Giving Knowledge for Free

THE EMERGENCE OF OPEN EDUCATIONAL RESOURCES

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Foreword

The development of the information society and the widespread diffusion of information technology give rise to new opportunities for learning. At the same time, they challenge established views and practices regarding how teaching and learning should be organised and carried out. Higher educational institutions have been using the Internet and other digital technologies to develop and distribute education for several years. Yet, until recently, much of the learning materials were locked up behind passwords within proprietary systems, unreachable for outsiders. The open educational resource (OER) movement aims to break down such barriers and to encourage and enable freely sharing content.

The OECD Centre for Educational Research and Innovation (CERI) has already addressed a number of issues regarding e-learning in higher education, publishing reports on *E-learning: The Partnership Challenge* (OECD, 2001) and *E-learning in Tertiary Education – Where do we Stand?* (OECD, 2005). The second of these reports concluded that e-learning is becoming increasingly prominent in tertiary education. All available evidence points to growing enrolments and provision, although from a low starting point. E-learning activities across tertiary education institutions are very diverse, from trivial online presence to programmes offered fully online. Modules accounted for the majority of e-learning activities, reflecting the dominant characteristic of e-learning as supplementary to on-campus delivery at undergraduate level. Learning objects were said to be viewed as a promising way forward as they can potentially cut costs and revolutionise pedagogy. Some of these issues are further analysed in this report which addresses four main questions:

- How can sustainable cost/benefit models for OER initiatives be developed?
- What are the intellectual property rights issues linked to OER initiatives?
- What are the incentives and barriers for universities and faculty staff to deliver their materials to OER initiatives?

- How can access and usefulness for the users of OER initiatives be improved?

The report is addressed to managers of higher education institutions as well as strategists and decision makers on international, national and intermediate level. Although it only covers higher education, most of the issues raised are also of relevance for the school sector and adult education. Further investigation into use and production of OER in schools and the implications for the school sector would be of utmost interest.

The project was led by Jan Hylén who is also the main author of the report. Francesc Pedró and Tom Schuller were closely involved in the design and execution of the project, and Ashley Allen-Sinclair in its administration.

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Director for Education

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Executive Summary

An apparently extraordinary trend is emerging. Although learning resources are often considered as key intellectual property in a competitive higher education world, more and more institutions and individuals are sharing digital learning resources over the Internet openly and without cost, as open educational resources (OER). This study, which builds on previous OECD work on e-learning, asks why this is happening, who is involved and what the most important implications are.

Higher education is facing a number of challenges: globalisation, an aging society, growing competition between higher educational institutions both nationally and internationally, and rapid technological development. OER is itself one of these challenges, but may also be a sound strategy for individual institutions to meet them. The trend towards sharing software programmes (open source software) and research outcomes (open access publishing) is already so strong that it is generally thought of as a movement. It is now complemented by the trend towards sharing learning resources – the open educational resources movement.

The report's title, *Giving Knowledge for Free*, reveals the potential implications of the OER movement. OER is not only a fascinating technological development and potentially a major educational tool. It accelerates the blurring of formal and informal learning, and of educational and broader cultural activities. It raises basic philosophical issues to do with the nature of ownership, with the validation of knowledge and with concepts such as altruism and collective goods. It reaches into issues of property and its distribution across the globe. It offers the prospect of a radically new approach to the sharing of knowledge, at a time when effective use of knowledge is seen more and more as the key to economic success, for both individuals and nations. How paradoxical this may turn out to be, and the form it will eventually take are entirely unforeseeable. The report offers some preliminary handles for understanding the issues raised.

OER projects can expand access to learning for everyone, but most of all for non-traditional groups of students, and thus widen participation in higher education. They can be an efficient way of promoting lifelong

learning, both for individuals and for government, and can bridge the gap between non-formal, informal and formal learning.

What are open educational resources?

The definition of OER currently most often used is "digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research". OER includes learning content, software tools to develop, use and distribute content, and implementation resources such as open licences. This report suggests that "open educational resources" refers to accumulated digital assets that can be adjusted and which provide benefits without restricting the possibilities for others to enjoy them.

Who is using and producing OER and how much?

The learning content at issue is open courseware, *i.e.* educational material organised as courses and typically distributed as PDF files, as well as smaller chunks of learning, often referred to as learning objects. The content may involve websites, simulations, text files, images, sound or videos in digital format, some only for use and others open also for adaptation and reuse. Although no definite statistics are available, there is a rapid expansion in the number of OER projects, as well as the number of people involved and the number of resources available. In January 2007 the OECD identified over 3 000 open courseware courses available from over 300 universities worldwide. In repositories such as MERLOT, Connexions, OpenLearn and others, there are hundreds of thousands of pieces of content or materials representing thousands of freely available learning hours. Although the dominant language so far is English, translation of resources combined with a growing number of non-English OER projects cater for greater language diversity and increased global use. The potential number of users is enormous.

With the scattered data available, only a general picture can be given of the users and producers of OER. The majority of producers of resources and OER projects are located in English-speaking countries in the developed world. The movement grows both top-down and bottom-up: new projects are started at institutional level and individual teachers and researchers also use and produce OER on their own initiative. The institutions involved so far seem to be well-reputed internationally or in their countries, rather than institutions that are unknown or have low status.

Why are people sharing for free?

The reasons for individuals and institutions to use, produce and share OER can be divided into basic technological, economic, social and legal drivers.

- The technological and economic drivers include improved, less costly and more user-friendly information technology infrastructure (such as broadband), hardware and software. Content is cheaper and easier to produce and costs can be further reduced by sharing. New economic models are emerging around the distribution of free content. Legal drivers are new licensing schemes that facilitate free sharing and reuse of content. Social drivers include increased willingness to share.
- A technical barrier is lack of broadband availability. Lack of resources to invest in hardware and software for developing and sharing OER is an economic barrier. Barriers such as these are often mentioned as significant obstacles in developing countries. Social barriers include lack of skills to use the technical innovations and cultural obstacles against sharing or using resources developed by other teachers or institutions.

There are three arguments for governments to support OER projects.

- They expand access to learning for everyone but most of all for non-traditional groups of students and thus widen participation in higher education.
- They can be an efficient way of promoting lifelong learning for both the individual and the government.
- They can bridge the gap between non-formal, informal and formal learning.

Institutions mention six types of reasons for being involved in OER projects.

- The altruistic argument that sharing knowledge is in line with academic traditions and a good thing to do.
- Educational institutions (particularly those publicly financed) should leverage taxpayers' money by allowing free sharing and reuse of resources.
- Quality can be improved and the cost of content development reduced by sharing and reusing.

- It is good for the institution's public relations to have an OER project as a showcase for attracting new students.
- There is a need to look for new cost recovery models as institutions experience growing competition.
- Open sharing will speed up the development of new learning resources, stimulate internal improvement, innovation and reuse and help the institution to keep good records of materials and their internal and external use.

A further motivation, mentioned by some major distance teaching institutions, is the risk of doing nothing in a rapidly changing environment.

Incentives for individual teachers and researchers can be summarised under four headings.

- The altruistic motivation of sharing (as for institutions), which again is supported by traditional academic values.
- Personal non-monetary gain, such as publicity, reputation within the open community or "egoboo" as it is sometimes called.
- Free sharing can be good for economic or commercial reasons, as a way of getting publicity, reaching the market more quickly, gaining the first-mover advantage, etc.
- Sometimes it is not worth the effort to keep the resource closed. If it can be of value to other people one might just as well share it for free.

Independently of whether institutions are engaged in OER projects or not, OER can be expected to affect curriculum, pedagogy and assessment. With thousands of (opencourseware) courses from internationally reputed higher education institutions available for free, teachers will need to consider that students compare their curriculum with others. Since the teacher's role as supplier of reading lists and teaching materials is diminishing, OER is likely to accelerate changes in the traditional teaching role and the evolution of more independent learners. An increase in non-formal and informal learning can be expected to enhance the demand for assessment and recognition of competences gained outside formal learning settings.

Copyright and open licences

Copyright law takes its definition from international conventions and is similar in most countries. Copyright primarily serves an economic function by granting creators monopoly rights in their creations for a limited time.

While information technology makes it possible to multiply and distribute content worldwide and almost at no cost, legal restrictions on the reuse of copyright material hamper its negotiability in the digital environment. Frustrated by this obstacle, academics worldwide have started to use open licences to create a space in the Internet world – a creative commons – where people can share and reuse copyright material without fear of being sued. To do this, copyright owners have to agree or give permission for their material to be shared through a generic licence that gives permission in advance. The Creative Commons licence is by far the best-known licence for such content, the use of which is growing exponentially.

How can OER projects be sustained in the long run?

The actual costs of an OER project vary considerably. Some initiatives have institutional backing involving professional staff, others build on communities of practitioners and rely on their voluntary work. There are all sorts of in-between models as well. Repositories can be organised as a place to share and exchange resources, which means that people are either users or producers, or they can promote the collaborative production of common resources. The first model is called the *user-producer* model and the second the *co-production* model, although again there are intermediate positions. The first model is more likely to be centralised than the latter. Although real costs can be met with resources other than money, most initiatives need to raise some capital. To this end a number of models for cost recovery are identified in the report: the *replacement* model, in which open content replaces other uses and benefits from cost savings; the foundation, donation or *endowment* model in which funding for the project is provided by an external actor; the *segmentation* model, in which the provider offers "value-added" services to user segments and charges them for these services; the *conversion* model, in which "you give something away for free and then convert the consumer to a paying customer"; as well as the voluntary support model or *membership* model, which is based on fund-raising campaigns or paying members.

Improving access to and usefulness of OER

Advocates of the open movement should consider actions for improving access to and usefulness of existing resources. The rapidly growing number of learning materials and repositories makes it important to find the most relevant and highest quality resources. *Metadata* (descriptive information about the resources) may improve the function of search

engines, but adding good quality metadata to resources is difficult and time-consuming. Alternative approaches such as automatically generated metadata and folksonomies are being tested, but whether these are scaleable solutions remains to be seen. *Quality* can be improved in many ways.

There is a troublesome imbalance between the *provision* of OER and its *utilisation*. The vast majority of OER is in English and based on Western culture, and this limits their relevance and risks consigning less developed countries to playing the role of consumers. However, a number of projects now exist in developing countries to develop OER based on their own languages and cultures.

Since the concept of OER builds on the idea of reusing and repurposing materials, *interoperability* is a key issue. Learning resources need to be searchable across repositories and possible to download, integrate and adapt across platforms. Software applications developed at different points in time and by different developers should be able to operate together. Open standards makes this possible. The development of new standards is a specialised task which requires financial support.

Policy implications and recommendations

The OER movement has implications at many policy levels. *Interoperability* issues, such as harmonisation of copyright legislation and agreements on standards, are dealt with at the international level. A good *knowledge base* regarding the OER movement needs to be developed internationally, with *awareness raising* activities to make the concept of OER better known. Funding bodies on all levels are recommended to support these activities.

At a national level OER represents a further *blurring of the borders* between formal and informal learning, and countries are recommended to study how OER can be efficiently used to meet some of the demand for increased lifelong learning. OER can make an important contribution to a diversified supply of learning resources. A plethora of digital learning resources supports methodological diversity, which again is a pre-requisite for promoting individualisation of the learning process. Governments are advised to take a *holistic approach* towards digital learning resources, of which OER is but one part.

A *review of the existing copyright regime* in order to promote further use of information technology in education should consider actions to create at least a neutral policy regarding commercial actors and OER. Governments willing to promote OER should earmark a small proportion of

funds made available for education for openly publishing education materials developed within publicly funded institutions, as well as open up national digital archives and museum collections to the education sector.

Public-private partnerships should be used more as a way to combine know-how and resources from both sectors. Wherever possible and reasonable *open standards* should be used and *open source software licensing* employed.

The rapid pace of development of the OER movement means that it will soon have an impact on all higher education institutions. This calls for management of institutions to consider *the risk of doing nothing*. Higher education institutions are advised to have an *information technology strategy* which includes, among other things, how the institution should deal with the opportunities and threats posed by the OER movement. Institutions willing to embrace the opportunities offered by OER should create *incentives* for faculty members to participate in the initiative, such as implementing teaching portfolios with at least one OER element, as part of the tenure process. The use of OER in teaching should also be encouraged and training offered.

Chapter 1

Setting the Scene

This chapter describes four challenges for higher education: globalisation, demographic changes, changing governance and technology. It discusses how open educational resources relate to these challenges. It presents the methodology used and reviews earlier writings on open educational resources.

Although learning resources are often considered key intellectual property in a competitive higher education world, more and more institutions and individuals are sharing their digital learning resources over the Internet openly and at no cost, as open educational resources (OER). This study asks why this is happening, who is involved and what the most important implications are.

Challenges for higher education

A number of challenges facing higher education institutions in the OECD area help to show why this development is taking place. The OECD project on the future of higher education analyses recent changes and key trends in order to inform government decision makers and other key stakeholders in higher education and facilitate strategic change (*www.oecd.org/edu/universityfutures*). According to the project, four forces for change stand out in terms of their impact on higher education in the coming decades: globalisation, demography, new approaches to governance and technology.

Globalisation

The globalisation of the world's economies is leading to increased permeability of national educational boundaries as well as greater emphasis on the internationalisation of curricula. The internationalisation of higher education seems to be a double-edged phenomenon, inducing growing collaboration and growing competition among countries and among institutional providers. The OECD's *Education Policy Analysis* (2006a) reports that cross-border higher education has grown significantly over the past decades and this is expected to continue. Between 1998 and 2004, the number of foreign students in the OECD area rose by 70% to 2.3 million. This growth has been driven by several interlinked forces: greater mobility of skilled workers in an increasingly knowledge-based economy; the drive to develop export industries and expand international collaboration in higher education; the need to build a more educated workforce in sending countries, where study options may be limited; the desire of students and academics to have international experience and promote mutual understanding; and the decline in the cost of transport and communications.

According to *Education Policy Analysis*, this growth has, in turn, fuelled greater competition for students and academics between countries and higher education institutions. At the same time, domestic higher education

systems increasingly face international pressures and competition, under voluntary harmonisation agendas (*e.g.* the Bologna Process in Europe, which has led to similar initiatives at a smaller scale in Latin America and Asia); under the pressures of international comparison, manifested by quality labels, ranking efforts and consumer choice; or owing to the increasing frequency of partnerships and recognition agreements. Like the older established research universities, higher education institutions of all types increasingly see themselves not simply in terms of their domestic role or agenda but as actors in a global market.

Through greater collaboration between higher educational institutions around the world and enhanced reuse of learning materials, both in their original form or translated or otherwise adapted, the phenomenon of OER contributes to the globalisation of higher education. At the same time it increases competition between institutions by making teaching content and processes within individual institutions visible to a potentially worldwide audience. Prospective students can be better informed not only by studying the general offer from institutions but also by viewing the curriculum and learning materials, and sometimes videotaped lectures, of individual departments.

Demography

As OECD societies age, and in some cases shrink, countries are becoming increasingly concerned about the impact of demographic factors on higher education. Reductions in the traditional 18-to-25-year-old student age group will affect institutions in a number of OECD countries. This decline may be offset by increased participation rates, the flow of foreign students (numbers of young people are rising in many non-OECD countries where demand for education is not fully satisfied) and by the increasing tendency of older adults to enter or return to education and the provision of programmes for them. With few exceptions, higher education systems have been slow to adjust to the needs of lifelong learners for shorter courses, more flexible delivery, recognition of prior learning and tailor-made programmes. Longer working lives with more career changes, and the possible growing enrolment of retired people in higher education, might indeed be a transformative force in the medium run.

Most countries need to increase participation in higher education, but higher education institutions generally have not so far been able to meet this challenge. OER initiatives might serve higher educational institutions as vehicles for outreach to non-traditional groups of students, widening participation in higher education, and provide learning opportunities for those unable to use more traditional offerings or who are not part of the

traditional groups of higher education entrants. Such initiatives can bridge the gap between non-formal, informal and formal learning. At the same time OER can be used by professionals for in-service training and home study by older people, opening new lifelong learning strategies as a means of tackling the challenges of aging societies.

Changing governance

Education Policy Analysis (OECD, 2006a) also reports new approaches to governance which combine in new ways the authority of the state and the power of markets in many OECD countries. There is strong demand for better public management. Accountability, transparency, efficiency and effectiveness, responsiveness and forward vision are now considered the principal components of good public governance, which higher education institutions are being and will increasingly be asked to implement. In this respect institution-based OER initiatives can be said to cater for improved quality control through enhanced transparency and comparability between institutions, departments or individual faculty members as well as direct feedback from both enrolled and informal learners.

Furthermore, it is said that the shift towards more autonomy and entrepreneurship is widespread, and institutions with very different profiles are increasingly able to compete with one another both within countries and across borders. These developments are set in a context of debate about national budget priorities; the efficiency of resource use; the organisation of higher education and private provision of higher education; and how costs should be shared among different groups in society (taxpayers, students and families, companies). Institutions are increasingly freer to develop their own strategies and determine their own priorities. Governments and other policy makers have to combine the encouragement of efficiency and excellence with the promotion of equity. In this context, wider circulation, sharing and reuse of learning resources and tools developed by public funding – which can ensure a better return on investment of taxpayers' money – should be of interest both to policy makers and representatives of institutions and funding bodies.

Technology and e-learning in higher education

The continuous development of information and communications technologies (ICT) is one of the drivers of the knowledge economy. Technology continues to gain ground in higher education and has already enhanced the on-campus student experience, through student portals, Internet access, digital libraries, and the availability of laptops, handhelds and other portable devices. E-learning is becoming part of the mainstream of

educational programmes. Digital technologies have also dramatically changed academic research, thanks to the rapid acceleration of computer and network performance, which has allowed researchers to access and manipulate massive data sets, to simulate, model and visualise more complex systems, and to strengthen international communication and collaboration in research. The OECD's *Education Policy Analysis* argues that these technologies have not revolutionised teaching and access to higher education as thoroughly as was predicted by some, and their past influence and future promise now tend to be considered more cautiously. Like other innovations, e-learning may, however, live up to its potential in the future and enable new ways of teaching, learning and interacting. Student expectations will be an important factor. Many of those who will enter higher education in ten years will never have known a time when they did not have access to the Internet for learning and games. In an upcoming project, called New Millennium Learners, the OECD will investigate how the day-to-day use of new technologies affects the ways in which people learn, and how these patterns of learning interact with what goes on in the formal education system.

