to decompile the completed and published .swf file into editable .fla.

In addition to the issue of file formats, OER developers should be sensitive to that of file size. Participants suggested that files should be kept as small as possible so that users with limited bandwidth are not excluded from accessing and downloading materials. If OER producers do opt for rich media formats, they should endeavour to make smaller and lighter alternatives available.

89 See http://www.metasolutions.us/resources/moodle/mods/ocw_metamod.php for more information.

3. MOTIVES FOR OER PRODUCTION

Individuals

Individuals are motivated to make teaching and learning resources available as OER, with varying degrees of self-interest, and for a wide variety of academic, pedagogical, ethical, philosophical and economic reasons. Teachers and researchers questioned in the OECD study indicated that one of their major motivations was 'to gain access to the best possible materials and to have more flexible materials' (Hylén, this volume). Other, less important motivations included outreach to disadvantaged communities or bringing down costs for students.

Participants proposed many reasons for individual production and dissemination of OER, including widening access, keeping students up to date, collaborating with a wider group, showcasing and self-promotion, and a self-driven interest in OER.

Some academics and others producing OER believe that they have an ethical or moral obligation to share their work and knowledge as widely as possible. OER enables them to make their teaching materials available to individuals and institutions that would not otherwise have access. Others may be motivated by the opportunity to reach out specifically to new learners – or by the prospect of continuing to serve former students, since OER enables graduates and other alumni to stay up to date in their fields on a self-study basis, whether for continuing professional development or for their own interest.

Individuals may also be drawn by the improved opportunities for exchange and collaboration with others, whether academics, students or other interested parties, through communal development projects and the sharing of materials. There are also other non-financial benefits for individual academics, such as the chance to make their teaching and expertise known on a wider stage: OER can play a role in the promotion and dissemination of personal achievements and skills.

Finally, participants observed that some individuals produce openly licensed materials primarily for their own work; sharing with others is simply a side effect.

Institutions

The background note identified six key arguments in favour of institutional OER production:

- Sharing knowledge is generally a good thing to do and is in line with the academic tradition of a collegial sharing of information.

- OER better leverages public funding by allowing free sharing and reuse of resources, which in turn minimizes duplication of both effort and results.
- Sharing and reusing resources reduces the cost of content development and production.
- OER is good publicity for institutions. It improves public relations and showcases the teaching on offer, which may in turn attract new students.
- OER may offer a new business model and method for generating revenue, as institutions face growing competition in a global marketplace.
- A policy of open sharing challenges institutions to put their houses in order – to better manage and archive materials, for example – which in turn will stimulate internal improvement, innovation and reuse.

Participants reflected on these and suggested a number of additional reasons for institutions to engage in OER production, based upon providing resources for current students and continuing education for alumni, attracting future students, interacting with a wider public, reducing costs, enhancing quality, encouraging innovation, and addressing moral concerns and legal requirements.

Institutions may be motivated to provide OER primarily for their own audience of prospective, current and former students. Current students can use OER to preview and select modules and courses of study. They can also go back and revise topics as needed. OER also gives alumni the opportunity to continue to access learning resources as their careers – and current thinking in their field of study – change and develop. Finally, OER can be used to attract future students and academics by showcasing the learning experience and approach employed by the institution.

It was suggested that cost reduction was a motivating factor for some institutions as, over time, academics would generate a corpus of appropriate OER for use in teaching and learning, rather than relying heavily on commercially produced content, including textbooks. Costs would be reduced for the institution itself, but also for its students, who would need to purchase less commercial material, which in turn presents another opportunity to generate good publicity.

Looking at the potential benefits from the teaching and learning side, the OER publication process provides an opportunity to assess and improve the quality of individual teaching and learning resources, and the overall course structure. For instance, increased content visibility could make it easier for academic staff to organize different parts of a course as well as entire courses.

Pedagogical benefits may also be accrued by sharing OER with individuals outside institutions, for example, by engaging researchers in

industry or other sectors who can contribute to academic development and thinking, or offer an outsider's view of pedagogical activities. The wider sharing of OER exposes academics and students to new perspectives, and encourages the exchange of new ideas and innovation that may not occur in the more traditional, closed context.

Finally, some participants argued that publicly funded institutions have a moral and ethical obligation to maintain and promote social and academic freedom. OER production should be a natural choice for such institutions. And participants were also reminded that some organizations, especially governmental agencies (e.g. in the United States), are required by law to make their resources openly available.

4. BARRIERS TO OER PRODUCTION

Individuals

The following barriers and obstacles faced by individuals were identified in the background note:

- lack of time and skill;
- a rigid pedagogical culture, with little innovation;
- lack of a reward system for OER production.

Participants elaborated further on these points, focusing specifically on lack of time, lack of incentives, lack of capacity, and fear of loss of control.

The commitments of many academics are already extensive. It can be difficult for them to find time for additional tasks that fall outside their teaching and research obligations, such as producing OER. Furthermore, OER development does not fit into the traditional academic reward system, so there may be little incentive. Academics gain credibility and advance in their careers through publication of research, preferably in prestigious international journals, rather than publication of teaching and learning materials openly on the internet.

