UNESCO Publishing

United Nations
Educational, Scientific and
Cultural Organization

OPEN EDUCATIONAL RESOURCES

CONVERSATIONS IN CYBERSPACE

Edited by SUSAN D'ANTONI
and CATRIONA SAVAGE

Education on the Move series

Open Educational Resources
Conversations in cyberspace

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

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.