Another trend, described in OECD (2006b), is the rapid growth of creative participation in developing digital content, driven by rapidly diffusing broadband access and new software tools. This is a new feature of society and the economy. Through the Internet, users participate and interact more and more to communicate and express themselves. This evolution, which uses the Internet's inherent capabilities more extensively, is best known as participative web (or Web 2.0). It posits an Internet increasingly influenced by intelligent web services based on new technologies which empower the user to contribute to developing, rating, collaborating and distributing Internet content and to develop and customise Internet applications. The rise of user-created content, or the so-called rise of the amateur creator, is a central pillar of the participative web and comprises various media and creative works (written, audio, visual and combined) created by Internet and technology users (including content from wireless devices such as photos). The OER phenomenon can be seen as the emergence of creative participation in the development of digital content in the education sector.

As noted, e-learning in higher education has not so far lived up to the expectations of the dot-com boom. However, although there are no coherent statistics on the use of e-learning in higher education in the OECD area, it seems clear that online education is growing and increasingly prominent. OECD (2005) showed that universities are gradually increasing their provision of e-learning and more students are signing up. The "e-learning" concept covers a wide range of systems, from students using e-mail and

accessing course work online while following a course on campus to programmes offered entirely online. The four categories are: web-supplemented courses, web-dependent courses, mixed mode courses and fully online courses. The study concluded that student take-up of e-learning is growing, but at most campus-based institutions, whole programmes at the web-dependent and fully online end of the scale account for well under 5% of total enrolments. It furthermore concluded that in most campus-based institutions the growth of e-learning has not altered the fact that face-to-face classroom teaching remains central.

A brighter picture of where e-learning in higher education stands at the moment is given in a report from the Sloan Consortium (2006) which for the fourth consecutive year reports a steady rise in the numbers of online students and offers in the United States, which refers to courses for which at least 80% of the course is delivered online. The number of students has grown from 1.6 million taking at least one online course at US degree-granting institutions in 2002 to 3.2 million in 2005, that is, almost 17% of all US higher education students. Over 58% of the more than 2 200 colleges and universities that responded to the survey say that online education is critical to the long-term strategy of their institution. But e-learning is not only growing in quantity, quality also seems to be improving. A majority of academic leaders (62%) believe that online learning is as good as or better than face-to-face. The share believing it is superior to face-to-face instruction has grown from 12% in 2003 to almost 17%. Fewer than 8% believe online learning is inferior in terms of learning outcomes.

Even if the Sloan study reports significant growth in more or less fully online courses, the blended mode of teaching is likely to be most common. A study based on an online survey in 2003 of college instructors and administrators – members of MERLOT mostly in the United States and two similar organisations – shows high expectations of growth in blended learning, with online components whose quality is as good or better than face-to-face teaching (Kim and Bonk, 2006). Together with the OECD e-learning report, this study predicts that reusable content objects will have a significant impact in the near future. Although they touch upon the risk of looking on learning from a content-driven perspective, the authors conclude that "these findings seem to reflect the perceived importance of online technologies for sharing and using pre-existing content".

Summing up, technological developments both open up new avenues and pose financial, technical and qualitative challenges to higher education. The role of e-learning is growing, in terms both of courses offered fully on line or as blended learning and of quality of students' learning outcomes, which seem to be as good, or even better, than in face-to-face teaching. When the International Council for Open and Distance Education (ICDE)

launched its Global Open Educational Resources Task Force in November 2006, it was said that: "One of the main driving forces for efficient and quality e-learning in the future is likely to be OER, which is a tremendous opportunity for everyone to share, use, and reuse the world's knowledge." (ICDE, 2006)

Earlier writings on OER

A literature review of earlier studies on OER could either take its starting point from the rather recent birth of the term "open educational resources" and be short, or comprise all its different components such as opencourseware, learning objects, open source software and open licences. The latter approach would be beyond the scope of this report. A minimalist approach to earlier studies on the OER movement includes only a few items. Johnstone and Poulin (2002) gives an early overview of what OER is, exemplified by the Massachusetts Institute of Technology (MIT) initiative. They describe some of MIT's background motives, how it has solved copyright issues as well as some of the technological challenges for spreading OER worldwide. Moore (2002) is among the first to make a distinction between open source development tools and open source courseware (the content). Looking at implications for higher educational institutions, she argues that not every institution needs to sponsor an open source project. Some may be better off participating as reviewers and occasional contributors. Quoting Werry (2001), she notes that the primary obstacles in developing an open source movement are organisation, co-ordination, political will and funding, not lack of expertise or overall financial resources or skill. Keats (2003) builds on lessons learned from open source software development and describes a process model for collaborative development of content. Keats believes this model could be a way to unlock the potential for African universities. Siemens (2003) lists a number of reasons for educators to share learning resources for free, including: it does not cost anything to share digital resources; it gives educators alternatives and increases competition on the market; it is democratic and a way to preserve public education.

These are examples of early articles describing the early stages of exchanging learning resources among educators, in the same way as programmers exchange software programmes, Materu (2004) is probably the first comprehensive report on what is later called OER. He concludes that open source courseware, as he calls it, has generated interest in all parts of the world with the United States in the lead. Although the concept has yet to have measurable effects on learning in institutions of higher education, there are indications that open source courseware is viewed as a valuable

opportunity by institutions in developing countries. However, Materu reports that their participation is constrained by lack of the resources needed to develop and adapt courseware to suit their specific environments.

In 2004 articles and papers on repositories of OER appeared. Hart and Albrecht (2004) examine the world of online repositories and referatories (websites hosting links to resources, but not the resources themselves) and explore their impact on faculty, students, IT support and institutional policies and procedures. They present examples of repository and referatory sites; demonstrate what these sites offer; discuss the potential impacts of resources on faculty and students; and consider the benefits, challenges and opportunities of these resources for institutions and information technology staff. In 2005 the UNESCO International Institute for Educational Planning (IIEP) launched a discussion forum on OER and issued background notes such as Johnstone (2005) which provides an overview of the OER movement at that point in time, with examples of existing initiatives. Looking forward she says that the OER movement will require many creative people willing to contribute and to use the resources. It can be seen to represent a grand, but achievable undertaking to share intellectual capital. In a second background note, four major OER initiatives are described, together with lessons learned and challenges ahead. The projects are the MIT OpenCourseWare (OCW) project, Rice University's Connexions, Carnegie Mellon University's Open Learning Initiative, and the Center for Open and Sustainable Learning at Utah State University.

A different source of information is evaluation reports from individual projects. Starting in March 2004 MIT has published annual comprehensive evaluation reports on the MIT OCW website (Carson, 2004, 2005, 2006a). These are the only such reports so far, and for the sake of building a good knowledge base for the OER movement one can hope that other projects will publish similar studies. Of interest also are the conference proceedings from the Open Education Conference at Utah State University in 2005 and 2006 which provide the reader with a glance at a number of OER initiatives and the issues they are struggling with (USU, 2005, 2006). Finally, in March 2006 UNESCO IIEP started a wiki on useful OER resources with, among other things, background reading on OER, which is continuously updated with the help of the public.

Methodology

This study has been carried out with an analytical and an empirical strand. In the first strand sustainability issues and cost/benefit models, together with questions on intellectual property rights, incentives and barriers to using and producing OER, as well as accessibility issues are

examined. Several papers commissioned from experts are available on the project website (*www.oecd.org/edu/oer*). These issues also were the main focus of two expert meetings. The meetings, small in size and by invitation only, were carried out as workshops that built heavily on background notes prepared by the experts, also available on the project website.

A three-week Internet discussion forum was organised by the UNESCO IIEP and the OECD to share the initial findings of the study, and to provide an opportunity to deliberate on the report in the international community. Through the forum, participants had the opportunity to preview some of the findings and conclusions of the report, to comment on them and to contribute to the final version. Desk research to locate previous studies in the field forms the third element of the analytical strand of the project.

The empirical element of the project consists of two parts: a web-based questionnaire and a series of case studies from higher education institutions (see Table 1.1). The case studies were carried out both by CERI staff and by external experts. They were done on the basis of a set of guidelines developed by the OECD Secretariat. A selection of the reports is available on the project website. The purpose of the site visits was to complement the questionnaire, which was sent to institutions and individual faculty members, by gaining deeper insight into how and why institutions engage in the use, production and sharing of OER. The institutions were selected for visits on the basis of criteria such as actual use and production of OER, although this was sometimes rather insignificant, and the experts' knowledge of and familiarity with the specific circumstances in his or her country. Institutional policies and practices regarding use, production and sharing of OER, including policies on intellectual property rights, were of primary interest during the visits. In all, 21 institutions in 11 countries were visited during 2006.

Two questionnaires were used in the project: one targeted individual teachers and researchers and the other was aimed at institutions involved in OER activities. The survey of individual teachers and researchers was carried out as a web-based questionnaire (see Annex A). A request to promote the questionnaire was sent out to a number of newsletters, blogs and websites involved in different ways in the OER movement. The promotion message was distributed in English and (in some cases) in French but the questionnaire itself was only available in English. The questionnaire was open for entries for six months in 2006. In all 247 entries were received but there were some blanks. Generally 180-190 answers were received to each question. A paper analysing all results of the questionnaire can be found on the project website.

Table 1.1. Institutions participating in the OECD case studies

Country	Institution	Expert(s) carrying out the visit
Australia	AEShareNet	Brian Fitzgerald and Nic Suzor, Queensland University of Technology
	Macquarie University	Brian Fitzgerald and Nic Suzor, Queensland University of Technology
Canada	Athabasca University	Walter Steward, Walter Steward & Associates
	Télé-Université	Judy Roberts, Walter Steward & Associates
Denmark	Aalborg University	Knud Erik Hilding-Hamann, Danish Technological Institute
France	ParisTech	Jan Hylén, OECD
Greece	Crete University	Katerina Kikis–Papadakis
Japan	The Japan OCW Consortium with visits to the following institutions: University of Tokyo, Keio University, Kyoto University, Osaka University, Waseda University, and Tokyo Institute of Technology	Toshio Kobayashi and Akemi Kawafuchi, NIME
Mexico	Autonomous University of Guadalajara	Francisco Benavides, OECD
	Instituto Tecnológico de Monterrey	Francesc Pedró, OECD
Sweden	Stockholm Institute of Education	Jan Hylén, OECD
Spain	The region of Extremadura	Francesc Pedró, OECD
	The Spanish National University of Distance Teaching (UNED)	Francesc Pedró, OECD
United Kingdom	Open University	Tom Schuller, OECD
United States	John Hopkins University's Bloomberg School of Public Health	Marianne Phelps
	Tufts University	Marianne Phelps

Source: OECD.

Although every second university in the OECD area (1 846 in all) was contacted by e-mail for the questionnaire to institutions, the response rate was so low that the results were not usable. This was probably due to imperfections in the e-mail addresses, a lack of language competence – the message was sent in English, French and Spanish – and the likelihood that OER activities are still largely grass-roots activities among individual

teachers and research groups in which the management level of the university is not involved.

When the answers from the institutions are checked against answers from the individual teachers and researchers they are similar. To the extent that any conclusions at all can be drawn from the answers from institutions, they seem not to be very different from those given by individuals using and producing OER.

Chapter 2

Open Educational Resources – Conceptual Issues

This chapter explores the concept of open educational resources and asks the question: how should "open", "educational" and "resources" be understood? It suggests that the term "open educational resources" refers to accumulated digital assets which can be adjusted and provide benefits without restricting the possibilities for others to enjoy them.

As information technologies have become more readily available, those involved in education have found that a vast number of digital resources are available from many sources. Many teachers are using the Internet in their courses and thus the amount of course content available in digital format is growing. Yet, until recently, much of this material was locked up behind passwords within proprietary systems. The OER movement aims to break down such barriers and to encourage and enable sharing content freely.

As described by Wiley (2006a), the term "learning object" was coined in 1994 by Wayne Hodgins and quickly entered the vernacular of educators and instructional designers. In terms of the history of OER, learning objects popularised the idea that digital materials can be designed and produced so that they can be easily reused in a variety of pedagogical situations. (For an overview of the relevant literature, see Wiley, 2006c.) The image of Lego bricks or atoms is sometimes used to describe how learning objects can be used and reused in different contexts. Wiley (1998) invented the expression "open content" which caught the attention of Internet users and popularised the idea that the principles of the open source software movement could be productively applied to content. Wiley also created the first widely adopted open licence for content (the Open Publication Licence).

Defining open educational resources

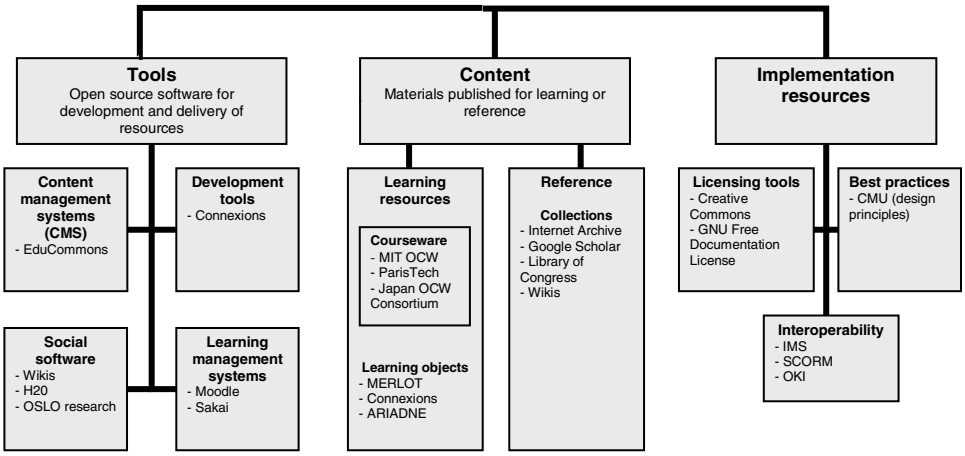
The term open educational resources first came into use at a conference hosted by UNESCO in 2002, defined as "the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes" (Johnstone, 2005). The definition of OER now most often used is: "open educational resources are digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research". To clarify further, OER is said to include:

- *Learning content*: Full courses, courseware, content modules, learning objects, collections and journals.
- *Tools*: Software to support the development, use, reuse and delivery of learning content, including searching and organisation of content, content and learning management systems, content development tools, and online learning communities.

- *Implementation resources*: Intellectual property licences to promote open publishing of materials, design principles of best practice and localise content.

A closer look at the definition shows that the concept of "open educational resources" is both broad and vague. A wide variety of objects and online materials can be classified as educational resources, from courses and course components, to museum collections, to open access journals and reference works. Over time the term has come to cover not only content, but also learning and content management software and content development tools, and standards and licensing tools for publishing digital resources, which allow users to adapt resources in accordance with their cultural, curricular and pedagogical requirements. Figure 2.1 illustrates the different elements of OER.

Figure 2.1. Open educational resources: a conceptual map



Source: Margulies, 2005.

The definition of "open educational resources" needs further refinement. To this end, the OECD Secretariat commissioned a paper from Ilkka Tuomi, on which this chapter draws. The paper is available on the project website (*www.oecd.org/edu/oer*).

Openness

"Open" has become somewhat of a buzz word which currently has positive associations for most people. According to Materu (2004), the present decade can be called the o-decade (open source, open systems, open standards, open archives, open everything) just as the 1990s were called the e-decade. The two most important aspects of openness have to do with free availability over the Internet and as few restrictions as possible on the use of the resource, whether technical, legal or price barriers. Several suggestions have been made as to how "open" should be interpreted in relation to OER. Walker defines it as "convenient, effective, affordable, and sustainable and available to every learner and teacher worldwide" and D'Antoni speaks of "The 4 A's – accessible, appropriate, accredited, affordable" (Daniel, 2006). Downes (2006) argues that "the concept of 'open' entails, it seems, at a minimum, no cost to the consumer or user of the resource" and goes on:

> "It is not clear that resources which require some sort of payment by the user – whether that payment be subscription fees, contribution in kind, or even something simple, such as user registration – ought to be called 'open'. Even when the cost is low – or 'affordable' – the payment represents some sort of opportunity cost on the part of the user, an exchange rather than sharing."

Tuomi (2006) distinguishes three quite independent areas where openness makes a difference. One has to do with *technical characteristics*, one with *social characteristics*, and the third with *the nature of the resource* itself. Openness in the social domain is fundamentally motivated by the expected social benefits and by ethical considerations related to freedom to use, contribute and share. To understand why such freedom is stressed, it is important to recall that from the outset the OER movement has been inspired by the success of open source software projects. Open source software is computer software for which the "source code" is published with a copyright that explicitly allows anyone to copy, modify and redistribute the code and its modifications without paying royalties or fees. In general terms, software is considered free – or "open" – if it is possible to use, contribute to and share the source code.

Openness in the technical domain, in contrast, is characterised by technical interoperability and functionality. Open standards are important since they make it possible for different software applications to operate together. They define interfaces between systems, but leave the specific implementation of system components in a "black box". Interoperability standards allow new system components to be developed in a way that guarantees their capacity to function as elements in the larger system and

also to link proprietary system components together. Industrial actors, therefore, put a great deal of effort into standardisation.

Open source systems, as technical systems, go beyond the "co-existence" of interoperable modules. Although open source systems often rely heavily on existing interoperability standards and well-defined system interfaces, Tuomi (2006) argues that they also enable "deep interoperability". This is because open source developers can "see through" and make modifications across system boundaries. In open source systems, system components are not "black boxes" that hide their internal structure and implementation. Instead, developers can also study the components with which they want to integrate new components. The system elements in open source systems can be characterised as "transparent" or "open" boxes. The open source model, therefore, leads to a developmental dynamic that is different from the traditional one. Openness in technical interfaces leads to additive growth, where new components can be added to a larger system without major effort. The open source approach, in contrast, can lead to accumulation that produces compound growth.

To conclude, *technical* constraints, such as lack of interoperability and unavailability of technical specifications (Tuomi, 2006) can limit openness. Another example is learning resources that can be used but are located behind passwords in learning management systems and not available to external users.

Constraints can also be *social*. They may be institutional or economic; for example, copyright can limit access to resources as can the price of access. Ethical standards relating to research and study can also limit access, for example for privacy reasons. Social constraints form a complex system with conflicting tensions, where, for example, money can buy more access and political power can be used to change institutional constraints.