Even where there is awareness of and interest in OER, individuals may feel constrained by their own lack of technical capacity. Many academics have not been trained to produce digital course materials and, perhaps more importantly, lack knowledge and capacity with regard to licensing and copyright issues. In many cases, a lack of institutional policy on OER means there is little or no support or guidance. Finally, academics may be concerned that by making their materials openly available, they are relinquishing control over their creations: resources could be taken out of context and misunderstood by users, or others may try to profit from their own hard work.

Institutions

The potential areas of risk for institutions engaging in OER production cover virtually all aspects of their operations: administrative, procedural, financial, contractual/legal, technical, cultural, academic and pedagogical. Participants suggested the following specific barriers to OER production at the institutional level: lack of policy, lack of capacity, lack of financial and human resources, fear of competitors, difficulty of acquiring OER production resources, and the constraints of the academic culture.

Most institutions have yet to develop a clear policy on OER production. Individual academics may become interested in creating OER, but find that their institutions have no guidelines on, for example, legal questions such as what sort of license they should adopt – questions that demand decisions at the institutional level. The lack of policy is in many cases related to a lack of knowledge and capacity among administrators and academics in terms of OER and, with regard to copyright and intellectual property implications, reluctance to address legal issues.

Without an institutional OER policy, there may be little reason to consecrate existing funds to OER production, especially in the current financial climate. Many academic institutions face budget restrictions and an uncertain financial future; few have the financial resources to employ the additional staff needed for an institution-wide OER initiative. Obtaining copyright clearance for third-party content, and eliminating or replacing copyrighted elements, for example, demand a considerable amount of staff time. Time and resources are also needed to develop capacity among teaching staff, so that they are more aware of copyright restrictions when developing course material. Related to this, institutions face difficulties in acquiring OER production resources, resulting in slow or inefficient production processes. Some existing open source systems, for example, may be too dependent on specific workflows to be appropriate for institutional adoption.

Another considerable disincentive – in a climate of increased competition and reduced funding – is the fear that another institution could take openly available materials and use them to gain a competitive advantage, especially if commercial use and use by private for-profit institutions is allowed.

Finally, it was argued that the prevailing culture in higher education places the responsibility for innovation in the hands of academics, rather than students who may have stronger incentives to experiment with, and to advance, teaching and learning methods.

Legal and licensing issues

Legal issues were raised and discussed throughout the three-week forum and, as indicated above, were seen as a major barrier to OER production for both individuals and institutions. In addition to the issues outlined elsewhere in the chapter, a number of observations were made relating to the particular challenges of understanding law in cyberspace and the implications of choosing different open licenses.

It was asserted that the legal situation in many countries and regions is unclear, and that this lack of clarity is a major barrier to use of web-based materials. The onus is on the user to understand what is or is not permitted under a particular license or copyright notice. Users may have some familiarity with the rules of their own country. However, in cyberspace, international and national law, legal principles and ethical values come together to form an intricate and confusing web. Principles such as 'fair use', for example, do not mean the same thing (or even exist) in all countries. Clear and accessible international overviews are hard to find, with the result that fear of contravening the law may inhibit the production and use of OER.

Even open publishing enthusiasts may be hindered by the relative lack of clarity. Many content developers do not fully understand the legal implications of the license they have chosen. For example, the Creative Commons 'non-commercial' option generated a great deal of debate. For many academics and institutions, a restriction on commercial use of their materials is a very important right to retain. Yet, to many open content proponents it represents an unacceptable restriction on the sharing of knowledge through the considerable limitations it places on adaptation and reuse. Materials carrying the non-commercial restriction cannot be remixed with materials with truly open licenses, for example. There is a clear need for a more focused debate on these issues, and IIEP agreed to organize a subsequent forum on the topic.[90]

Access issues

Lack of access, whether for technical, cultural or capacity-development reasons, was also highlighted repeatedly as a significant barrier to participation in the OER movement, especially in developing countries. In the discussion, it was

90 This forum will take place in 2008 in the context of the UNESCO Education Sector-supported continuation to the IIEP work (Editor).

noted that the World Wide Web Consortium's Web Accessibility Initiative (WAI) is not geared towards the particular access issues connected with OER. The WAI focuses specifically on developing 'strategies, guidelines, and resources to help make the web accessible to people with disabilities' (WAI, 2007), rather than seeking to address the problems associated with access in developing countries. It was argued that similar standards should be developed to maximize access to OER in developing countries. However, others pointed out that locally created OER, which builds on local knowledge and approaches, may be more relevant for developing countries than OER produced in more developed countries. Promoting the creation of original OER might be an area to be explored further by UNESCO and OECD in the future.

5. POLICY ISSUES

Susan D'Antoni proposed a grid with a draft classification of policy issues – and the levels at which responses could be developed – to focus and structure the discussion in the final week. The grid (Table 10.2), which was modified slightly during the discussion, was used to capture the policy issues identified by participants.

Some general points were also discussed, touching on policy development processes, partnerships and the wider context of OER policy. All highlight the importance of looking beyond the institution.

It was suggested that OER policy development should involve wide consultation with many stakeholders, to ensure that bottom-up initiatives, which are pervasive in OER production, are brought into the mainstream. In addition, any policy finally implemented should be regularly reviewed and updated to ensure that it remains relevant to the current situation. It should also be framed within the context of improving teaching and learning, rather than as 'change for change's sake'.

Participants argued that working in partnership is essential for the effective uptake and dissemination of OER. An open approach across organizations will lower technical barriers and encourage collaboration. It is particularly important to facilitate participation in developing countries and among organizations with limited internal capacity.

Finally, although most of the discussion focused on actions at the institutional and individual levels, it was stressed that governments have a key role to play in ensuring that materials are open and accessible to all. And as international organizations, OECD and UNESCO should engage in ongoing leadership and monitoring of the nascent OER movement.

6. CONCLUSIONS

Although OER is still a relatively new phenomenon, numerous projects are being established throughout the world. The OECD-CERI study focused principally on OECD countries and on institutional initiatives. The total number and range of OER projects worldwide is likely to be much higher. Both are difficult to gauge, however, owing to the differing definitions of OER. Nonetheless, participants proposed and refined two effective models for mapping OER projects and individual resources, which may be used in future mapping exercises. In addition, the group found that there are many issues relating to OER that are still in need of further study and development, in particular those relating to defining educational resources, copyright and licensing, and tools and accessibility.

Both incentives and barriers to OER production and use are numerous. These were considered in terms of individual and institutional perspectives, and those discussed during the forum are summarized in Table 10.3.

Participants called for OECD and UNESCO to further explore and champion the OER movement. In particular, they suggested that an ongoing monitoring project should be implemented, ensuring that a wider sample of OER projects is included, and paying particular attention to the non-English-speaking world. Another fruitful avenue would be to further develop the work on OER policy. One approach could be to identify examples of institutional, regional and national OER policy development and introduction, and to investigate their effectiveness with the aim of describing 'best practices' for policy- and decision-makers.

In conclusion, it should be noted that the engagement of the expanded OER community in a discussion of a major study proved to be an effective means of sharing preliminary research findings on an important emerging development in higher education. The community of over 600 individuals from almost 100 countries worldwide made a valuable contribution to the finalization of the OECD report[91] by providing information on OER initiatives and offering new perspectives on issues of critical importance.

91 Entitled *Giving Knowledge for Free: the emergence of Open Educational Resources*, the report was released in mid-2007 and is available to order or download from the OECD Online Bookshop (http://www.oecdbookshop.org/oecd/display.asp?SF1=DI&CID=&LANG=EN&ST1=5L4S6TNG3F9X) (Editor).

Table 10.2. Policy issues by level

Issues \ Level	Institutional	Local	Provincial/state	National	International
Promotion/ awareness	- Target traditionally neglected groups - Offer training for academics - Open OER collections to general public	- Offer training for academics - Exchange knowledge and approaches between local institutions	- Encourage/oblige publicly funded institutions to produce some teaching content as OER	- Encourage/oblige publicly funded institutions to produce some teaching content as OER - Include sessions on OER in statutory training for educators - Promote rigorous academic open access (OA) journals	- Promote OER to policy-makers and academics via studies and research
Faculty support/ recognition	- Credit academics for OER production - Encourage use of teaching profiles in OER format	- Organize local competitions to reward excellent OER	- Encourage use of teaching profiles in OER format - Organize regional competitions to reward excellent OER	- Encourage use of teaching profiles in OER format - Organize national competitions to reward excellent OER	- Encourage national authorities to support academics producing OER
Localization/ adaptation/ translation	- Offer training for academics	- Offer training for academics	- Stimulate and facilitate exchange and adaptation of OER between institutions	- Stimulate and facilitate exchange and adaptation of OER between institutions	- Stimulate OER exchange between countries - Offer funding for localization, etc., particularly for developing countries
Copyright/ intellectual property (IP)	- Create/revise institutional policy/ guidelines on copyright and IP	- Set up suitable IP regime - Coordinate work on copyright and interoperability	- Create/revise and disseminate copyright and IP policy/guidelines - Coordinate work on copyright and interoperability	- Create/revise and disseminate national copyright and IP policy/guidelines	- Promote debate on copyright and IP - Facilitate international agreements on copyright and IP
Quality assurance	- Devise quality criteria for academics - Validate OER according to criteria	- Promote quality criteria among academics - Offer guidance to institutions on devising quality criteria	- Encourage uptake of a national quality standard for OER - Offer guidance to institutions on devising quality criteria	- Stimulate research on quality in OER - Develop national OER quality standards - Promote rigorous OA journals	- Stimulate research on quality in OER - Determine commonalities between national quality approaches to enable identification of equivalent quality materials
Technology/ infrastructure	- Ensure easy access, particularly for underserved groups - Offer technical support to academics		- Coordinate access opportunities	- Provide local access opportunities - Develop national technical infrastructure	- Encourage international agreement on interoperability - Lobby governments to invest in infrastructure
Standards	- Develop clear and simple guidelines for OER production	- Develop clear guidelines for OER production - Sponsor institutional work on standards	- Monitor institutions for compliance with national standards	- Set national OER standards	- Set international OER standards
Financial support/ sustainability	- Research OER production and business models	- Research OER production and business models - Public–Private Partnerships (PPPs)	- Research OER production and business models - PPPs	- Fund training for academics and policy-makers - Make provision for OER in R&D budget - Use and encourage PPPs	- Fund training for academics and policy-makers - Make provision for OER in R&D budget - Use and encourage PPPs