In the social domain, different levels of openness can be distinguished. The most fundamental kind of openness involves access and accessibility. Accessibility can depend on individual capabilities; for example, course content may be freely available in a language the user does not understand, or the user may have a disability that precludes using the content. The Web Accessibility Initiative led by the World Wide Web Consortium is an initiative aimed at broadening access to the Internet for those with disabilities and the elderly (see Chapter 7). A practical criterion for this kind of openness is the existence of a non-discriminatory opportunity to reach, explore and study the resource, an important aspect of which is availability without cost to the user. This includes both direct costs for the resource itself as well as indirect costs such as licensing fees for the software needed to read or use the resource. In practical terms, this means that the resource

should be published in a format everyone can open without having to buy proprietary software.

Another instance of socially constrained openness is related to geography. While the vast majority of learning resources are globally available, the right to use a resource is limited in some instances to a specific geographical area, such as a country or a region. One example is the BCcampus project in British Columbia, Canada, which has developed a version of the Creative Commons licence, called the BC Commons, to make learning resources openly available in the province. Obviously, geographical restrictions cannot be too limited if a resource is to be considered open, but it is difficult to draw a sharp line. The argument made for BC Commons is that academics may be more willing to participate in the OER movement if they start on a smaller scale (the province) rather than immediately sharing their resources worldwide. If this is true, there is an important trade-off between this type of social (or spatial) openness and the amount of resources available.

As will be explained in more detail in Chapter 5, authors or developers can use licences to specify the kind of use of the resource that is allowed. The Creative Commons licence is the best-known and most often used open licence at present and offers a number of options. The most restrictive version gives users the right to download the resource and share it with others as long as they mention and link back to the author or developer, but not to change the content in any way or use it commercially. Other versions give users more independence. This means that while "open" means "without cost", it does not follow that it also means "without conditions".

Furthermore, according to Tuomi (2006) a higher level of openness is about the right and ability to modify, repackage and add value to the resource. This kind of openness blurs the traditional distinction between the "consumer" and the "producer". The term "user-producer" is sometimes used to highlight this blurring of roles. To adapt or modify a digital resource it needs to be published in a format that makes it possible to copy and paste pieces of text, graphics or any published media. This means that non-editable formats, such as Flash (.swf) and Adobe Portable Document Format (.pdf), do not qualify for a higher level of openness. Examples of more open formats are HTML, ODF, RTF, SVG, PNG and others. However, these formats are more difficult to use and thus exclude people lacking the necessary skills.

The higher level of openness discussed above is similar to a definition of free content available at a wiki called Freedomdefined.org initiated by Mako

Hill and Möller.[1] According to this definition, works that are "free" offer the following freedoms:

- The freedom to study the work and to apply knowledge acquired from it.
- The freedom to redistribute copies, in whole or in part, of the information or expression.
- The freedom to make improvements or other changes, and to release modified copies.

The wiki includes a list of licences that are considered to meet this definition. To be recognised as "free" under this definition a licence must grant the following freedoms:

- *The freedom to study and apply the information*. The licensee must not be restricted by clauses which limit his/her right to examine, alter or apply the information. The licence may not, for example, restrict "reverse engineering", [the process of discovering the technological principles of a device/object or system through analysis of its structure, function and operation], and it may not limit the application of knowledge gained from the work in any way. [This condition is compliant with the most basic level of openness discussed above.]
- *The freedom to redistribute copies*. Copies may be sold, swapped or given away for free, as part of a larger work, a collection or independently. There must be no limit on the amount of information that can be copied. There must also not be any limit on who can copy the information or on where the information can be copied. [This condition goes beyond the openness discussed above since it excludes the use of a licence with a clause prohibiting commercial use of the resource by a third party.]
- *The freedom to distribute modified versions*. In order to give everyone the ability to improve upon a work, the licence must not limit the freedom to distribute a modified version, as above, regardless of the intent and purpose of such modifications. However, some restrictions may be applied to protect these essential freedoms, as well as the requirement of attribution. [Like the previous condition, and for the same reason, this goes beyond openness as defined above.]

To conclude, the Mako Hill and Möller definition of freedom goes beyond all the levels of openness described by Tuomi (2006) and would

1. See *http://freedomdefined.org/Definition*.

view most existing OER as not free. The OECD Secretariat therefore adheres to Tuomi's definition of openness.

Educational

The term "educational" also needs to be clarified. Does it mean that only materials produced for use in formal educational settings should be included? If so, it would exclude resources produced outside schools or universities but used in formal courses, such as newspaper articles, and materials produced in such institutions but used for informal or non-formal learning outside. Downes (2006) argues that it ought not to be an *a priori* stipulation that something may, or may not be, an educational resource since learning extends beyond formal settings and resources used in a non-formal setting may still be instances of OER. To leave the definition open, on the other hand, means that the concept remains ambiguous and vague. One alternative is to say that only materials actually used for teaching and learning should be considered. The advantage is that this avoids making an *a priori* stipulation that something is, or is not, an educational resource. The disadvantage is the difficulty of knowing whether a resource is actually used for learning or not in formal or non-formal learning settings.

The purpose of using OER in education is of course to enhance learning, notably a kind of learning that enables the development of both individual and social capabilities for understanding and acting. It is well established that OER are also used for informal or non-formal learning outside formal educational settings. It is sometimes argued that to acknowledge and strengthen the importance of this role of OER, the term "education" should be replaced by "learning" and a better term would be "open learning resources".

Without wishing to diminish the importance of OER in informal or non-formal learning, the Secretariat has chosen to remain with the existing terminology. The reason is pragmatic: the OER movement is growing very rapidly and it would be unwise to change terminology as more and more people learn about the phenomenon under the name of OER.

Resources

The dictionary definition of "resource" is a stock or supply of materials or assets that can be drawn on in order to function effectively. Digital resources, which can be copied and used without destroying the stock, are non-rival or renewable resources. Tuomi (2006) argues that from a learner's point of view the standard dictionary definition of a resource works well. It is well known from educational and ethnographic studies that learners

mobilise many different types of "assets" for learning. Learners also learn by creatively using resources not intended for learning purposes. A similar view might be taken by teachers, namely that an educational resource is "anything that can be used to organise and support learning experiences".

In the context of computer-aided teaching and learning, resources are often understood as learning content that can be stored in a digital repository as a text, audio or video file. This view might in some cases be problematic, such as when different kinds of social software are used for discussions, co-operation and help and advice as part of the learning process. In such cases it is the flow or the automatically generated service rather than the stock that constitutes the source of learning.

From this simplified description of Tuomi's (2006) discussion, it can be concluded that openness should be looked upon in relation not only to social and technical characteristics but also as an aspect of the resource itself. One way of describing open resources is to define them as resources that produce services that anyone can enjoy, without reducing the enjoyment of others, as is often the case with digital resources. In economic terms, this means that the resources are non-rival or "public goods". It is not simply that such resources are available to anyone despite their use by others; in some cases the resource becomes more valuable as more people use it. This is the case for open source software which is available for free and becomes more valuable as more people use it. The effect is the same as for the telephone, e-mail or other networked services, not all of which are free, a phenomenon described as Metcalf's law.[2] The more people use the service, the more valuable it is to have access to it. These so-called "open fountains of goods" form yet another kind of open resources. Figure 2.2 summarises the different aspects of openness.

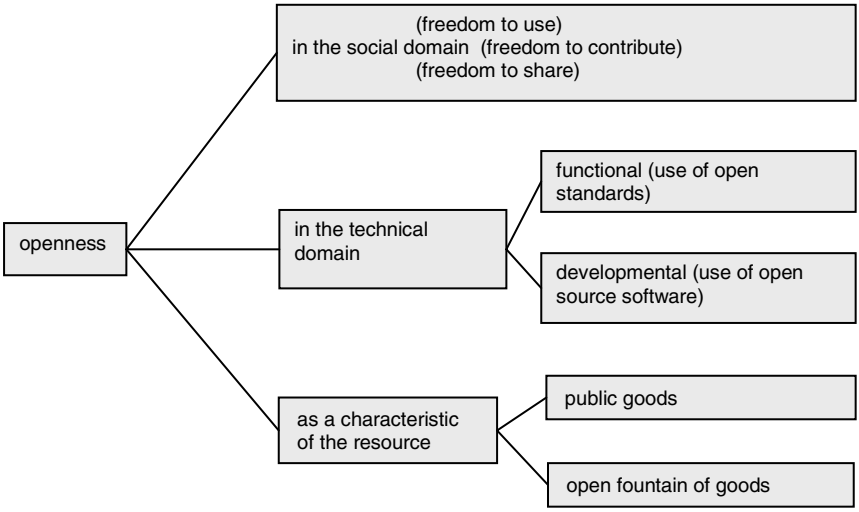
Conclusions

Openness exists in many different forms and domains. The different levels introduced above should be seen as descriptive and not normative, since many initiatives only offer the most basic level of openness but are still important. To sum up it is argued here that "open resources":

- Are sources of services that do not diminish their ability to produce services when enjoyed.
- Provide non-discriminatory access to the resource.
- Can be adjusted, amended and shared.

2. See *http://en.wikipedia.org/wiki/Metcalfe%27s_Law*.

Figure 2.2. Aspects of openness



Source: Author.

Furthermore, Tuomi (2006) argues that there is a need to specify the conditions under which contributions can be made and that these should adhere to the five principles of "communalism", "universality", "disinterestedness", "originality" and "scepticism" developed by Robert Merton in 1942 and often summarised by the acronym CUDOS. But since the reasons and needs of people to share and reuse resources may be very varied ("what is junk to one may be gold to another", see Chapter 4), this condition seems to be superfluous.

It is now possible to offer the following clarification of the definition of OER as "digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research". Such resources are *accumulated assets that can be enjoyed without restricting the possibilities of others to enjoy them*. This means that *they should be non-rival* (public goods), or that *the value of the resource should be enlarged when used* (open fountain of goods). Furthermore, to be "open" means that *the resources either provide non-discriminatory access to the resource or can also be contributed to and shared by anyone*.

Finally it should be mentioned that OER is still in its infancy, and practices and technologies are rapidly changing. It is therefore impossible to give the concept a definitive definition. In the coming years, it will be necessary to return to the question of how OER should be defined.

Chapter 3

Who is Involved? Mapping the Open Educational Resources Movement

This chapter maps the users and producers of open educational resources. Although no definite statistics can be given, the movement has expanded in terms of the number of projects, of people involved and of resources available. It is a global development, although most resources are currently produced in developed countries. The movement grows both top-down and bottom-up; new projects start at institutional level and individual teachers and researchers use and produce open educational resources on their own initiative. All kinds of institutions are involved, as well as researchers and teachers from all disciplines.

Although it is still early days for the OER movement, the number of initiatives is growing rapidly. Side by side with large institution-based or institution-supported initiatives, there are many small-scale activities. Building on Wiley (2006a), the following is a brief overview of the OER movement in post-secondary education as of winter 2006.

Over 3 000 open access courses (opencourseware) are currently available from over 300 universities.

- In the United States 1 700 courses have been made available by university-based projects at MIT (see Box 3.1), Rice University, Johns Hopkins Bloomberg School of Public Health, Tufts University, Carnegie Mellon University, University of Notre Dame, and Utah State University. In October 2006 Yale announced that it will launch an OER initiative in autumn 2007.
- In China 750 courses have been made available by 222 university members of the China Open Resources for Education (CORE) consortium.
- In Japan more than 400 courses have been made available by the Japanese OCW Consortium, whose members have grown from seven in May 2005 to 19 in October 2006.
- In France the 800 educational resources from around 100 teaching units that have been made available by 11 member universities of the ParisTech OCW project are expected to double during 2007.

Box 3.1. Massachusetts Institute of Technology's OCW initiative

History

In spring 2000 MIT's Council on Educational Technology appointed a team to "develop a recommendation to address how MIT can generate and offer [online educational] modules that provide the target market with a working understanding of current hot issues and emerging fields". At that time many organisations were launching start-up ventures and competing for market leadership and financing. The MIT team began its work with the idea of making its programme generate revenue, ensuring it would be "financially viable and sustainable". Of all the ideas considered, that of offering content free of charge was never discussed until close to the launch of OpenCourseWare (OCW).

Before deciding on OCW, the team conducted three major studies: team members interviewed organisations, both educational institutions and companies, engaged in e-learning; they pursued market research and created a business model; and they assessed current e-learning projects at MIT. The research resulted in a model suggesting that an online programme would become financially independent in five years – a finding in sharp contrast with everyday news of large returns from similar

initiatives at the time. At this point the team went back to the assessment of e-learning projects at MIT which had made two important findings. First, without exception, faculty respondents created online materials to improve the quality of their teaching. Second, with few exceptions, faculty members received no monetary compensation for their work. These interviews revealed a core commitment among the respondents to continuously improve their teaching as part of their responsibility as faculty members.

In October 2000 the team considered all its findings and raised the idea of making the course materials publicly accessible online at no charge. This would not be equivalent to offering the experience of an MIT education, but it was considered that it would send a strong message about the university's vision: in the era of the Internet economy, MIT values learning, including e-learning, over financial gain. After meetings with the provost, university president and a university-wide faculty meeting, support for the idea was strong, opening the way for the public announcement of OCW in April 2001. Participation of individual MIT professors is entirely voluntary, but so far 75% of MIT's faculty have contributed to OCW. 49% have contributed two or more courses.

Staffing and budget

Although OCW was not to be a money-making scheme, implementation would not be free. It was estimated to cost USD 85 million over ten years to produce online materials from all courses offered by MIT in 2000. When OCW was announced, the financial issue was not resolved. Grants from the Hewlett Foundation and Mellon Foundation and others made the initiative possible. Today MIT OCW employs at least 29 staff including eight core staff, five publication managers, four production team members, two intellectual property researchers, and ten department liaisons. The two intellectual property researchers manage rights issues for 6 000 pieces of third-party-owned content each year (*e.g.* requesting the right to use the materials on the MIT OCW website). Department liaisons identify faculty to work with and manage those relationships on behalf of MIT OCW.

MIT OCW also contracts with a number of vendors to gain access to additional services, such as Sapient, Microsoft, Maxtor, Hewlett-Packard, Akamai and NetRaker, each of which provides additional services or products to the initiative.

Annual budgets for MIT OCW projected from 2007 through 2011 average just over USD 4.3 million a year, with the most resources allocated to staff (USD 2.1 million), technology (USD 1 million), and contracted services (USD 560 000 a year). An average spend of USD 4.3 million a year on an average of 540 courses produced a year makes for an average cost of just under USD 10 000 per course.

Materials and user statistics

MIT OCW offers lecture notes, problem sets, syllabi, reading lists and simulations as well as a small selection of complete video and audio lectures. 1 550 of MIT's approximately 1 800 courses has been published as of autumn 2006. In addition, OCW has published 133 updated versions of previously published courses.

According to MIT OCW's own evaluation, there were 8.5 million visits to OCW content during the period October 2004-September 2005, a 56% annual increase. This includes both visits to MIT and mirror sites. The MIT OCW site is currently mirrored in more than 70 locations around the world. OCW materials are being widely distributed offline to secondary audiences: 18% of visitors distribute copies of OCW material to others; 46% of educators reuse site contents, and of those, 30% give students printed copies and 24% provide digital copies. The use of OCW is centred on subjects for which MIT is well recognised such as electrical engineering and computer science, maths, management, physics economics and mechanical engineering.

Sources: *http://ocw.mit.edu*, Lerman and Miyagawa (2003), Wiley (2006b), Carson (2006a).

Other initiatives include:

- The UK Open University's OpenLearn initiative. It will make 5 400 learning hours of content available online in two ways: the LearningSpace which offers materials for learning and a LabSpace where content can be downloaded, re-mixed, adapted and reused.
- AEShareNet in Australia has approximately 20 000 objects available for free educational use.
- In Europe the biggest distance teaching universities in nine countries, including Russia and Turkey, are starting a project called Multilingual Open Resources for Independent Learning (MORIL) to share resources to enrich their own curricula and improve training offers in terms both of number of courses freely available and of languages.

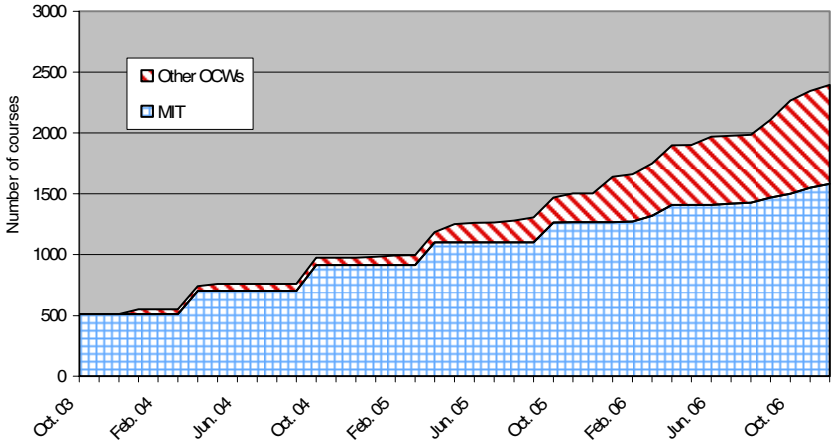
This picture is constantly shifting because of rapid developments. More OER projects are emerging at educational institutions in Australia, Brazil, Canada, Cuba, Denmark, Hungary, India, Iran, Ireland, the Netherlands, Pakistan, Portugal, Russia, South Africa, Spain, Sweden, Thailand, the United Kingdom, the United States, and Vietnam and elsewhere.

While the OCW model is sometimes criticised for offering only static lecture notes in PDF format without interactivity, user evaluations from MIT OCW show that 97% of users find PDF a suitable format for their purposes (d'Oliveira, 2006). Furthermore, the OECD case studies show that the OCW model is developing. Tufts University constructs a web portal for every OCW course with a description of the course and links to syllabus, schedule and usually the full lecture notes (Phelps, 2006b). Sometimes presentation slides are included. The university has also developed an open source software-based content management system with over 400 000 pieces of content that provides the opportunity to reuse the existing content in new contexts. While typical course management systems provide courses in silos, this system has metadata-indexed key words, nuggets and topic sentences, and allows for integration of content across all courses and constitutes a rich reference for students. Access to current research is also provided. Future plans are to add case studies of ten virtual patients. After using the tools provided in the content management system for developing courses, it is technically easy to make the course available as OCW. The main barrier is copyright issues, linked to the use of third-party materials in the database. In practice this means that in some cases the full complement of OCW materials may not appear online owing to copyright issues. This is particularly true of health sciences courses for which staff often draw on a wealth of sources, making it difficult to gain all the approvals and releases needed to include everything in a publicly available site.

Mulder (2006) argues that the learning resources emerging from three initiatives initiated by Open Universities in Europe (OpenLearn, OpenER and MORIL) represent a "second wave" of OER. The argument is that since they are produced by distance teaching universities without the assumption of a face-to-face teaching situation and predominantly target lifelong learners, the materials are particularly well-suited to self-learners.

There are also a number of projects under way to make these higher education materials available in multiple languages, including Universia's Spanish and Portuguese translations, China Open Resources for Education's (CORE) simplified Chinese translations, Opensource Opencourseware Prototype System's (OOPS) traditional Chinese translations, and Chulalongkorn University's Thai translations. These translation projects currently represent 9-10% of all opencourseware-style courses but received around 50% of the total traffic to OCW courses, a sign of the level of demand for such courses in East Asia and South Asia. More than 100 higher education institutions and associated organisations from around the world have formed the OpenCourseWare Consortium, using a shared model, with the aim to advance education and empower people worldwide through opencourseware. Member institutions must commit to publishing, under the institution's name, materials from at least ten courses in a format that meets the agreed definition of opencourseware, which is "a free and open digital publication of high-quality educational materials, organised as courses" (Carson, 2006b). The rapid growth of materials made available by the OpenCourseWare Consortium is illustrated in Figure 3.1.

Figure 3.1. Total opencourseware courses available within the OCW Consortium, October 2003 to December 2006



Source: MIT.

Box 3.2. MERLOT

Multimedia Educational Resources for Learning and Online Teaching (MERLOT) has been developed and provided by the California State University Center for Distributed Learning since 1997. It was modelled after a project funded by the US National Science Foundation and initially sponsored by Apple Computer.

In December 2006 it had 24 higher education partners and affiliates, 13 professional societies, ten digital libraries and a number of corporate partners, mainly from North America. It has over 40 600 members – faculty, staff, librarians, administrators and students from all over the world. MERLOT is a "referatory" rather than a repository since it links to materials stored elsewhere. The materials encompass simulations, animations, tutorials, drills and practices, quizzes and tests as well as lectures, case studies, collections, reference materials and podcasts. It has 15 discipline communities, two partner communities and one workforce community. The community portals provide members with differentiated information about exemplary teaching strategies, professional associations, journals, conferences, and other resources for continuous professional development.

As one of few providers of OER, MERLOT uses a peer review process for materials much like that of an academic journal. All discipline communities have an editorial board that uses the following review criteria:

Quality of content: Currency, relevance and accuracy of the information. Is the content clear and concise and informed by scholarship, does it completely demonstrate the concepts, how flexible is it, does it integrate and summarise the concept well, etc.?

Potential effectiveness as a teaching tool. Does the material specify the learning objectives, does it identify prerequisite knowledge, is it efficient, does it reinforce concepts progressively, does it build on prior concepts and does it demonstrate relationships among concepts, etc?

Ease of use. Is the material easy to use, does it have clear instructions, is it engaging, does it have visual appeal, is it interactive, does it use effective navigation techniques, do all elements work as intended, etc.?

All peer reviewers on each discipline-specific editorial board share and compare their evaluations following the processes developed and the framework provided to create test cases. These test cases are then used to develop evaluation guidelines/criteria that are applied to all materials in the discipline. Each editorial board establishes inter-rater reliability in its evaluations before the materials in its discipline are evaluated. The review teams typically use a two-stage review process, first establishing whether the materials are worth reviewing, and then a more intense independent review by two reviewers. If there is a significant disparity in the two reviews, an editor or associate editor assigns the material to a third reviewer. An integrated or composite review is created by the two separate reports, which is then posted on the MERLOT website.

The peer reviews are sometimes complemented by user comments and ratings. In December 2006 MERLOT contained links to more than 15 500 resources.

Source: *www.merlot.org* and MERLOT (2006).

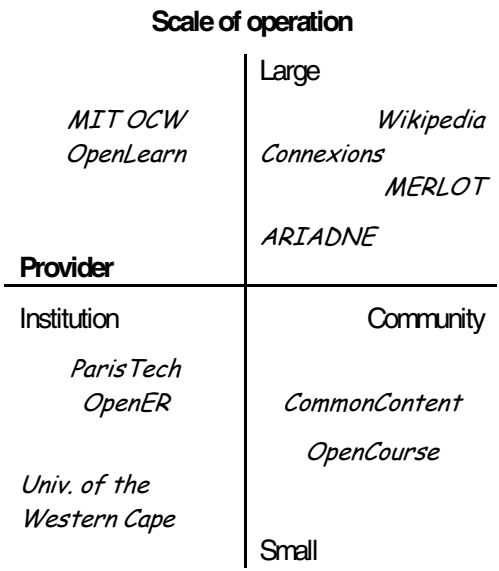
The number of non-course OER available – articles, individual curriculum units, modules and simulations – are also growing at a terrific rate. Math World contains 12 600 entries. In January 2007 Rice's Connexions project hosts more than 3 759 modules and 199 courses available for mixing and matching into study units or full courses. The University of California at Berkeley offers over 150 videos of course lectures and symposia, in total more than 250 hours, free of charge through Google Video. Textbook Revolution contains links to 260 freely available, copyright-cleared textbooks. MERLOT (see Box 3.2) offers almost 15 800 resources; the Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) Foundation for the European Knowledge Pool offers links and federated searches in several networks and repositories. UNESCO's International Institute for Educational Planning hosts a wiki containing a listing of "OER useful resources" with links to portals, repositories and open content projects. Even more difficult than listing the number of initiatives would be estimating the quantity of available resources, even with a narrow definition of OER. On top of the resources accessible through initiatives such as the ones listed above, many more can be found by using search engines such as Google or Yahoo!.

At the moment it is not possible to give an accurate estimate of the number of ongoing OER initiatives. What can be offered is a preliminary typology of different repositories. As already mentioned, there are both large-scale operations and small-scale activities. It is also possible to distinguish between types of providers – institution-based programmes and more community-based bottom-up activities. In both cases there are all kinds of in-between models, as shown in Figure 3.2.

In the upper left corner of the figure, large-scale and institution-based or supported initiatives are found. Good examples are the MIT OCW programme and OpenLearn from the Open University in the United Kingdom. Both are large in terms of the financial funding provided. They are entirely institution-based in the sense that all materials originate from own staff although OpenLearn will also provide an experimental zone for downloading, remixing and sharing. In the upper right corner, large-scale non-institution-based operations are placed. The best example is probably Wikipedia, one of the Internet's real success stories and a good example of a large-scale community-based operation. Wikipedia is large in terms of content – it has more than 3.5 million articles in the ten largest languages – but small in terms of staff as would be expected for an initiative totally dependent on voluntary contributions. Other examples would be MERLOT, Connexions and ARIADNE. In the bottom left corner of the figure, three examples of small-scale institution-based initiatives are listed. The University of the Western Cape, South Africa, has launched a "free content

and free open courseware strategy". OpenER, launched by the Open University of Netherlands, has released a website of 400 hours of materials in Dutch for non-formal learners. Finally, in the bottom right corner are examples of small-scale community-based initiatives. OpenCourse is a "collaboration of teachers, researchers and students with the common purpose of developing open, reusable learning assets (*e.g.* animations, simulations, models, case studies, etc.)". Another example is Common Content, a repository of information about works made available under licences from Creative Commons, or in the public domain.

Figure 3.2. Categories of open educational resource providers



A third dimension to consider is whether the repository provides resources in a single discipline or is multidisciplinary. There are examples of single disciplinary programmes, such as Stanford Encyclopaedia of Philosophy and the Health Education Assets Library (HEAL) but the multidisciplinary approach seems to be more common at the moment.

Use, users and producers of open educational resources

Not much is known about who actually uses and produces all of the available OER. Of course, institution-based initiatives, such as the opencourseware programmes at different universities, use their own staff to

produce their material and some, such as MIT, try to continuously learn who their users are. Overall, however, very little is known about the users and producers. To correct this deficiency, the OECD project launched two web-based surveys during spring 2006, one targeting institutions and one aimed at individual teachers and researchers. The first received a very small number of answers, although over 1 800 e-mails were sent to universities in the 30 OECD member countries. The e-mails were sent to the rector/vice-chancellor's office and the poor result may be a sign that OER is still mostly a grass-roots phenomenon, in which the managerial level of the institutions is not involved and is unaware of such activities in research groups or as initiatives by individual faculty members.

The survey of individuals was answered by 193 people from 49 different countries throughout the world (see Figure 3.3 and Table 3.1). The geographical spread is interesting, although there is a clear bias towards teachers from English-speaking countries. This may be due to the fact that the questionnaire was only available in English. The small number of replies also calls for great caution in interpreting the results. The majority of respondents worked at institutions with up to 10 000 students and about one-third at institutions with 11 000-50 000 students. More than half of the respondents worked in the area of education, and two out of three represented publicly funded institutions. A small group (12 people) worked in private for-profit universities.

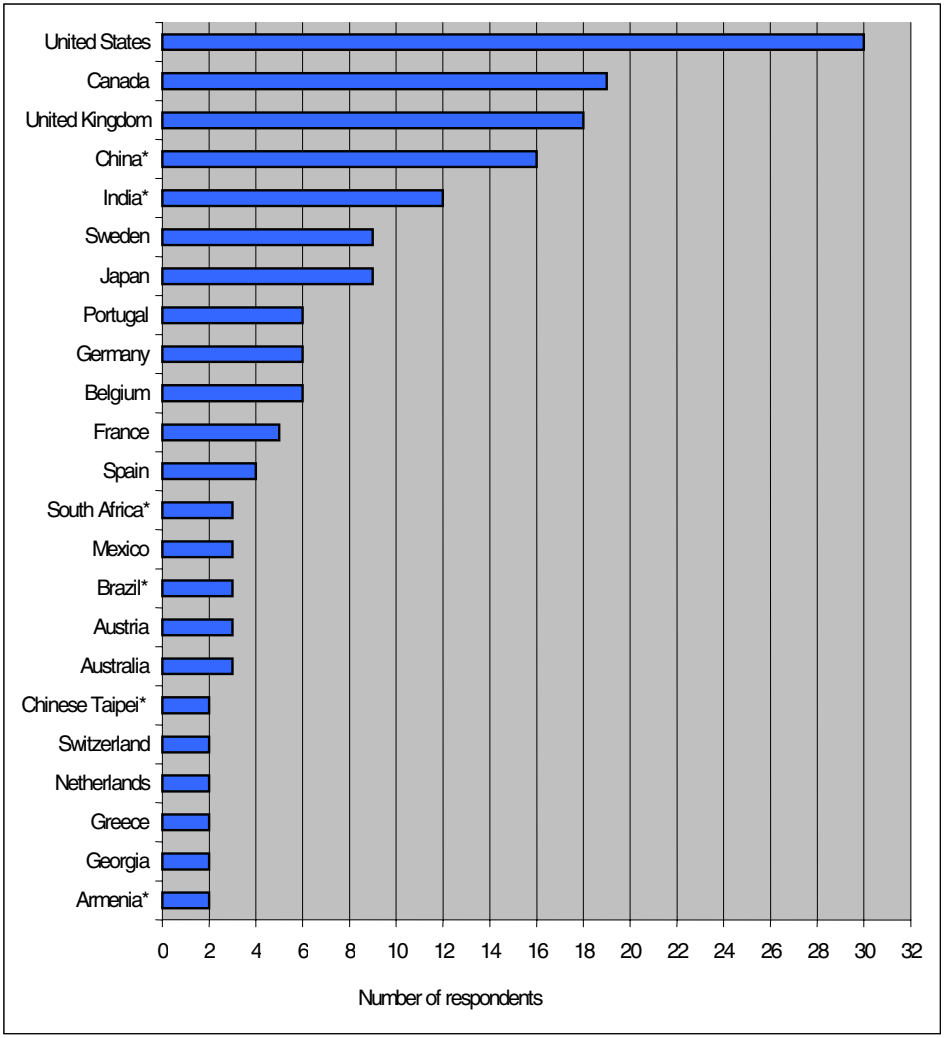
Table 3.1. Countries with one entry to the OECD questionnaire

Argentina*	Finland	Mauritius*	Sudan*
Belarus*	Ghana*	New Zealand	Togo*
Colombia*	Iceland	Nigeria*	Trinidad and Tobago*
Czech Republic	Iran*	Pakistan*	Turkey
Dominican Republic*	Italy	Philippines*	United Arab Emirates*
Egypt*	Kyrgyzstan*	Romania*	
Estonia*	Malaysia*	Slovakia	

* = Non-OECD countries.

Source: OECD.

Figure 3.3. Countries with two or more respondents to the OECD questionnaire



* = Non-OECD countries.

Source: OECD.

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

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

As a part of an extensive study on the use and users of digital resources in California 13 OER providers were interviewed (Harley, 2006). All sites were developed for educational purposes with broad intentions, *e.g.* to provide supplementary materials for students, to assist instructors in teaching, or to provide general course materials to support any type of learning. All of them target post-secondary instructors as their primary audience, together with students and the general public. Although most interviewees claimed that their resources are intended to reach a broad audience, even those sites with broad outreach missions recognised that their materials are often most useful for faculty preparing new courses. Although good usage data is rare, anecdotal evidence suggested that the actual audience varied significantly from the target audience in only a few cases.

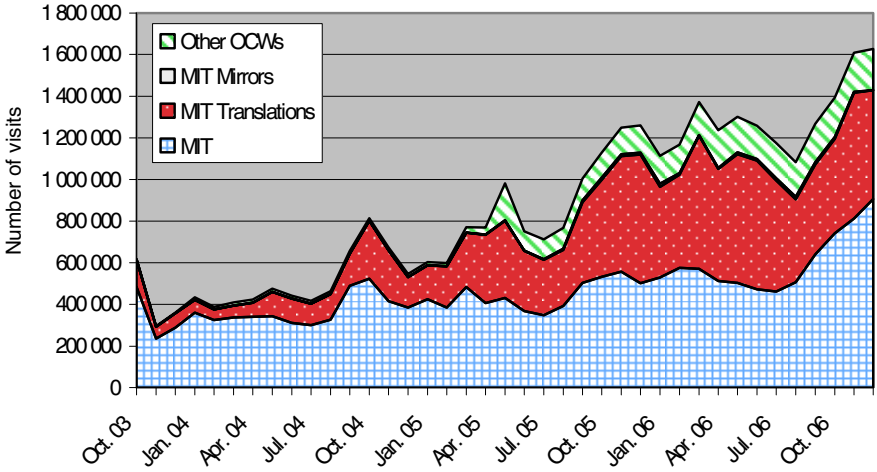
Other findings regarding OER users come from individual projects. According to Carson (2006a), 8.5 million visits were paid to MIT OCW content during 2005, an annual increase of 56%. The traffic seems to be increasingly global – 57% were non-US visits, with 21% of visitors from western Europe, 15% from East Asia and 6% from South Asia. The remaining 15% of the traffic originated from eastern Europe, the Middle East, Africa, the Pacific, Central Asia and the Caribbean. Carson (2005) reports that self-learners, typically with a bachelor's or master's degree, seem to make up the bulk of traffic (47%), followed by students (32%) and educators (16%). Higher percentages of educators use the site in developing regions, such as East Asia, Latin America, eastern Europe, the Middle East and North Africa. Self-learner percentages continue to be highest in North America, East Asia and western Europe.

On their website Tufts OCW reports that 59% of their visitors from June 2005 to January 2007 were from North America, 14% respectively from northern Europe, western Europe, and Asia and Pacific Islands. Half of the respondents to their user survey identified themselves as self-learners, while 43% were faculty members or students; 25% held a doctoral degree or equivalent, over 30% a master's degrees or equivalent and 26% a bachelor's degrees or equivalent (Phelps, 2006b). Taken together, over half of the users had a master's degree or higher (Tufts, 2006).

Johns Hopkins University's Bloomberg School of Public Health started an OCW initiative in 2005 and reports that the number of visitors grew by 111% during the first year. Among the visitors, 19% indicated their status as

healthcare professionals, 23% as self-learners and 7% as educators. A total of 13% reported that they were students, 3% of them Johns Hopkins students. In all 64% of the visits were from the United States (Phelps, 2006a).

Figure 3.4. Overall traffic to MIT OCW materials, October 2003 to December 2006



Source: MIT.

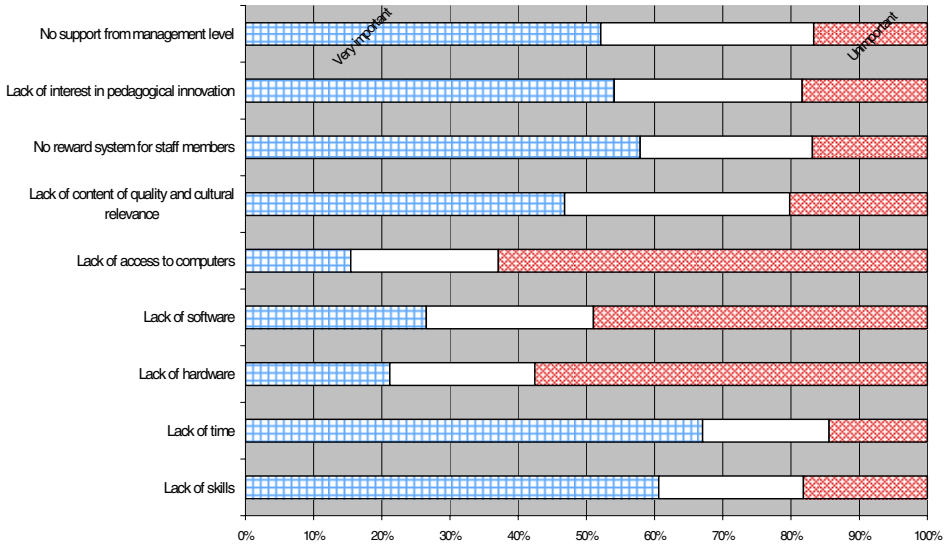
In January 2007 Connexions reported that it is accessed by more than 1 million people from 194 countries (*http://cnx.org*). In January 2006, the number of unique visitors was over 500 000, in comparison to over 264 000 in January 2005 (*http://cnx.org/news/2006-02-07*).