Table 10.3. Incentives for, and barriers to, OER production

OER incentives	OER barriers
Individual	*Individual*
• Gaining access to good-quality, flexible materials, and enabling exchange with colleagues • Reducing costs for students • Keeping students/alumni up to date on a self-study basis • Outreach to disadvantaged groups • Collaborating with a wider group • Showcasing and promotion of work • Ethical/moral duty	• Lack of time – heavy teaching schedules • Lack of innovation in pedagogy • Lack of capacity and knowledge, leading to fear of loss of control • Lack of reward system and incentives • Little management or peer support • Lack of appropriate tools
Institutional	*Institutional*
• Cost reduction, leverage of public funds • Experimenting with new business models • Creating alternatives to commercial materials • Encouraging innovation • Quality enhancement and diversity • Public relations/showcasing • Attracting future students • Continuous education of alumni/students • Ethical/moral duty	• No clear OER policy • Lack of capacity and financial resources • Fear of competitors and loss of competitive advantage • Difficulty in acquiring/implementing OER production • Constraints of academic culture • Constraints of existing production tools

REFERENCES

WAI. 2007. About WAI – links to documents. http://www.w3.org/WAI/about-links.html (Accessed 12 February 2007.)

Section 4.

Priorities for action

At the end of the first forum in 2005, participants were asked to specify the three most important issues for promoting and enabling the OER movement. The responses formed the basis of an eventual classification of fourteen priorities. As the two-year UNESCO-IIEP project drew to a close in mid-2007, members of the community were invited to consider the list and to select and rank the five most important issues for advancing the OER movement, as well as the stakeholders who should be engaged.

This exercise provided a moment of reflection for a group whose members had been actively or passively engaged in a series of interactions over a period of more than a year and a half. More than half responded. Given the size and geographic representation of the community, its consensus on key priorities is important input to the Open Educational Resources movement – to inform future thinking, planning and action.

Chapter 11

OPEN EDUCATIONAL RESOURCES: THE WAY FORWARD

Susan D'Antoni

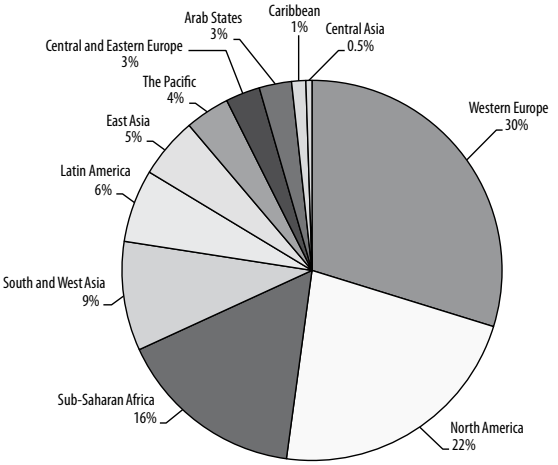
1. INTRODUCTION

After a period of intense discussion on OER, it could be expected that the community would have formed an opinion on which constitute the priority issues for advancing the OER movement, and on which stakeholders should take the lead.

It should be remembered that, at the time of the survey, the community united a large number of individuals from a wide range of organizations, as well as different geographic regions: over 620 members, representing 98 UNESCO Member States, of which 67 were developing countries (Figure 11.1). Although geographic representation in the community was not perfect, roughly half of the members were from developing countries – an important balance as the community reflected upon an initiative that seeks to equalize access to knowledge worldwide.

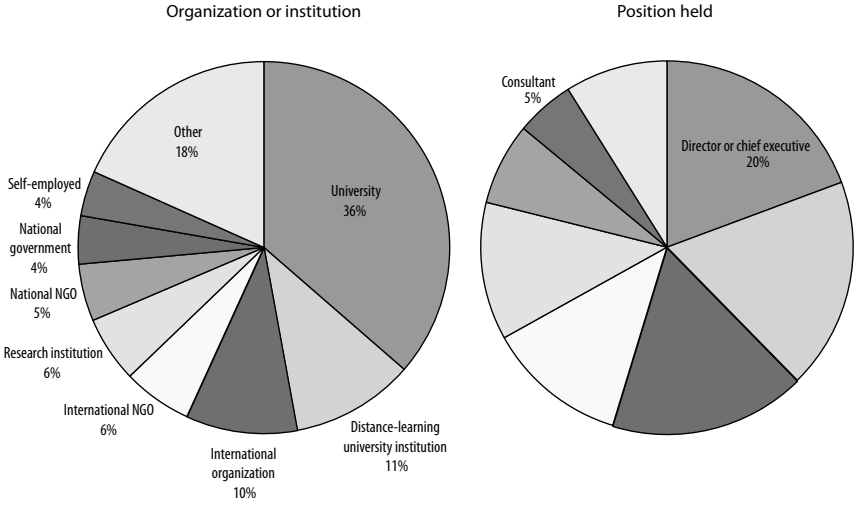
More than 50 per cent of the community members took the time to reflect on the list of issues and to specify their own priorities. The respondents mirror almost exactly the geographic representation of the full community. They represent a fairly wide range of organizations, although over half come

Figure 11.1. OER community members by region



from universities and distance learning institutions. Many hold high-level positions in their organizations, either as head or senior official or manager. Teachers, researchers and project officers also constitute an important number (Figure 11.2). This profile means that this collective priority-setting exercise largely reflects the perspective of the educator and the institution.

Figure 11.2. Occupational profile of respondents



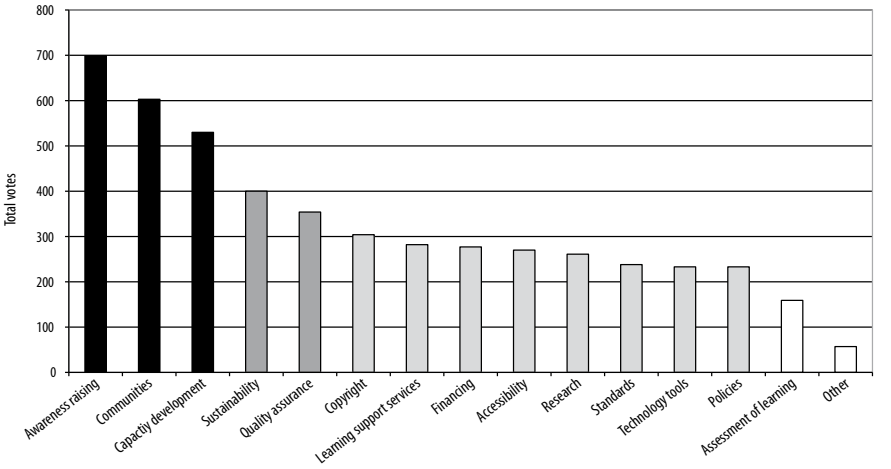
2. THE PRIORITY ISSUES

The five most important issues[92] stand out clearly, with a sixth that deserves attention (Figure 11.3).

Awareness raising and promotion and *communities and networking* emerged as the main priorities for promoting the advancement of the OER movement. Third-ranked *capacity development* is essential to enabling creation and reuse of OER, while the fourth issue, *sustainability*, points to the importance of ensuring that OER initiatives find their way into existing and new approaches to extending flexible learning opportunities and knowledge sharing. The flagging of *quality assurance* raises a concern, one that reflects the broader issue of accessing information on the web. Without the control processes of the publishing industry and the selection process of the library or resource centre, users may be on their own in determining the quality of a resource. The very

92 Weighted by priority assigned by respondent – that is, an issue ranked as first priority was weighted 5, second priority as 4, third as 3, fourth as 2 and fifth as 1.

Figure 11.3. Priority issues in rank order



openness of access to OER means that the traditional structures of education systems which support and protect the learner may be absent.

The sixth issue, *copyright and licensing*, is of growing concern. Resources intended for release as OER, but which contain copyrighted material, pose a problem. Either copyright clearance must be obtained, or the material must be replaced or eliminated. Furthermore, the license assigned to educational resources determines the degree to which they may be openly and freely used. Alternate open licenses have been developed (such as those from Creative Commons), and their use is growing. Developers and users would benefit from guidance to help them better understand the implications of the license they select for their materials or that has been applied to the materials they wish to use.

Priorities of developed and developing country respondents

Since different countries have different situations and face different challenges in considering creation and reuse or adaptation of OER, the information collected was broken down in several ways. First, developed and developing countries were separated,[93] which revealed differences in priorities, as can be seen in Table 11.1.

While *awareness raising* remains the highest priority for both groups, issues such as *sustainability*, *accessibility* and *copyright*, for example, are ranked

93 See UNESCO Institute for Statistics (2006) for developed and developing countr classifications.

Table 11.1. Priority issues for developed and developing country respondents

Developed countries	Developing countries
1. Awareness raising and promotion	1. Awareness raising and promotion
2. Communities and networking	2. Capacity development
3. Sustainability	3. Communities and networking
4. Quality assurance	4. Technology tools
5. Copyright and licensing	5. Learning support services
6. Capacity development	5. Research
7. Accessibility	7. Policies
8. Financing	8. Quality assurance
9. Standards	9. Financing
10. Learning support services	10. Sustainability
11. Research	11. Accessibility
12. Policies	12. Copyright and licensing
13. Technology tools	13. Standards
14. Assessment of learning	14. Assessment of learning

quite differently. Some of the differences might be explained by current levels of creation and availability of OER in developed and developing countries. For instance, *sustainability* – in common with *copyright* and *standards* – becomes a priority when there is a critical mass of OER initiatives. On the other hand, *capacity development*, *technology tools* and *learning support services* are a priority in countries where there is currently a low level of OER development and use. Also identified as of higher priority in developing countries are *research* and *policies*. This may reflect the importance of a supportive environment for OER development in countries with very limited resources. Ensuring that OER development is an appropriate strategy for a particular country – one which suits its needs – might necessitate research; and facilitating such OER development might require an enabling policy framework.