An increase of resources in different languages seems to result in an increase in the number of visitors to a site, and also has an impact on where the visitors come from. MIT OCW translation affiliation sites account for the most dramatic increase in traffic during the last year, with 3.4 million visits recorded to their four translation sites during 2005. ParisTech OCW, offering resources mostly in French, reports 30-35 000 unique visitors per month (Hylén, 2006). Of these, two-thirds are from Europe (predominately France), about 10% from Africa and 5-6% from North America. The case study from Japan OCW Consortium reports an average of 8 000-12 000 visitors a month and increasing, at each member university (Kobayashi and Kawafuchi, 2006).

About two-thirds of the respondents to the OECD questionnaire said they were involved in the production of open content, to either a large or a small extent. When asked to value nine possible barriers for involving other colleagues, the most significant barriers were said to be lack of time, followed by the lack of a reward system to encourage staff members to devote time and energy to producing open content, and a lack of skills (see Figure 3.5). A perceived lack of interest for pedagogical innovation among colleagues was also an important factor. It can be noted that pedagogical innovation is not prominent among reasons for individuals or institutions to participate in OER projects (see Chapter 4). The least significant barriers were said to be lack of access to computers and other kinds of hardware and lack of software.

When asked what licence they use for resources they have produced, more than half of respondents said that they did not use any licence. One-quarter used some kind of Creative Commons licence, and the rest other open licences. Although the use of Creative Commons licences is growing, this finding indicates a need for more awareness-raising activities regarding copyright and open licences, a conclusion that is strengthened by several observations made during the series of site visits carried out as a part of the OECD study.

Figure 3.5. Barriers for colleagues to use open educational resources

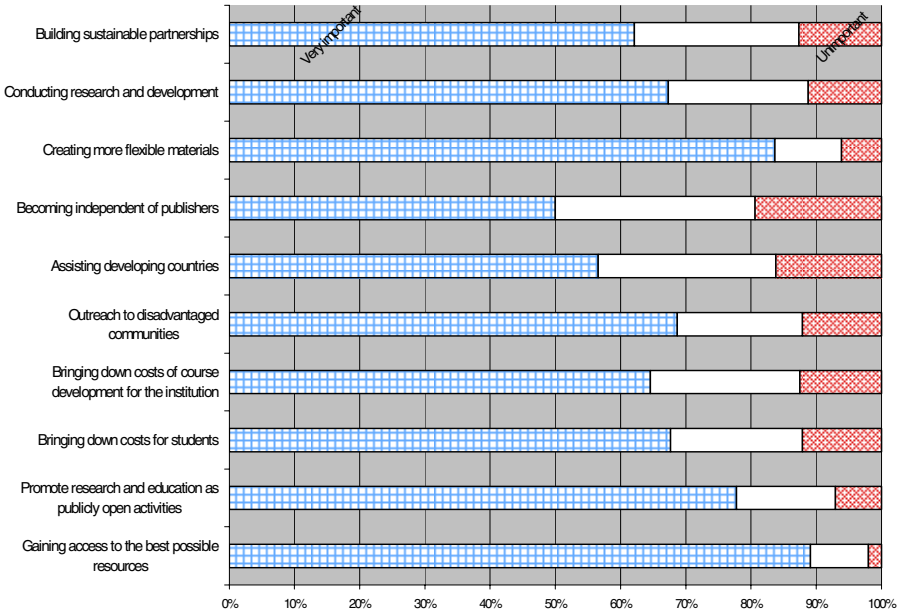


Source: OECD.

Furthermore, results from the survey suggest that instructors view OER as a high-quality complement to other learning resources. Other goals for using these resources are to make their own materials openly available even if they include third-party content, thus making materials more flexible and promoting openness (see Figure 3.6).

Two-thirds of respondents said that they used open content to some or a limited extent in their teaching. Also, it seems as if smaller chunks of learning material are used more than larger ones. Almost eight out of ten said they used learning objects or parts of courses rather than full courses in their teaching. More than half of the respondents said that they used content they have produced themselves. Four out of ten used content produced within their own institution, three out of ten used resources originating from co-operation with other institutions and about one-quarter used content produced by publishers.

Figure 3.6. Goals for using open educational resources in own teaching

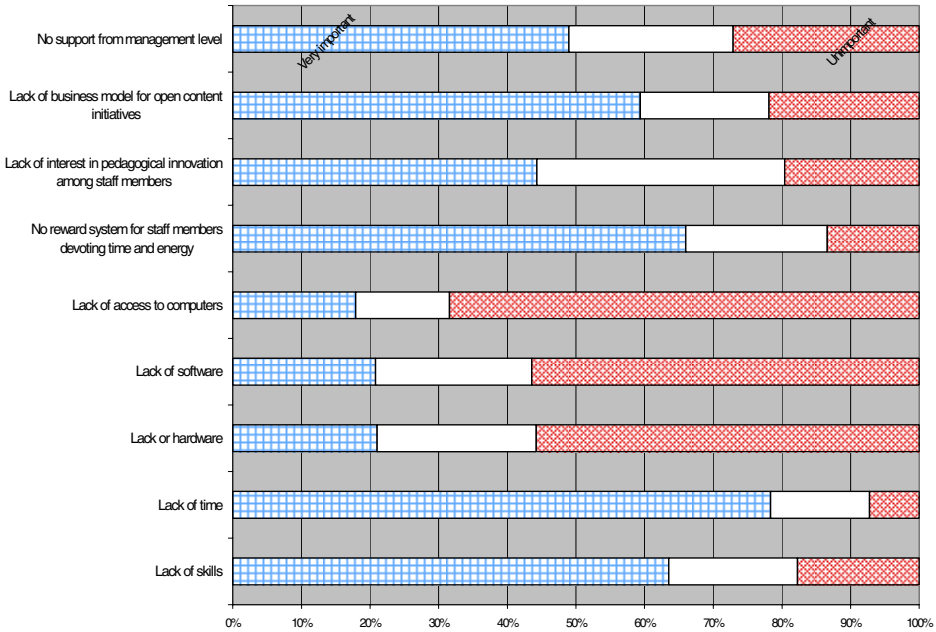


Source: OECD.

The respondents were asked to consider why more colleagues are not involved in open-content production. Figure 3.7 shows that the most significant barriers is "lack of time" followed by the "lack of a reward

system for people devoting time and energy to producing open content" and "lack of skills". The same factors were ranked as most important among teachers in both OECD and non-OECD countries although lack of skills was perceived as most significant in the latter and lack of time in the former. The lack of cost recovery models for open content initiatives is also perceived as an important negative factor. The least significant barriers are said by respondents both in OECD and non-OECD countries to be lack of access to computers and other kinds of hardware and lack of software, although a larger proportion in non-OECD countries considers lack of hardware, software and access to computers as a problem.

Figure 3.7. Barriers to producing open educational resources



Source: OECD.

The Macquarie E-Learning Centre of Excellence (MELCOE), Australia, is a different kind of producer of OER. It is specialised in developing open source software tools and open standards for e-learning. Among other things it has developed the Learning Activity Management System (LAMS) which now has a growing number of users (see Box 3.3).

Box 3.3. Macquarie E-Learning Centre of Excellence (MELCOE), Australia

MELCOE is a research centre established specifically for research and development (R&D) in e-Learning, including the development of free software and standards to facilitate e-learning and IT infrastructure for the education sector. MELCOE is formally established at the university level, with the majority of funding to date received from Australian federal government grants. While research at MELCOE involves a number of other universities and interested commercial partners, the R&D is predominantly based or directed at Macquarie University. The two main areas of production of open source software within MELCOE are the LAMS (Learning Activity Management System) and MAMS (Meta Access Management System) projects.

LAMS provides a system to help educators build and use sequences of learning activities. These sequences can be thought of as workflows for educational tasks. It also provides a structure for students to progress through the educational sequences, and engage in collaborative online learning and discussion. Sequences of activities can be designed to complement tutorials, for independent learning contexts, or for external students to participate in class-based exercises. LAMS is designed to be easy to use for educators to create and implement a wide range of flexible learning activities. It is open source software which provides intuitive visual tools to create sequences of activities, the infrastructure for students to progress through those sequences, and a management interface to direct and evaluate student participation. The release of LAMS as free software was instituted on a university level – a high-level decision was made to release LAMS as free software for the public good. It is hoped that LAMS will transform the process and development of online learning, and releasing it as free software is designed to increase its uptake in the educational sector.

LAMS is licensed under the GNU General Public License (GPL). Non-GPL licences can be negotiated for institutions who wish to build upon LAMS without an obligation to redistribute modifications (for example, a closed source learning management system that wishes to bundle and distribute LAMS), but to date no "dual licensing" of LAMS has occurred. All current users of LAMS acquire the software under the GPL licence. The GPL was chosen because it was the most common licence. This is seen as important in order to encourage community support and development. The copyleft GPL was specifically chosen over other OSI-approved licences because of the opportunities it afforded for potential dual-licence commercialisation.

The MAMS project aims to provide a middleware component to increase the efficiency and effectiveness of Australia's higher education research infrastructure. MAMS was funded by the Australian federal government under the Systemic Infrastructure Initiative "Backing Australia's Ability". MAMS addresses the need for middleware to enhance access to information and services, such as scholarly information and journals, large datasets and grid computing facilities. The MAMS project is designed to provide infrastructure for cross-institutional authentication and authorisation, combined with additional technical services for basic digital rights management, search and retrieval, and metadata management.

MAMS provides core infrastructure designed to increase the sharing of information between higher education research institutions. MAMS software is released under the Apache licence. The Apache licence is used because the MAMS software sits on top of Apache-licensed software called "Shibboleth" (not the Apache web server itself). The MAMS software is directly shared among approximately 50 partner institutions.

Source: Suzor (2006a).

Conclusions

To sum up, there is a great need for more information regarding who the users of OER are and what kind of use is most common. With the scattered data available, one can only paint only a very general picture of users and producers of OER. The majority of producers of resources and OER projects seem to be in English-speaking countries in the developed world. The institutions involved so far seem to be well-reputed internationally or in their countries, rather than unknown or low-status institutions. Both small and large institutions are involved, as well as campus-based and distance teaching establishments. About half of the institutions seem to be involved in some kind of established co-operation for sharing resources with others.

Most have educators in post-secondary institutions as their primary target group, although students and the general public are also often mentioned audiences. The users of OER appear to come from all over the world. Many seem to be well-educated self-learners, but educators are probably also prominent users.

Most repositories or sites have chosen not to have any log-in procedure for users. Also web statistics and other data are diverse and difficult or sometimes impossible to compare as a result of different evaluation methodologies and the diversity among both resource providers and types of resources. The resulting lack of information might be overcome, to some extent, by more co-ordinated gathering and analysis of web statistics and user surveys, although such activities are expensive and time-consuming, particularly for small and voluntary initiatives. In order to build a better knowledge base on the OER movement, grant-giving parties should be open to requests for funding of evaluation activities. An encouraging initiative is taken by the OCW Consortium to develop a common evaluation framework for all consortium members. This will of course build on specific circumstances pertaining to opencourseware projects – such as only delivering courses, always being institution-based, etc. – which might not be fully applicable to other OER projects, but it will most certainly establish a good basis for others to build on.

Chapter 4

Why People are Sharing: Incentives, Benefits and Barriers

This chapter examines some underlying drivers and inhibitors with respect to the production and use of open educational resources. It also looks into reasons for governments, institutions and individual teachers and researchers to use and produce open educational resources.

The first and most fundamental question anyone arguing for free and open sharing of software or content has to answer is: Why? Why should anyone give anything away? What are the possible gains in doing so? Advocates of the open source software, open access and OER movements of course have arguments in favour of their specific cause. But general arguments also apply to all three. These can be divided into pull arguments, which list the gains to be achieved by open sharing of software, scientific articles and educational materials, and push arguments, which register the threats or negative effects that might appear if software developers, scientists and educationalists do not share their work openly.

On the push side, it is sometimes argued that, if universities do not support the open sharing of research results and educational materials, traditional academic values will be increasingly marginalised by market forces. The risk of a software monopoly, if everyone uses Microsoft programmes, or a combined hardware and software monopoly, if too many use Apple's iPod music player and listen to iTunes, is often used as a reason to support the open0source software movement. The same applies to the risk of monopoly ownership and control of scientific literature, according to opponents of the large-scale commercial scientific publishing model. The possibility for researchers to keep a seat at the table in decisions about the distribution of research results in the future is sometimes said to be at risk. Increased costs and vulnerability, greater social inequality and slower technical and scientific development are other concerns.

On the pull side, a number of possible positive effects from open sharing are put forward, such as: free sharing means broader and faster dissemination, with the result that more people are involved in problem solving, which in turn means rapid quality improvement and faster technical and scientific development; decentralised development increases quality, stability and security; and free sharing of software, scientific results and educational resources reinforces societal development and diminishes social inequality. From a more individual standpoint, open sharing is claimed to increase publicity, reputation and the pleasure of sharing with peers.

Drivers and barriers

Before looking at motivations for participating in the OER movement, it is necessary to look at a number of drivers and barriers that set the basic conditions and are, for example, technical, economic, social, policy-oriented or legal (OLCOS, 2007; OECD, 2006b). The technical drivers include:

- Increased broadband availability.
- Increased hard drive capacity and processing speeds coupled with lower costs.
- Rise of technologies to create, distribute and share content.
- Provision of simpler software tools for creating, editing and remixing.
- Decreased cost and increased quality of consumer technology devices for audio, photo and video.

Economic drivers will be further discussed later but include monetary incentives for sharing content for free and the emergence of new cost recovery models, wrapped around free content, for institutions and individuals. For educational institutions, economic drivers may also include opportunities to reduce costs by co-operation and sharing. Other economic drivers are:

- Lower cost of broadband Internet connections.
- Lower costs and increased availability of tools for creating, editing and hosting content, and lower entry barriers.

The social drivers will also be discussed in more detail later, particularly altruistic motives, non-monetary gains for individuals and opportunities for institutions to reach out to new social groups. Other social drivers include the increased use of broadband, the desire for interactivity, and the willingness to share, to contribute and to create online communities which is changing the media consumption habits of Internet users, particularly among younger age groups, *i.e.* 12-17 years old (OECD, 2006b). Legal drivers include the rise of new legal means to create and distribute open tools and content through licensing schemes such as Creative Commons and the GNU Free Documentation Licence. Policy drivers would include the need to leverage an initial investment of taxpayers' money by encouraging free sharing and reuse among publicly funded educational institutions, and the will to make knowledge available to individuals and institutions that would not otherwise have access.

Barriers for using or producing OER can also be characterised as technical, economic, social, policy-oriented and legal. A technical barrier would be the lack of broadband availability. The lack of resources to invest in the hardware and software needed to develop and share OER would be an economic barrier. Other economic barriers are difficulties for covering the costs of developing educational resources and sustaining an OER project in the long run. Technical and economic barriers are often mentioned as significant obstacles in developing countries. Social barriers include absence

of skills to use the technical inventions mentioned as drivers and cultural obstacles against sharing or using resources developed by other teachers or institutions, a phenomenon observed in several of the OECD case studies. There seems to be a paradox within the academic community which strongly emphasises the importance of openly sharing research results and building on existing scientific data, but at the same time often takes an unresponsive attitude towards sharing or using educational resources developed by someone else.

In the two Canadian case studies, the risk of misuse by other institutions and unethical competition is commented on. The President of Athabasca University in Canada clearly stated that he:

> "…would have no difficulty making more open content available if he could count on only public universities could access it. He would trust public universities to make ethical use of that content and to cite its sources correctly. Being unable to prevent rapacious, unethical, for-profit organisations from profiting from content makes him unwilling to proceed with further opening of Athabasca's content at this time." (Stewart, 2006)

Similar concerns were also expressed by other institutions visited (Pedró, 2006a). In terms of social barriers, the lack of a reward system for teachers and researchers to devote time and energy to develop OER may be the most important. Lack of awareness about the advantages of OER or skills to use or produce such content or tools are probably other important barriers, as well as lack of time (see Chapter 3). Another barrier for reuse might be that learning resources are context-bound and need to be localised, which might be prohibited (if a licence with No Derivatives clause is applied), difficult, time-consuming or expensive. Legal barriers include the prohibition to use copyrighted materials without the consent of the creator. The time required and cost of obtaining permission for using or removing material for which a third party owns the copyright prior to making them available as OER were often mentioned as a significant barrier in the OECD case studies. Many of these barriers could be gathered under the heading "deficiency of a clear policy in institutions regarding OER and copyright issues". The following chapters will deal with some of these barriers in greater depth.

Arguments for government involvement in open educational resources

The 25 countries of the European Union, like most other countries, are faced with the challenge of making a successful transition to a knowledge-based economy and society. To achieve this, the European Union has

launched the so-called Lisbon strategy. An important part of the strategy is a boost in investments in human capital through better education and skills. Among other things this calls for a significant widening of participation in higher education, particularly in a lifelong learning context. José Manuel Barroso, the President of the European Commission, has stated that "lifelong learning is a *sine qua non* if the Lisbon objectives are to be achieved" (European Commission, 2005). Taking the Lisbon strategy as their starting point, Kirschner *et al*. (2006) describe how three interrelated OER projects (OpenLearn at Open University UK, OpenER at Open University NL, and MORIL) address this challenge. Since the participating universities are open and distance teaching institutions, they have a long tradition of creating learning resources designed to be studied by independent learners who often have competing demands on their time and a range of needs and experience. An important part of these initiatives will be to create and deploy tools, support and an environment for learning, recognising that learning does not take place in a social vacuum. The MORIL project, initiated by the European Association of Distance Teaching Universities (EADTU), consists of both a non-matriculated and a matriculated offer. The OpenLearn and OpenER projects do not have a matriculated offer, but aim at getting learners acquainted with higher education and helping them to gain experience that will improve their self-confidence and motivation to cross the threshold to formal higher education. Since learners can study at their own pace and at hours most suitable for them while keeping their usual occupation, this approach seem to be cost-efficient both for individuals and governments. If successful, these projects would represent interesting and cost-efficient ways of widening participation in higher education. In short, these examples show how OER projects can be used by governments to widen participation in higher education, bridge the gap between non-formal, informal and formal learning, and promote lifelong learning.