Priorities of different regions

Just as there are differences in priorities between developed and developing countries, there are different ranking patterns among regions (see Appendix 2). Note, however, that these patterns should be taken only as indicative, since the number of respondents from some regions was very small.

While *awareness raising* appears as a high priority for those in all regions, the ranking of *policies* varies quite a bit – from the fourth priority in Latin America and the Caribbean to the lowest priority of respondents from South and West Asia, the Pacific and the Arab States. The diversity in the

ranking of issues underlines the importance of developing regional and local communities and initiatives that will focus on local needs and conditions.

Priorities of respondents involved (or not) in an OER initiative

More than half of the respondents indicated that they were involved in an OER initiative. Overall, their priorities reflect fairly closely those of the whole group of respondents, with the top three issues remaining *awareness raising*, *communities and networking*, and *capacity development*. The ranking for those involved in an OER initiative also supports the supposition that *copyright and licensing*, *sustainability* and *financing* will all move up the agenda of priority issues as OER development and use become more widespread.

Those not involved in an OER activity ranked *capacity development* as a high priority, which points to the need for 'how to' resources for those with no prior experience with OER.

3. THE LEAD STAKEHOLDERS

For each issue ranked as a priority, respondents identified the stakeholders they felt should assume a leadership role. And, just as certain priority issues stood out, so did the lead stakeholders. Four of these were assigned significant roles, with multiple issues to take up in advancing the OER movement (see Appendix 3 for details).

Higher education institutions

Given the topic under discussion, and the profile of respondents, one could have predicted that higher education institutions would be chosen as the lead organization for OER. And it was the university's primary functions – *research* and *supporting learning* – that were cited most frequently. Yet, *awareness raising* and *capacity development* were also seen as priorities. More surprisingly, two issues that relate to the creation of OER – *copyright* and *financing* – and which demand a decision at the institutional level, were not considered to be of priority to higher education institutions. It should be noted, however, that, throughout the discussions, participants stressed the need for expert legal guidance on copyright. As for the low ranking of *financing*, it may reflect the fact that, currently, most OER initiatives are donor-financed.

International organizations

International organizations were also judged to have an important role. *Copyright*, *financing* and *standards* join *awareness raising* as the issues

that should be addressed by international bodies. Standard setting is a function often undertaken at the international level. However, financing OER is a less obvious role for international organizations, and its being cited underlines the importance of the discussion of sustainable models for OER.

National governments

National governments were seen as the most important stakeholder for *policy support* for OER, and for ensuring *accessibility*, which is often promoted through education policy on the one hand, and through investments on technology and infrastructure on the other. Along with international organizations, national governments were identified as the stakeholder best placed to take up the challenges of *copyright* and *financing* of OER.

Academics

Academics were identified as the stakeholder group that should take responsibility for those issues related to their various roles and functions in the educational institution: namely, *research*, *learning assessment*, *quality assurance* and *learning support*.

Other stakeholders

The remaining stakeholders were assigned leadership in those issues most clearly related to their missions and functions. For example, grant-making organizations and higher education funding bodies could take up the challenge of *funding* initiatives, while regulatory bodies could take responsibility for *quality assurance* of OER.

Finally, it should be noted that an important role for stakeholders was identified: that of championing OER. Clearly, any or all of the stakeholders could decide to champion OER (as has the Hewlett Foundation). What is important is that effective champions continue to step forward for OER. For, every movement, in order to succeed, must have its champions; and this is particularly so at the beginning.

4. THE WAY FORWARD

Through its deliberation on the key issues and the lead stakeholders, the international community on OER has sketched out a way forward for the movement, as well as for its own actions.

Advancing the movement

First priority: Awareness raising

If OER is to contribute to increasing access to knowledge worldwide, it is crucial that actors – from policy- and decision-makers at all levels, to teachers and academics – be made aware of its potential, so that they will be able to make informed decisions on if, and how, it can be used in their local situation. Raising awareness of OER and its attendant issues has been the primary goal of the UNESCO-IIEP community, and it is clear that continuing and concerted awareness-raising actions must be a priority.

> *Awareness raising at the international level among UNESCO Member States will continue. However, this action must also be complemented by awareness raising actions at other levels. A strategy is needed, as well as useful resources for activities such as workshops.*

Second priority: Communities and networking

The strength of the OER community and the continuing adherence of its members underline the importance of this type of international forum for discussion and information sharing. Building and supporting such a community is congruent with the main functions of UNESCO: as a laboratory of ideas and a clearinghouse, a standard setter, a capacity builder in Member States, and a catalyst for international cooperation. Nonetheless, an international community functions under certain constraints, such as operating in one language and necessarily focusing on topics of general concern. Both awareness-raising and capacity-development action would be strengthened by decentralized activities complementary to those of the international community.