So far there seem to be few OER initiatives with direct governmental support. The United Kingdom is probably the most ambitious example. It funds the Joint Information Systems Committee (JISC) not only to develop educational resources but also to build repositories and digital content infrastructure. Another example is the Dutch OpenER which receives two-thirds of its funding from the Dutch Ministry of Education, Culture and Science. Still another is the Indian Knowledge Commission which has identified a need for rapid expansion of India's higher education system (Kumar, 2006). In order to meet the challenges of the 21st century, India needs to widen access to quality education. An important part of its strategy is to use OER and high bandwidth networks to serve the knowledge needs of diverse communities, to amplify interaction among students and teachers, and to introduce innovative and interactive educational experiences. The Commission further advocates India becoming a member of the OCW

Consortium and leveraging the pool of available OER. Stacey (2006) describes an OER initiative launched by the province of British Columbia in Canada as a part of their BCcampus, which is an inter-institutional collaboration of 26 public post-secondary education institutions. The initiative has direct governmental support, both politically and financially. Extremadura offers a third example of a government-supported initiative (see Box 4.1).

Box 4.1. The case of Extremadura

The Spanish region of Extremadura is the poorest region in Spain and is sparsely populated, but it has a very consistent public policy towards the use and development of open source software, open culture and open knowledge. Since much of the investment in technical infrastructure, equipment and training was made possible by funding from the European Commission, the governing party considers that one way of paying the debt it owes to the international community is to grant open access to all the benefits, in terms of software development and ultimately of open knowledge resources. A plan in five consecutive steps has been launched, including public investment in IT infrastructure and services, broad IT training facilities for all, emphasis on networking with firms and social institutions, an option in favour of open source software and free access to open knowledge.

The choice of open source software initially arose from a financial cost analysis and the opportunity to save some EUR 30 million. Open source software was used first in the vast computer base of the educational system, then in the health service and ultimately in all areas of public administration. To this end, the government created its own Linux distribution, called Linex, which is freely downloadable from the Internet. Successive versions have adapted the distribution to the particular needs of users in education, health, the public sector and even in small and medium-sized enterprises. This choice has been internationally recognised as the most important public effort in the domain of open source software and still seems to be unparalleled. The regional parliament issued a political mandate last summer to force the government to migrate from all software applications being used at public facilities to open source software equivalents, thus following the path of the education and the health sectors.

The success of Linex, and the continuous and sustained effort by the government to disseminate open source software developed not only in Extremadura but also in Latin America, gave rise to the consideration that open knowledge was the next frontier, and only the jump from a wide use of open source software to the creation of a culture of open knowledge could lead the region towards realisation of the knowledge society. The above-mentioned political mandate from the regional parliament also empowered the government to provide free access to all knowledge-related content residing in public servers. The government is now seeking innovative measures to promote this culture by putting in place incentives, mainly financial, to produce open educational resources and to make these resources available to the whole population. Until now, this has been the case in compulsory and adult education where a public call for the development of open educational resources worth EUR 1 million has been launched twice, as well as in the training of civil servants. Still pending is the incorporation of the university, potentially the biggest provider of open educational resources of the highest standards.

Source: Pedró (2006b).

Reasons for institutional involvement

From an institutional point of view there seem to be a number of reasons for involvement in OER. Vest (2004), the former president of MIT, has given five reasons for MIT to "give away all its course materials via the Internet": to advance education and widen access; greater opportunity for MIT faculty to see and reuse each other's work; to create a good record of materials; increased contact with alumni; and a way to help their own students become better prepared.

Since MIT is a campus-based institution, it has been argued that the OCW initiative did not threaten its core business. It would be much riskier for a distance teaching institution to do something similar. That makes it even more interesting to look at the reasons for the Open University in the United Kingdom to launch its OpenLearn initiative. McAndrew (2006) lists eight motivations, which include the idea that the philosophy of open content matches the Open University's mission; and that the OER movement is developing and the Open University should join sooner rather than later. He also mentions the risks involved in doing nothing when technology and globalisation issues need to be addressed and the fact that this could be a route for outreach beyond the existing student body. Furthermore this is seen as a chance to learn how to draw on the world as a resource and as a test bed for new technology and new ways of working. It is also seen as a demonstration of the quality of Open University materials in new regions and a way to work with external funders who share similar aims and ideals.

The risk for an institution of doing nothing in a rapidly changing environment was also raised in the OECD case studies and expert meetings. Distance teaching universities in particular are struggling with the fact that a major part of their income currently stems from sales of teaching materials developed and marketed as a part of their teaching methodology. In some cases these materials are not available in digital format. Instead they are sent by mail to paying students, a model that is increasingly losing marketability. According to a pro-vice-chancellor of the Open University of Catalonia, participating in one of the OECD expert meetings, and the rector of the Spanish National University of Distance Teaching, a shift towards a more up-to-date model of production and distribution would need to go hand in hand with a restructured cost recovery model in which OER will most probably have a prominent role (Pedró, 2006c).

In the OECD case studies conducted at institutions with OER projects, a number of arguments for using and producing OER were presented. They include: a wish to promote an international perspective within the university,

to share resources with developing countries, to be a part of the institution's contribution to society, to establish a service to local, national and international communities, and to enhance the institution's visibility as part of a process to recruit better students and instructors.

There seem to be six main arguments for institutions to engage in OER projects.

- One is *the altruistic argument that sharing knowledge is a good thing to do* which is also in line with academic traditions, as pointed out by the open access movement. Openness is the breath of life for education and research. Resources created by educators and researchers should subsequently be open for anyone to use and reuse. Ultimately this argument is supported by the United Nations Human Rights Declaration, which states: "Everyone has the right to education. Education shall be free…" (Article 26).

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

- A third argument is taken from the open source software movement: "What you give, you receive back improved." *By sharing and reusing, the costs for content development can be cut, thereby making better use of available resources.* Also, the overall quality should improve over time, compared to a situation in which everyone always has to start anew.

- A fourth argument for institutions to be engaged in OER projects is that *it is good for public relations and it can function as a showcase to*

attract new students. Institutions such as MIT have received a lot of positive attention for their decision to make their resources available for free. Other institutions can do the same. Carson (2006a) shows that 31% of the freshmen at MIT became aware of the MIT OCW prior to making their decision to apply to MIT and, out of these, 35% indicated that the site was a significant influence on their choice of school. Furthermore the Johns Hopkins OCW reports that 32% of their visitors during their first year of operation indicated their status as prospective students. A variation of the fourth argument is the wish to reach out to new groups, to people without access to, or prior knowledge of, higher education.

- A fifth argument is that many institutions face growing competition as a consequence of the increasing globalisation of higher education and a rising supply of free educational resources on the Internet. In this situation there is *a need to look for new cost recovery models,* new ways of obtaining revenue, such as offering content for free, both as an advertisement for the institution, and as a way of lowering the threshold for new students, who may be more likely to enrol – and therefore pay for tutoring and accreditation – when they have had a taste of the learning on offer through open content. The open universities in the Netherlands and the United Kingdom both use this argument.
- A sixth argument is that *open sharing will speed up the development of new learning resources, stimulate internal improvement, innovation and reuse* and help the institution to keep good records of materials and their internal and external use. These records can be used as a form of market research if one is interested in the commercial potential of individual resources.

It is hard to know the extent to which the above incentives function as driving forces behind OER initiatives. More research is needed. It should also be emphasised that altruistic motives and economic incentives are likely to be in play simultaneously.

Motives for individuals

So far, the incentives for individual researchers, teachers and instructors to share learning resources are less comprehensively mapped and less well-known than the motives for open access publishing or participating in open source software projects. The motives for individuals to become engaged in OER, however, are probably similarly complex. Drawing on the literature (Fitzgerald, 2006; CED, 2006; Stacey, 2006) and the OECD case studies, four main groups of reasons appear:

- *Altruistic or community support reasons.* Sharing is a good thing to do, it stimulates further innovation, it offers personal satisfaction to know that one's materials are available and used all over the world, and it is a pleasure to develop things together with peers and share with others.

- *Personal non-monetary gain.* Publicity, reputation or "egoboo" within the open community. Specific gains from participating in OER activities include support for digitising the teaching materials and clearing copyrights to third-party materials, opportunities to restructure and systematise lectures and get feedback, and finally increased possibilities for future publication.

- *Commercial reasons.* A strategy for enhancing the commercialised version of the content. Creating an open content version of the material, *e.g.* a draft (pre-print) or a chapter, may in fact be a strategy for enhancing the final commercial product. Sharing may help get a new product to market more quickly, gaining a first-mover advantage, and it may help build a community of users that will support a new product or process; it may also stimulate sales of related products. Tracking use and reuse creates a form of market research and high use data that can be invaluable for launching commercialisation scenarios. Providers of tools (*e.g.* platforms) may treat users as co-developers, sharing freely tools they can use to create valuable content.

- *It is not worth the effort to keep the resource closed.* In cases of small but useful cumulative innovations, creators may conclude that it is not worth the time and effort to obtain copyright or a patent. Or, creators may conclude that intellectual property mechanisms may not effectively protect the innovation, for example if many others have similar information, if it would be difficult to keep the development a secret, and if the development can be easily replicated. Furthermore, there is the fact that "what is junk to one may be gold to another" – the digital junk of one person may be the building blocks of knowledge and creative genius for another.

Findings from the OECD questionnaire presented above in Figure 3.6 suggested that practical considerations were more important for teachers than altruistic concerns, such as assisting developing countries, outreach to disadvantaged communities, or bringing down costs for students. At the same time, however, the least important factor for respondents was personal financial reward. When asked about the most significant barriers among colleagues not using OER in their teaching, the respondents pointed out lack of time and skills, together with the absence of a reward system. Lack of technical know-how among faculty for producing and using OER is a recurrent theme in the OECD case studies. Another important barrier is the

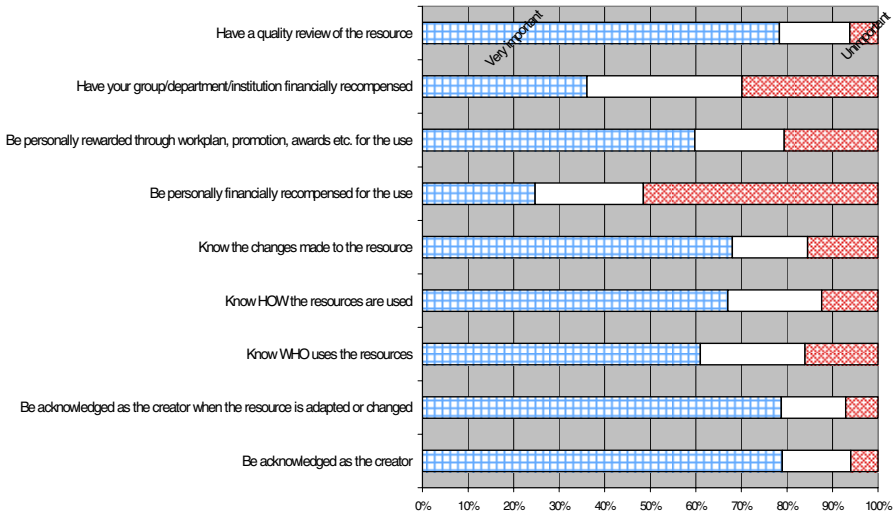
feeling of loss of control over materials and possible misuse or misunderstanding because of the lack of an appropriate context for the material, which is mentioned several times in the OECD case studies. A perceived lack of interest in pedagogical innovation among colleagues was also mentioned. The barriers described correspond to lessons learned in an Australian evaluation of an institutional learning environment, which included a learning resource catalogue (Koppi, 2003). The authors conclude that "[t]he issue of reward for publicising teaching and learning materials is of paramount importance to the success of a sustainable learning resource catalogue where the teaching staff themselves take ownership of the system". To establish a credible academic reward system that includes the production and use of OER might, therefore, be the single most important policy issue for a large-scale deployment of OER in teaching and learning.

Respondents to the OECD questionnaire were asked what is important to them as producers of open content, and they were asked to rank nine different alternatives from very important to unimportant. As shown in Figure 4.1, the factors ranked as most important were "to be acknowledged as the creator of a resource when it is used", and "when it is adapted or changed", and "to have a quality review of the resource". Financial compensation either to the creator him/herself or to his/her research group or department was considered the least important factor. Other kinds of rewards such as promotions, awards, etc., also seem not very important. This may suggest that many of those involved in producing OER are enthusiasts and people looking mostly for non-monetary gains.

The OECD case studies from institutions with OCW initiatives (Japan OCW Consortium, Johns Hopkins, ParisTech, Tufts), together with available data from MIT OCW, suggest growing support among faculty for participation once the initiatives have started. If this holds true, it is good news for the OER movement but the data are still weak and need to be closely monitored.

Research evidence suggests that one should not expect more than a small proportion of a community to be actively involved in projects of this kind (see Box 4.2).

Figure 4.1. What is important to you as a producer of open content



Source: OECD.

Conclusions

Education and science have a longstanding tradition of openness and sharing. The OER movement is but the latest example. However, when listing other motives for institutions to initiate OER projects, it becomes clear that what at first appears to be a paradox –giving intellectual property away in a competitive world – might actually be a way of handling a changing landscape for higher education. Institutions are experimenting with new ways of producing, using and distributing learning content, novel forms of covering their costs and more efficient ways of attracting students.

The same is true for individual teachers and researchers. Although many are driven by willingness to share and co-produce with peers, other motivations exist simultaneously, maybe even for the same individuals. One of the current strengths of the OER movement is that it allows multiple motivational systems to coexist.

Box 4.2. OLCOS Roadmap to open learning communities: How much contribution can be expected, and how can the level of participation be raised?

Learning content repositories that seek to establish a community around the content they hold will ask how many active contributors they may expect. One observer suggests: "It's an emerging rule of thumb that suggests that if you get a group of 100 people online then one will create content, 10 will "interact" with it (commenting or offering improvements) and the other 89 will just view it." (Arthur, 2006) For this pattern he cites available data for community content generation projects such as Wikipedia and discussion lists on Yahoo!. For example, on the Yahoo! Groups, 1% of the user population might start a group and 10% participate actively by starting a thread or responding to a thread in progress. The initial idea of a "1% Rule", *i.e.* that about 1% of the total number of visitors to an "online democratised forum" (such as a wiki, bulletin board or community that invites visitors to create content), was promoted by the marketing consultants Ben McConnell and Jackie Huba (2006).

The ratio of creators to consumers is also important with respect to learning communities which, among other activities, create content. But what really is important is not the "1% Rule", but the question of how to achieve at least 10% of people who add something to the initial activity and content. In an OLCOS expert workshop, Graham Attwell from Pontydysgu (Bridge to Learning) proposed what may be called the "searching–lurking–contributing" theory of learning processes: *i)* first, persons interested in a topic will "Google" some links; *ii)* then they will find denser places of content, such as a website of a community of interest, a thematic wiki, weblogs of experts on the topic, etc.; *iii)* then they will become "lurkers", *i.e.* come back to find new information, discussions, commentaries, links, etc. If the community has a newsletter or an RSS feed they may also subscribe to such services. Finally, *iv)* if they feel "familiar" with the community they may also become contributors. So, a strategy for educational communities that want to raise the number of active participants and content contributors is first of all not to shut out learners who just want to observe what is going on. Furthermore, it is important to actively "grow" the community through direct information channels (*e.g.* a regular e-mail newsletter or RSS feed) and opportunities to participate (for other options that help to "familiarise" interested people, see the practical suggestions by Ross, 2002, and SitePoint Community, 2003).

But how large can the active core of group members become? According to anthropological insights, a useful benchmark may be 150 individuals (Dunbar, 1996). This is confirmed by findings about the size of tribes, the growth of firms (which above 150 people acquire a more rigid, bureaucratic structure), or the number of scientists who co-operate and form a network around a specific research problem.

Source: OLCOS (2007).

So far few governments have seized the opportunity to use OER projects as a way to promote lifelong learning and to widen participation in higher education. With the projects described in this report as beacons, it can be hoped that more projects will be initiated. Furthermore, even if the list of technological drivers facilitating production and use of OER is further extended in Chapter 7, it is already clear that there is a strong trend towards greater user involvement both outside higher education in the form of user-

created content and within institutions. Institutions' efforts in the form of clearer policies regarding copyright ownership, promotion of using open licences, and above all reward systems for teachers and researchers that encourage the use and production of OER, are likely to have positive effects. Drivers, inhibitors and motivations for developing and sharing OER are summarised in Table 4.1.

Table 4.1. Drivers, inhibitors and motivations for developing and sharing open educational resources

Governments	Institutions	Individuals
Widening participation in higher education	Altruistic reasons	Altruistic or community supportive reasons
Bridge the gap between non-formal, informal and formal learning	Leverage on taxpayers' money by allowing free sharing and reuse between institutions	Personal non-monetary gain
Promote lifelong learning	"What you give, you receive back improved"	Commercial reasons
	Good public relations and showcase to attract new students	It is not worth the effort to keep the resource closed
	Growing competition – new cost recovery models are needed	
	Stimulate internal improvement, innovation and reuse	

Underlying drivers	Underlying inhibitors
Technical: Increased broadband availability; increased hard drive capacity and processing speed; new and improved technologies to create, distribute and share content; simpler software for creating, editing and remixing.	Technical: Lack of broadband and other technical innovations
Economic: Lower costs for broadband, hardware and software; new economic models built around free content for recovering costs.	Economic: Lack of resources to invest in broadband, hardware and software. Difficulties to cover costs for developing OER or sustaining an OER project in the long run.
Social: Increased use of broadband, the desire for interactivity, increased skills and willingness to share, contribute and create online communities.	Social: Absence of technical skills, unwillingness to share or use resources produced by someone else.
Legal: New licensing regimes facilitating sharing of free content.	Legal: Prohibition to use copyrighted materials without consent.

Chapter 5

Copyright and Open Licences

The chapter looks into copyright and open content and the limited exceptions to the rights of the copyright owner. The Creative Commons licences are discussed as well as important barriers to the further use and production of open educational resources raised by copyright law, such as practical difficulties for obtaining rights to use digital resources, commercial use of open educational resources and a lack of awareness among academics regarding copyright law.

The Internet and associated digital technologies provide an enormous potential for accessing and building information and knowledge networks. Information and knowledge can be communicated in an instant across the globe, cheaply and with good quality, by even the most basic Internet user. In short, recent developments in digital technology have opened up a vast new landscape for knowledge management.