> *Regional, linguistic and topic-specific communities will complement and extend the initial activities of the international OER community. UNESCO will promote the development of a loose network of regional, linguistic or topic nodes that can support appropriate regional or local action, while maintaining contact at the international level through the community on OER.*

Enabling creation and use

Third priority: Developing capacity

Individuals and institutions interested in creating or adapting and reusing OER need support to help them develop their capacity to do so. One of the interactions of the community focused on the elaboration of a 'Do-It-

Yourself/Do-It-Together' resource that would serve this function.[94] Such a resource was seen as particularly important to promote OER creation and use in developing countries.

> *A Do-It-Yourself/Do-It-Together resource should be developed to enable active engagement in the OER movement.*

Fourth priority: Quality assurance

If the OER movement is to take hold widely, the resources must be – and be seen to be – of high quality. When information is taken from web sites worldwide, the user often lacks a frame of reference for determining the quality of the information being accessed. The OER movement would benefit from an exploration of current international quality-assurance mechanisms and general guidelines and, potentially, from linking with existing quality-assurance agencies.

> *UNESCO could establish a connection with the lead agencies for quality assurance in education on behalf of the members of the international community on OER, and promote the development of guidelines for OER quality assurance.*

Removing barriers

Fifth priority: Sustainability

If the OER movement is to flourish, approaches and models are needed that will ensure the viability of OER initiatives. Currently, the majority of OER development is undertaken on a project basis, and often with donor support. If it is to be sustainable, OER must be integrated into the policies and procedures – as well as the regular budgets – of organizations.

> *The discussion that has already begun to identify and consider all the options for sustainability must continue. Models must be articulated, tested and evaluated, and the lessons learned shared widely.*

Sixth priority: Copyright and licensing

Copyright and licensing is an issue that permeates the discussion and debate on creation and reuse of OER. It is an issue with important implications for both creators and users, and for their institutions. It might be expected to move up the agenda of key issues as more and more OER development takes place.

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94 See Chapter 6, pp. 97-104 for more information.

Copyright and its implications for OER need to be explored by the OER community, and the situation clarified for the institution, the creator and the user. UNESCO will hold a discussion on the topic, with input from a panel of experts.

5. A FINAL WORD OF A PERSONAL NATURE

Being involved in the coming together and consolidation of such a large and vibrant community has been a pleasure and a privilege for me. The OER community has a very special character: its composition, as well as the nature and shape of its exchanges, give it a character every bit as distinct as that of a colleague or a friend. This community is wonderful in its thoroughly energetic thought and action, as colleagues can be – and it is cherished in the way that friends can be.

The internet and the web offer opportunities for interaction with tremendous potential for an organization such as UNESCO, with its mandate for advice and action worldwide. International meetings, workshops and consultations are all means by which the Organization carries out its work in collaboration with Member States, but their capacity to include all those interested in the topic or activity at hand is necessarily limited. What liberty we now have to reach further and faster with the aid of the internet! True, the tool is not yet perfect for the purpose – there are many who cannot connect, but their numbers are diminishing, as are the costs associated with technology and connectivity. Over the period that the OER community has been in existence, we have been able to link far more people and institutions than would have been feasible through other means. And we have been helped in doing so by the Hewlett Foundation, with its vision of promoting equal access to knowledge worldwide.

This community came together with a bang (500 individuals joined at the beginning), and its collective energy has never flagged – a testimony to the power of such international interaction in cyberspace. I feel privileged to accompany it.

REFERENCES

UNESCO Institute for Statistics. 2006. *Global Education Digest 2006: comparing education statistics across the world.* Montreal, Quebec, UNESCO Institute for Statistics.

APPENDICES

Appendix 1. Classification of priority issues for advancing the OER movement

Advancing the OER movement	
Awareness raising and promotion	Increasing awareness of OER through all appropriate channels and among all stakeholders, and explaining its potential and benefits.
Communities and networking	Linking individuals and organizations in Communities of Interest or Practice, for the exchange of information or collaborative development of resources.
Research	Investigation and Inquiry into OER. Any new development deserves investigation so that it is better understood.
Enabling creation and reuse of OER	
Policies	New approaches may demand new policies to support the creation and reuse of OER, and those who are implicated, such as teachers and learners.
Standards	An agreed set of criteria, some of which may be mandatory. For example, standards for licensing and metadata are needed to ensure interoperability of OER.
Technology tools	Software tools to facilitate the development, access and sharing of OER.
Quality assurance	The systematic review of OER to ensure that acceptable standards of education, scholarship and infrastructure are being maintained.
Capacity development	Increasing the capability of individuals, institutions and organizations to create and use OER.
Enabling learning with OER	
Learning support services	Online services, including forums and communities, to support and enhance learning with OER.
Assessment of learning	The process of evaluating knowledge, skills and competencies gained through learning with OER.
Removing barriers to OER	
Accessibility	The degree to which people can access and use information and communication technologies (ICTs) and, through them, access OER.
Copyright and licensing	The barriers to creating and reusing OER constituted by copyright (which grants the exclusive right for a certain term of years to an author to print, publish and sell copies of the original work).
Financing	Securing financial resources for OER initiatives.
Sustainability	Designing and applying models that ensure the ongoing viability of OER initiatives.

Appendix 2. Issues ranked by order of priority: regional breakdown

	Western Europe *No. of respondents = 97*
1	Awareness raising
2	Communities
3	Sustainability
4	Copyright
5	Quality assurance
6	Accessibility
7	Learning support services
8	Capacity development
8	Financing
10	Standards
11	Policies
12	Technology tools
13	Research
14	Assessment of learning
15	Other

	North America *No. of respondents = 72*
1	Communities
2	Awareness raising
3	Sustainability
4	Capacity development
5	Quality assurance
6	Financing
7	Copyright
8	Research
9	Standards
10	Accessibility
11	Learning support services
12	Technology tools
12	Assessment of learning
14	Policies
15	Other

	Sub-Saharan Africa *No. of respondents = 54*
1	Awareness raising
2	Capacity development
3	Communities
4	Research
5	Policies
6	Financing
7	Accessibility
8	Learning support services
9	Technology tools
10	Sustainability
11	Quality assurance
12	Standards
13	Other
14	Copyright
15	Assessment of learning

	Latin America & Caribbean *No. of respondents = 28*
1	Capacity development
1	Communities
3	Awareness raising
4	Policies
5	Research
6	Quality assurance
7	Financing
8	Sustainability
8	Learning support services
8	Assessment of learning
11	Technology tools
11	Standards
13	Copyright
14	Accessibility

	South & West Asia *No. of respondents = 27*
1	Capacity development
2	Awareness raising
3	Learning support services
4	Communities
4	Technology tools
4	Accessibility
7	Quality assurance
8	Research
9	Sustainability
10	Assessment of learning
10	Financing
12	Copyright
13	Standards
14	Policies

	East Asia *No. of respondents = 15*
1	Awareness raising
2	Copyright
3	Sustainability
4	Communities
5	Quality assurance
5	Capacity development
7	Policies
8	Learning support services
9	Accessibility
10	Technology tools
10	Financing
12	Standards
13	Assessment of learning
14	Research
15	Other

	The Pacific *No. of respondents = 14*
1	Awareness raising
2	Capacity development
3	Quality assurance
4	Communities
5	Copyright
5	Sustainability
7	Accessibility
8	Research
8	Standards
10	Financing
11	Technology tools
12	Learning support services
13	Assessment of learning
14	Policies

	Central & Eastern Europe *No. of respondents = 10*
1	Awareness raising
2	Communities
3	Research
4	Standards
5	Policies
5	Quality assurance
7	Capacity development
8	Sustainability
9	Learning support services
9	Accessibility
9	Financing
12	Copyright
13	Technology tools
13	Assessment of learning

	Arab States *No. of respondents = 8*
1	Technology tools
2	Awareness raising
3	Capacity development
4	Communities
5	Quality assurance
5	Standards
5	Learning support services
8	Research
8	Financing
10	Accessibility
11	Assessment of learning
12	Sustainability
13	Policies

Note: Issues in shaded boxes were identified as priorities by more than half of the respondents in the region.

Appendix 3. Priority issues for stakeholders

Stakeholder	Priority issues	% of respondents
Higher education institutions	1 Research	81
	2 Learning support services	74
	3 Awareness raising and promotion	71
	4 Assessment of learning	70
	5 Capacity development	69
	6 Quality assurance	66
	7 Sustainability	60
	7 Policies	60
	9 Standards	57
	10 Accessibility	55
	11 Communities and networking	54
	12 Copyright	51
International organizations	1 Awareness raising and promotion	75
	2 Copyright	69
	3 Financing	66
	3 Standards	66
	5 Communities and networking	60
	6 Capacity development	58
	7 Policies	54
	8 Sustainability	51
	9 Research	50
National government	1 Policies	87
	2 Copyright	68
	3 Financing	66
	4 Awareness raising	61
	5 Accessibility	56
	6 Sustainability	55
	7 Capacity development	50
Academics	1 Research	71
	2 Assessment of learning	66
	3 Quality assurance	59
	4 Learning support services	53
	4 Communities and networking	53
	6 Awareness raising and promotion	52
OER associations	1 Communities and networking	66
	2 Awareness raising and promotion	61
	3 Standards	60
Professional and academic organizations	1 Assessment of learning	56
	2 Awareness raising and promotion	55
	3 Communities and networking	54
Technology companies	– Technology tools	73
Foundations or other grant-making organizations	– Financing	71
Higher education funding bodies	– Financing	56
Regional or local government	– Policies	54
Publishing and media companies	– Copyright	52
Regulatory and accreditation bodies	– Quality assurance	51
Non-governmental organizations	– Awareness raising	51

Note: The order of the issues in the table relates to the number of times that the stakeholder was selected for each issue: only issues assigned to a stakeholder by more than half of the respondents are shown. The percentages are indicative of the degree of consensus that a certain issue should be taken up by a certain stakeholder.