Copyright is a part of what is generally referred to as intellectual property rights. According to Wikipedia, intellectual property is an umbrella term for various legal entitlements which attach to certain types of information, ideas or other intangibles in their expressed form. The holder of this legal entitlement is generally entitled to exercise various exclusive rights in relation to the subject matter of the intellectual property. The term intellectual property reflects the idea that this subject matter is the product of the mind or the intellect, and that intellectual property rights may be protected by law in the same way as any other form of property. Intellectual property laws are designed to protect different forms of subject matter, although in some cases there is a degree of overlap.

The five main categories of intellectual property are:

- *Copyright* covers creative and artistic works (*e.g.* books, movies, music, paintings, photographs, software) and gives the copyright holder the exclusive right to control reproduction or adaptation of such works for a certain period of time.
- *Patents* may be granted for a new, useful and non-obvious invention, and give the patent holder an exclusive right to exploit the invention commercially for a certain period of time (typically 20 years from the filing date of a patent application).
- *Trademarks* protect distinctive signs which are used to distinguish the products or services of different businesses.
- *Industrial design* protects the form of appearance, style or design of an industrial object (*e.g.* spare parts, furniture, textiles).
- *Trade secrets* are secret, non-public information concerning the commercial practices or proprietary knowledge of a business, public disclosure of which may sometimes be illegal. They are sometimes either equated with, or a subset of, "confidential information".

Intellectual property law is a highly specialised area requiring expert knowledge, particularly when taking into account the legal differences

among jurisdictions. For this reason the OECD Secretariat commissioned a paper from Brian Fitzgerald, on which this chapter particularly draws. The full paper is available on the project website (*www.oecd.org/edu/oer*). Since the purpose of this report is to give an overview of the open educational movement and the most important issues emerging from growing interest in this field, this chapter will be restricted to copyright issues, and content issues in particular, leaving licences for open source software tools aside. The reason is that licences for open source software are less problematic at present and of less immediate interest to the general academic population.

Copyright and open content

Copyright law takes its definition from international conventions and is similar in most countries. It provides that one cannot reproduce, copy or communicate/transmit to the public copyright material (literary, dramatic, musical and artistic works, films and sound recordings) without the permission of the copyright owner. In short, the default rule is that all uses not expressly permitted by the copyright holder are prohibited. Copyright primarily serves an economic function by granting creators monopoly rights in their creations for a limited time (usually the life of the creator plus 50 to 70 years). Copyright enables them to receive remuneration (should they wish to) for their use of those creations. This in turn provides an incentive for further creativity and innovation. However, most copyright laws have been structured to provide a balance between providing incentives in the area of innovation and creativity and ensuring access to information for users of copyright material, while also being careful not to restrict competition in the marketplace. At the international level, copyright law has long been considered to be a balance of competing policy objectives such as the rights of authors and the larger public interest, particularly education, research and access to information (Fitzgerald *et al.*, 2006).

There are some important (yet limited) exceptions to the copyright owner's monopoly. Permission may be provided by a statutory or compulsory licence (usually subject to the payment of a levy, royalty or licence fee), or not required at all, *e.g.* where an insubstantial part is used or fair use or fair dealing occurs. Private use and educational use are permitted in most jurisdictions to some degree, as either fair use or fair dealing, under a statutory or compulsory licence, or as the result of a specific exception. However, these exceptions are invariably limited in scope and confined to certain specific circumstances. Therefore, while the technology has the capacity to facilitate significant use of copyright material for private or educational purposes, legal restrictions on the reuse of copyright material will often hamper its full exploitation in the digital environment.

Box 5.1. The Creative Commons licences

Creative Commons licences are part of a genre of licences that are used to negotiate legal rights in digital content. Many other types of open content licences exist; however, the Creative Commons licences have gained significant attention and popularity over the last three years. The Creative Commons licences are not designed for software, but are intended for use in relation to other kinds of creative copyright material: websites, educational materials, music, film, photographs, blogs, etc. Along with the text of the various open content licences, the project has developed metadata that can be used to associate creative works with their licence status in a machine-readable way. In addition to certain "baseline" rights and restrictions which are included in all Creative Commons licences, the copyright owner can choose among a number of licensing options, which can be used alone or in combination.

Baseline features

The following features are common to all Creative Commons licences:

- Licensees are granted the right to copy, distribute, display, digitally perform and make verbatim copies of the work into the same or another format.
- The licences have worldwide application for the entire duration of copyright and are irrevocable.
- Licensees cannot use technological protection measures to restrict access to the work.
- Copyright notices should not be removed from copies of the work.
- Every copy of the work should maintain a link to the licence.
- Attribution must be given to the creator of the copyright work (BY).
- They are "fair use/fair dealing plus" in that they grant a layer of protection on top of and in addition to the scope of activity that is permitted under existing copyright exceptions and limitations.

Optional features

Copyright owners can choose from among the following optional licence conditions:

- Non-commercial (NC): Others are permitted to copy, distribute, display and perform the copyright work – and any derivative works based upon it – but for non-commercial purposes only.
- No derivative works (ND): Others are permitted to copy, distribute, display and perform exact copies of the work only and cannot make derivative works based upon it.
- Share Alike (SA): Others may distribute derivative works only under a licence identical to that covering the original work.

By mixing and matching these elements, copyright owners can choose between the following six core licences:

- Attribution (BY): This is the most accommodating of the licences offered, in terms of what others can do with the work. It lets others copy, distribute, reuse and build upon the work, even commercially, as long as they credit the copyright owner for the original creation.

- Attribution-Non-commercial (BY-NC): This licence lets others copy, distribute, reuse and build upon the work, as long as it is not for commercial purposes and they credit the copyright holder as the original author.
- Attribution-Share Alike (BY-SA): This licence lets others reuse and build upon the work even for commercial purposes, as long as they credit the copyright holder and license any derivative works under identical terms.
- Attribution-Non-commercial-Share Alike (BY-NC-SA): This licence lets others reuse and build upon the work, as long as it is for non-commercial purposes, they credit the copyright holder and they license their new creations under identical terms.
- Attribution-No Derivatives (BY-ND): This licence allows use of a work in its current form for both commercial and non-commercial purposes, as long as it is not changed in any way or used to make derivative works, and credit is given to the original author.
- Attribution-Non-commercial-No Derivatives (BY-NC-ND): This is the most restrictive of the six core licences. It is often called the "advertising" licence because it only allows a work to be copied and shared with others in its original form, and only for non-commercial purposes and where credit is given to the original author. This licence does not allow the creation of derivative works or the use of the work for commercial purposes.

The licences come in three layers:

1. (A "human-readable" Commons Deed, (a simple summary of the licence) which describes the freedoms associated with the content in terms anyone should be able to understand.
2. A "lawyer-readable" Legal Code – a (dense legal "fine print") licence – that makes enforceable the freedoms associated with the content.
3. Machine-readable metadata that makes the freedoms associated with the content understandable by computers.

Both the first and the second layer are "ported" (linguistically translated and legally adapted) into other languages.

The Creative Commons licences were launched in December 2002. One year later there were about 1 million linkbacks to the Creative Commons licence. In December 2004 there were 6 million linkbacks, and in December 2005 45 million. In June 2006 there were 145 million linkbacks, a clear sign that the use of Creative Commons licences is growing exponentially.

As of June 2006, the use of the different licence options had the following distribution:

- Attribution (BY) is used by 96.6% of all licensors.
- Non-commercial option (NC) 67.5%.
- Share Alike (SA) 45.4%.
- No derivatives (ND) 24.3%.

There seems to be a tendency over time towards people choosing more flexible licences. The use of the NC option has decreased from 74% in February 2005, and the same trend is visible for the ND and SA options (down from 33% and 49% respectively in February 2005). It also worth noting that two-thirds of all licensors permit derivative works.

Source: Creative Commons, Fitzgerald (2006).

As Fitzgerald *et al*. (2006) explain, the growth of this new digital and virtual knowledge landscape has also created a potential for greater control by copyright owners over access and usage. The rising costs of subscriptions to key academic journals, in large part made possible by, and implemented through, the first generation of digital distribution and licensing models, has motivated a frustrated research community to find new ways to disseminate knowledge. Faced with the enormous potential of the Internet and the increasing limitations presented by traditional journal licensing, researchers worldwide have united in a movement known as open access, which aims to disseminate knowledge broadly and freely across the Internet in a timely fashion. Reinforced by the fact that much research is publicly funded, the open access movement has captured worldwide attention and support. As shown in Chapter 4 the OER movement shares these drivers with the open access movement and is exploring new ways of creating, distributing and sharing educational materials. Choosing the same strategy as the open source software movement, they have not become anti-copyright. Instead they build on different kinds of open licences. The vision behind the creation of open licences is a space in the Internet world, a creative commons, where people can share and reuse copyright material without fear of being sued. This requires copyright owners to agree or give permission for their material to be shared through a generic licence that gives permission in advance. Today, the Creative Commons licence is by far the best-known and most-used licence for content (see Box 5.1). There are many similar licences, particularly for open source software tools. The actual number is partly dependent on how one is defining "open".

Creative Commons is a worldwide project. At the time of writing, the licences had been translated to meet legal requirements in 35 countries with another 24 working on doing so. Creative Commons aims to build a distributed information commons by encouraging copyright owners to license use of their material through open content licensing protocols and thereby promote better identification, negotiation and reutilisation of content for the purposes of creativity and innovation. It aims to make copyright content more "active" by ensuring that content can be reutilised with a minimum of transactional effort. As Creative Commons highlights, the use of an effective identification or labelling scheme and an easy-to-understand and implement legal framework is vital to furthering this goal. This is achieved by establishing generic protocols or licence terms for the open distribution of content which can be attached to the content with a minimum of fuss under a Creative Commons label (see Box 5.1). In short, the idea is to ask willing copyright owners to "license out" or distribute their material on the basis of protocols designed to enhance reusability and build the information commons.

Open licences like those of Creative Commons are not trying to undermine copyright. On the contrary they rely on the power of copyright ownership and law to structure open access downstream. As Fitzgerald and Fitzgerald (2004) explain:

> "The powerful insight that Richard Stallman and his advisers at the Free Software Foundation...discovered was that if you want to structure open access to knowledge you must leverage off or use as a platform your intellectual property rights. The genius of Stallman was in understanding and implementing the ethic that if you want to create a community of information or creative commons you need to be able to control the way the information is used once it leaves your hands. The regulation of this downstream activity was achieved by claiming an intellectual property right (copyright in the code) at the source and then structuring its downstream usage through a licence (GNU General Public Licence). This was not a simple "giving away" of information but rather a strategic mechanism for ensuring the information stayed "free" as in speech. It is on this foundation that we now see initiatives like the Creative Commons expanding that idea from open source code to open digital content."

In a digital world where educational users increasingly engage with a culture of cut and paste, remix, collaboration and instant Internet access, open content licensing will provide a vitally important facility for sharing and reshaping knowledge in the name of culture, education and innovation. While respecting the basic principle of copyright, open content licensing allows a broader understanding of information management in a way that builds on the existing system. There can be little doubt that open content licensing will become an important option in the copyright management, distribution and utilisation of educational resources.

The different versions of the Creative Commons licence described in Box 5.1 can be linked to the discussion of openness in Chapter 2. The first baseline feature, stating that "licensees are granted the right to copy, distribute, display, digitally perform and make verbatim copies of the work into another format", guarantees a Level I openness to all materials licensed under Creative Commons. As long as it is possible to read or access the information contained in the resource, Level I openness is compatible with the most restrictive version of the Creative Commons licence. Level III openness, on the other hand, which requires the right to modify and add value to a resource, would not be compatible with the No Derivatives clause in the Creative Commons licence. As will be explained in more detail in Chapter 6, the issue of commercial uses of OER is a growing concern. The different levels of openness do not have much to say about commercial use

of the content or tools, but as shown in Box 5.1 a Non-Commercial clause would exclude all such use.

Criticism of Creative Commons comes both from proponents of free content as it was defined in Chapter 2, and from commercial players that view Creative Commons as a threat to the rights of creators.[1] According to the latter, publishers and users alike will be less willing to pay for work that is also available for free; therefore, Creative Commons licences and others devalue creative works. Freedom activists disapprove of Creative Commons on the grounds that the suite of licences is mostly referred to as a whole, although some options – namely the No Derivatives and Non-Commercial clauses – are not compatible with "free content" as defined by Mako Hill and Möller. Stallman, among others, says he is not willing to support the Creative Commons at present because of this deficiency.[2] The Creative Commons project has developed a new set of icons to make it clearer which type of licence options are used in different circumstances.

Barriers

Fair use and educational use

Two important exceptions generally apply to the rule that without permission one cannot reproduce, copy or communicate copyright material to the public: fair use/fair dealing and educational use. In their White Paper on obstacles to educational use of copyrighted material in the digital age, Fisher and McGeveran (2006) conclude that the exceptions to copyright that may protect uses of content for digital learning are "frequently narrow, cumbersome, incompatible with new technology, or vague".

In United States a classroom use exception gives teachers and pupils the right to use materials "in a classroom or similar place devoted to instruction". But it is not clear whether this exception allows for the use of a class webpage, blog or wiki even if online access is limited to teachers and students. Fisher and McGeveran (2006) explain that:

> "While the [classroom use] exception immunises teachers from liability for the public performance rights involved in displaying content in the classroom, other rights, including reproduction rights, are not included. When teachers simply displayed directly an analog copy of the work, this was sufficient. In a digital environment, however, incidental reproduction is commonplace – as when a teacher inserts an image into

1. See *http://wiki.creativecommons.org/CcDebate#Criticisms_of.*

2. See *www.fsf.org/blogs/rms/entry-20050920.html* and *http://yro.slashdot.org/article.pl?sid=06/02/07/1733220.*

> a PowerPoint slide. … While there are good arguments that the reproduction is protected under the fair use doctrine, the omission of other rights certainly limits the effectiveness of the classroom use exception."

The US Technology, Education and Copyright Harmonization Act of 2001 represents an attempt by the Congress to update educational use exemptions in light of new technological realities. According to Fischer and McGeveran (2006), the new provision for distance learning does provide some limited additional protection for educators operating in a digital environment. However, a number of stipulations sought by rightsholders were also incorporated in the statute. In combination, these restrictions – one of the primary problems being the restriction of the scope of digital learning covered – so limit the reach of the act, and make it so difficult for educators to comply with its requirements, that most observers believe the exception from liability it offers has little or no value.

The White Paper also examines the situation in a number of other countries. In India and China legislation seems to be more favourable to online learning, while countries in Europe are implementing the provisions of the European Union Copyright Directive in rather different ways. Four clusters of countries are identified: some allow the reproduction and the making available of articles and short excerpts of books (Belgium, Germany, Greece, Hungary, Lithuania); some allow short excerpts only (Luxembourg, Portugal, Slovakia); some have a provision similar to the US face-to-face teaching exception but recognise virtually no other non-infringing educational use (Estonia, Slovenia); and finally one country (Malta) seems to be highly permissive, as it has transposed the directive (almost) literally. In addition, a number of countries (including Denmark, Sweden and the United Kingdom) implement the education-related aspects of the European Union Copyright Directive through collective licensing schemes (in some cases combined with fair dealing) rather than through statutory exceptions. Broadly speaking, the situation seems easier in most countries than in the United States.

While the primary aim of the White Paper is to identify obstacles to the educational use of digital material, some ways forward are described that may restore what is described as "the appropriate balance". Among the identified paths are: the reform of at least some problematic rules in US legislation that would improve the status of educational uses of content; greater reliance on technology to help users analyse the need to secure licences for using content and to assist with such rights clearance where necessary; and increased distribution of content under more open licence models such as Creative Commons, thus enlarging the amount of content available for unencumbered educational use.

Practical difficulties for obtaining rights

Before publishing educational resources that make use of third-party materials on the Internet, the author, or the publisher, must ensure they have the right to use these materials. The clearance process – sometime referred to as the "permission maze" because of its complexity – requires the user to:

- Establish whether a licence is required or not, which sometimes requires sophisticated legal analysis.
- Locate the appropriate rightsholder, which is sometimes easy and sometimes not.
- Agree to a licence, which can be difficult since large rightsholders sometimes ignore small educational users since the potential revenue might not be sufficient to engage in a negotiation.
- Pay for the licence, which can be very expensive.
- Carry out other terms and restrictions of the licence such as a requirement that the educational user employ digital rights management systems to protect the content.

As Fisher and McGeveran (2006) point out, "trouble can arise at any of these points". It is obvious from the case studies carried out as a part of the OECD project that the difficulties and costs related to rights clearance for use of third-party content are considerable, in some cases almost half of the cost of the whole initiative.

Commercial use of open educational resources

As described in Box 5.1, authors using the Creative Commons licences can choose among four optional licensing conditions, one being the non-commercial clause. This option gives others permission to copy, distribute, display and perform the copyright work and derivative works based on it, but for non-commercial purposes only. Creative Commons explains this clause in the following way: "You may not exercise any of the rights granted to you…in any manner that is primarily intended for or directed towards commercial advantage or private monetary compensation."

This means that if anyone wants to use the work for a commercial purpose he/she must do so in agreement with the rightsholder. This clause is used by approximately two-thirds of all rightsholders using Creative Commons. However, there is no clear understanding of what constitutes "commercial use". Creative Commons' initial belief was that the term "non-commercial" should be left undefined so that communities would build their own definition and, if necessary, have recourse to the courts to set the

standards of what the term meant. Although different communities have developed their own understandings of the term, each community has not necessarily respected the definition of other communities. Instead, for example, members of "free and open source software communities", who believe that non-commercial means that absolutely no money can change hands anywhere in connection with a licensed work, have been adamant that members of the education community should not define non-commercial such that schools can charge for course packs.

For their part, many licensors in the education community believe that this activity is permitted under the non-commercial term. This discrepancy led Creative Commons to begin working on a reconciliation of the different community definitions of non-commercial. The challenge that Creative Commons faces in defining non-commercial is that a court will look at the licensor's intent when determining the meaning of the term, and possibly also at what the licensee understood the term to mean and/or industry practice; but it is unlikely to take into account Creative Commons' view of the meaning of the term. Although issuing draft guidelines may help users better understand what does and does not constitute permitted non-commercial use, this does not mean that Creative Commons will have the final say over what non-commercial use means. The draft guidelines look among other things at whether the user is an "allowable non-commercial user" such as an individual or a non-profit educational institution or library, if the work is used in or in relation to advertising, if money changes hands in exchange for services provided in connection with the work, and finally what derivative uses are made of the work.[3]

As an example of different communities' different understandings of the non-commercial clause, the guidelines issued by Creative Commons state that use of a non-commercial licensed work by a corporation is considered commercial while use of the same work by a not-for-profit entity is not commercial – meaning that higher education institutions established as commercial corporations should not be able to reuse such material. However, a similar set of guidelines from MIT states that for-profit companies may use materials with a non-commercial clause.[4]

Another issue related to the non-commercial clause is the fact that it makes it more difficult in practical terms to reuse content. The clause puts a restriction on the work that makes it incompatible with materials licensed under some other licences, particularly those that require the derivative work to be licensed under the same conditions as the original work. In Creative

3. See *http://creativecommons.org/weblog/entry/5752*.

4. See *http://ocw.mit.edu/OcwWeb/Global/terms-of-use.htm#noncomm*.

Commons this clause is called "Share Alike". In the open source software movement similar licences are called "copyleft". Works licensed under a Creative Commons "Share Alike" licence without commercial restrictions cannot be combined with content licensed under a Creative Commons "Share Alike" non-commercial licence. Critics of the non-commercial clause argue that the clause is harmful in two ways: it locks up a lot of content by limiting reuse, creating a significant barrier to the growth of free content in education, and it hinders the development of new economic models that add value around free content (Möller, 2005). It is said that the "Share Alike" clause might be a better choice since it requires any derivative work to be made available under the same conditions, meaning that any company trying to exploit the author's work will have to make their added value available for free to anyone. On the other hand, it could be said that it is not fair to single out the non-commercial licence as providing more of a barrier to compatibility than other licence conditions. The fact remains, however, that it is currently the most debated licence.

The above paragraphs show the importance of awareness of the consequences of using different licence options. The issue of unintended incompatibility (intended incompatibility will always remain) between materials or tools licensed under different licences, or different versions of the same licence, is an upcoming key issue. Increased interoperability in both technical and legal terms is of fundamental importance for the growth of the OER movement. The Creative Commons project has worked out an interoperability chart, available on their website, showing which combinations of licence options in Creative Commons work together. Their strategy to overcome problems with interoperability with other licences is to create a board of experts in licensing from around the world. This board will establish procedures by which similar free licences, upon submission from the licence curator, can be deemed compatible. If a licence is deemed compatible, Creative Commons will add metadata to express the freedoms associated with the content, and links to a Commons Deed, to explain the freedoms associated with the content. The Creative Commons will then certify the licence as within the federation of free licences.

Lack of awareness of copyright issues

So long as publication, consumption and distribution of texts were mediated through physical media, academics remained for the most part unaware of the licensing that underpinned the exploitation of copyright. The Internet and other digital media have changed this. Because they have access to publishing and production tools and through licensing access to a digital, ephemeral product rather than a physical object such as a book or print, researchers as well as teachers now engage with licensing as never before.

Yet, they are, for the most part, either unprepared or unwilling to engage in cumbersome licensing procedures.

Although many academics are willing to share their work, they often hesitate to do so in this new environment for fear of losing their rights to their work. The opposite of retaining copyright is to release work into the public domain, in which case the author retains no rights and anyone can use the material in any way and for any purpose. Even if this might be acceptable to some people some of the time, it is not unusual for an author to wish to retain some rights over his work, *e.g.* to stop third parties from making commercial use of the material without his/her consent. In 2002-03, the RoMEO project in the United Kingdom undertook a survey of 542 researchers to learn what kind of rights they wanted to retain over their work (Gadd, 2003). Over 60% were happy for third parties to display, print, save, excerpt from and give away their papers, but wanted this to be on the condition that they were credited as the authors and that all copies were verbatim, and 55% wanted to limit the use of their work to educational and non-commercial use. The RoMEO report concluded that the protection offered to research papers by copyright law is in excess of what most academics require. This demonstrated the need for institutions to offer training in copyright law to researchers and instructors. Open content licences have been developed to resolve this problem by providing a way to permit controlled sharing, with some rights reserved to the author.

The RoMEO project also showed that 41% of authors "freely" assign copyright to publishers without fully understanding the consequences. Findings from the OECD questionnaire and case studies show low awareness among teachers and researchers producing learning resources of the importance of using open licences, and few initiatives from institutions or government agencies to address this deficiency. This seems to support the assumption that raising the awareness of copyright issues and licences is an important challenge for the open culture movements. It may be that even easier ways of retaining only those rights that individual authors want to retain are needed, together with active advice and support from higher education institutions. A comparison of seven Australian universities underpins previous international research showing that relying solely on academics' voluntary deposits of research articles to open access archives will result in approximately a 15% contribution (Sale, 2006). Requirements to deposit research output in an open archive coupled with effective author support policy results in much higher deposit rates.

It is encouraging to note that in June 2006 Microsoft released a free copyright licensing tool, which easily enables the attachment of a Creative Commons licence to works created in Microsoft Office applications.

Policy recommendations

In addition to Fisher and McGeveran (2006), others are calling for action to restore the appropriate balance between rightsholders and the public interest. An international group of experts from the arts, creative industries, human rights, law, economics, science, technology, the public sector and education have developed a test, or set of basic rules, for lawmakers to consider before passing laws on intellectual property rights, called The Adelphi Charter. The charter states that:

> "The expansion in the law's breadth, scope and term over the last 30 years has resulted in an intellectual property regime which is radically out of line with modern technological, economic and social trends. This threatens the chain of creativity and innovation on which we and future generations depend." (*www.adelphicharter.org*)

As part of the Open Access to Knowledge (OAK Law) project, Fitzgerald *et al.* (2006) have developed an action agenda and recommendations for the Australian Department of Education, Science and Training regarding a legal framework for copyright management of open access within the Australian academic and research sector, which can also be useful for the OER movement. They recommend that each institution should develop and publish its policy on open access, clearly declaring its objectives and interests in providing materials by this means. Template guidelines and model documents should be developed to assist institutions practically in the establishment and management of open access systems, and should include:

- Guidance on the development of institutional open access policies, outlining different models of open access and providing means for determining and reviewing the categories of materials which are to be made available by open access and the scope of open access which is to be afforded, in terms of the classes of persons who are to be allowed access and the extent of rights granted to access and reuse the materials.
- Examples of model institutional open access policies, accompanied by explanatory statements of each open access policy.
- Guidance on matters to be considered when formally allocating responsibility to an appropriate office within the institution's governance structure, in order to ensure appropriate ongoing administration of the open access policy.
- Guidance on the operation of copyright and contract in structuring an open access system.

Furthermore it is essential to ensure that the rights exercised by the repository and end users are secured through the legal relationships between the relevant parties (or "stakeholders"). As well as the author and publisher, the stakeholders include (among others) the funding organisation, the author's employer, the digital repository and the end user. The rights to use the material will be determined by the application of principles of copyright law, together with the terms of any contract between the parties. To ascertain who is permitted to use academic materials deposited in a repository and the extent of the permitted use of such materials, it is necessary to identify the various stakeholders and their respective roles, describe the legal relationships among them and understand how copyright interests are allocated.

The OAK Law report proposes that, in order to provide practical assistance to institutions establishing or managing open access systems, template guidelines should be developed to describe the respective roles of each of the relevant stakeholders in the academic and research environment and how the relationships among them interact to determine:

- Whether academic and research output should be made available through open access channels.
- If so, the kinds or categories of material which are to be made available.
- The extent to which such material is to be available, that is, the extent of the rights granted to access and use the material.
- How the desired scope of access to and use of the identified materials can be secured within the legal framework applying in the particular institution.

Taking into account the differences in responsibilities between different policy levels among countries, these recommendations could very well serve as a model for institutions and countries looking at ways of promoting the development and use of OER.

Chapter 6

Sustainability Issues for Open Educational Resources Initiatives

The issue of sustainability is central to every open educational resources project. This chapter gives an overview of different ways of organising a project, possible cost recovery models, important trade-offs between costs and other issues, as well as factors to consider for the long-term survival of open educational resources projects.

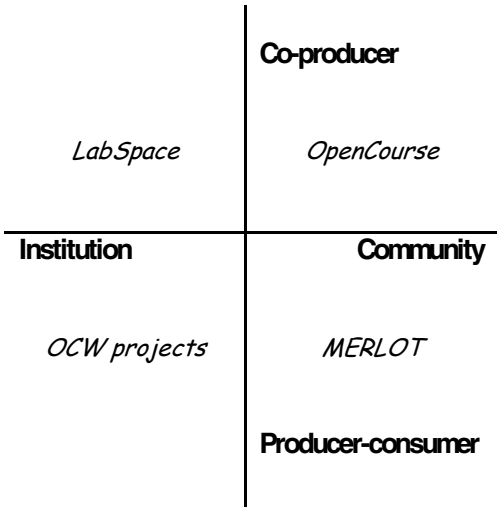
As the number of OER initiatives grows, the issue arises of how to sustain them in the long run. Anecdotal evidence suggests that most receive some initial funding from their own institution, from governmental funds or from private foundations, if they are not voluntary efforts made without consideration of their sustainability. However, once the initial funding ceases, it becomes urgent to find alternative ways of covering the costs of the operations. Sustainability is not simply an economic matter, although this is important, but also involves issues such technical maintenance, organisation, content models and scaling possibilities. How these and other issues affect individual initiatives depends very much on the size of the project and its institutional and financial basis. The OECD Secretariat commissioned a paper on sustainability issues from David Wiley on which this chapter draws heavily. Wiley's paper in turn draws to some extent on papers by Dholakia and Downes, also commissioned by the Secretariat. All these papers are available on the project website (*www.oecd.org/edu/oer*).

As described in Figure 3.2 above, it is sometimes useful to distinguish between different kinds of providers. At least three dimensions have an impact on how to approach the sustainability issues: the size of the operation (small or large), the type of provider (institution or community) and the level of integration of users in the production process (co-production or producer-consumer model). Figure 6.1 plots some initiatives to give examples of institution-based initiatives using the co-production model and the producer-consumer model, as well as community-based projects using the two different approaches.

LabSpace – a part of the OpenLearn initiative from the UK Open University – is an example of an institution-based project being opened for co-production of its resources. The other part of OpenLearn, called LearningSpace, would figure in the lower left corner in the figure together with all projects building on the opencourseware model. Since this model uses courses taught at universities it must have institutional backing and the courses are generally produced by the teaching staff and consumed by others. The Open Course initiative hosts mostly discipline-oriented communities that develop, evaluate and use open content. According to their website it is "a collaboration of teachers, researchers and students with the common purpose of developing open, reusable learning assets". Stephenson (2005) describes this as an ecosystem where "those creating, using and improving open content form an ecosystem". MERLOT, on the other hand, is also community-based but less oriented towards collaborative production

of resources. It is more a place to exchange and share with peers than to co-produce.

Figure 6.1. Examples of projects using the co-production and producer-consumer model



As Downes (2006) shows, the producer-consumer model is more likely to be managed centrally and involve professional staff. The model offers more control over quality and content, but requires higher levels of funding. The co-producer model, instead, is more likely to depend on decentralised management, may involve numerous partnerships, and may involve volunteer contributors. There is little control over quality and content, but such approaches require much less funding.

Growing competition among higher education institutions and the need to either find sources of savings or new revenue models might explain some of the institutional interest in OER. Institutions might even in some cases see OER projects as a way to sustain the institution itself, by earning revenue for the institution as well as the project, by cutting the institution's costs or by increasing enrolments and thereby income. There are also examples of institutions rethinking their publication strategy by working closely together with an OER project. Rice University, for example, which had close links to the OER project Connexions, has recently re-launched its university press which has been dormant for ten years. The university considers that the new technology offers new ways to use multimedia to

publish original works on demand.[1] Using the technology and publishing platform developed by Connexions, Rice University's first e-publication was issued in October 2006. Rice University Press will also work together with other university presses.

As Wiley explains (2006b), sustainability is often viewed as a project's ability to continue operations. While the idea of *continuation* is certainly a critical part of the meaning of sustainability, no value should be placed on the simple continuing existence of an unproductive project and staff. The definition of sustainability should include the idea of *accomplishing goals* in addition to that of longevity. Hereafter, sustainability will be defined as an OER project's ongoing ability to meet its goals. OER projects must find two unique types of sustainability.

- They must find a way to sustain the production and sharing of OER.
- Of equal importance, they must find a way to sustain the use and reuse of their OER by end users (whether teachers or learners).

The first challenge must be considered in two parts: *i)* the sustainable production of OER; and *ii)* the sustainable sharing of resources. For the first part, producing OER requires human resources, workflow processes and supporting technology. At a minimum, someone must capture content, digitise it, check it for copyright issues, resolve copyright issues, and provide quality assurance of the final product. All this involves computers, access to the network, and one or more supporting software tools. There are real costs involved in people's time, developing workflow policies, purchasing computers, connecting to the network, and acquiring and administering software. Meeting these costs is one part of the sustainability challenge. For the second part, copies of the finalised OER must be distributed to end users. This can mean distribution of digital copies over the Internet, distribution of digital copies of the resources on physical media such as hard drives, DVDs and USB "thumb" drives, or printed paper copies. Each of these distribution methods has real costs, including bandwidth for distributing digital copies online, and media inventory, duplication and shipping costs for physical media and paper. Meeting these costs is another part of the sustainability challenge for OER projects.

The second challenge is to meet the goals of an OER project and thus avoid any risk of spending years producing and sharing resources that teachers and learners are unable to use. If possible, resources should be shared in a format that operates equally well across hardware and operating system platforms and sourced in such a way that local adaptations can be

1. Rice News and Media Relations, 13 July 2006.

made. But, as discussed by the MIT OCW project (d'Oliviera, 2006), in the case of resources not originally created for digital publication, there is a clear trade-off between publishing as many resources as possible as is, converted to a PDF format, and converting the resources to formats more open for adaptation and reuse but requiring more work. XML is an emerging standard for Internet publishing which allows maximum flexibility for display, manipulation and repurposing of content. But creating rich XML documents requires familiarity with the course and subject matter to ensure proper coding and structuring of content, and can be accomplished neither by automated conversion tools alone nor by human transcribers who lack knowledge of the content. The conclusion by the MIT OCW project is that:

> "Unless original course materials were submitted to OCW in XML or in a structure that could easily be transformed into XML, publishing in XML would add an untenable level of effort (double or more in some cases) to the production process for most types of courses." (d'Oliviera, 2006)

Users may need technical tools to make effective reuse of resources; they may also need training or to see examples of how such localisation can be performed. Finally, in order to adhere to the Share Alike licence used with many OER, users need either a place to put their derivative works themselves or one on which others can find their derivative works. Again, there are real costs associated with taking the trouble to source content in an easily editable, cross-platform manner, in providing novel tools for resource localisation, in providing training about the localisation process, and in providing mechanisms for users to meet their Share Alike obligations. Meeting these real costs is another part of the sustainability challenge for OER projects.

Meeting such costs so that projects can continue to achieve their goals is not a problem unique to OER projects. However, the firm determination to give away the results of all these efforts, with no "cost recovery" mechanism, is a special characteristic of OER projects. Without a way of bringing in money, how is a project to obtain the resources necessary to keep pace with its real costs from year to year?

Organising open educational resources initiatives

There is growing interest in understanding voluntary Internet communities. So far most of the focus has been on open source software communities (Weber, 2004), but Benkler's (2005, 2006) analyses of "peer production" or community-based production of content and a number of articles on the Wikipedia phenomenon accord greater attention to voluntary

and collaborative content production. The intriguing question for community-based, or peer, production is how it works in terms both of getting people involved and of co-ordinating their work. Benkler (2005) argues that an important reason for the success of the open source software production model is that many people can contribute small modules. The task looks more attractive when one does not need to devote too much time to it. When many people are involved, the burden on each becomes lighter. The possibility of contributing small modules of content has helped ensure the success of Wikipedia, while the Wikibook project has not had the same success. This may be because book chapters cannot be divided into small enough parts; if the bits are small, the process of compiling individual contributions into chapters is probably more time-consuming than writing the book oneself.

The organisational aspect of the work requires a form of organisation that recognises and promotes volunteers' motivations for sharing. Thus, Downes (2006) argues, a volunteer organisation needs a clear overall vision, strategy and roles for participants. For example, the open source software community Apache Foundation is explicitly a meritocracy that organises its volunteer staff, with vice-presidents responsible for different products, volunteers serving roles varying from "developers" to "committers" to "users". Members who have developed significantly may become a "Project Management Committee member [who] is a developer or a committer that was elected due to merit for the evolution of the project and demonstration of commitment" (*www.apache.org*).

The co-production and producer-consumer approaches also need to organise work differently. Consider, for instance, the production and selection of learning materials for use. MERLOT, for example, uses the producer-consumer approach and invites volunteer contributions. But it also, as far as possible, subjects the material to professional review by peer committees, very much like an academic journal. The production and selection process, therefore, is formalised, and to a good degree centralised. It is also considerably slower than a model in which anyone is allowed to submit a contribution. At MERLOT, only 14% of materials submitted have been reviewed (Hanley, 2005). Against this background, Downes argues that the workflow needs to be reorganised and not seen as something that is *done for learners* and supported through some sort of sustainable (or commercial) programme. Instead it should be looked at "as something that learners *do for themselves*, and indeed, that any act of learning consists in exactly these steps". He also cites Wiley (2005):

> "It seems to me that sustainability and scalability are problematic only when people rely on others to do things for them. Scalability and sustainability happen more readily when people do things for

themselves. Centralising open educational services is less scalable/ sustainable. Decentralising them is more scalable/sustainable. Wikipedia has two employees and well over a million articles in multiple languages. We need to learn this lesson if open education is really going to reach out and bless the lives of people."

From a co-production perspective, it can be concluded that the sustainability of OER – in a fashion that results in both affordable and usable materials – requires thinking of OER as only part of a larger picture, one that includes volunteers and incentives, community and partnerships, co-production and sharing, distributed management and control.

Costs and revenue models

The actual costs of running an OER project vary considerably. OpenLearn, launched by Open University in the United Kingdom, has a budget of almost USD 5 million a year for the first two years. The budget for MIT OCW is USD 4.3 million a year with some 29 staff. The Stanford Encyclopedia of Philosophy costs roughly USD 190 000 a year (Zalta, 2005) and the OCW initiative at Utah State University has one full-time project director and five part-time student assistants and a budget of USD 127 000 a year (Wiley, 2006). The OCW project at the University of the Western Cape in South Africa runs its operation with three staff and approximately USD 44 000 a year. Other initiatives with more of a community-based approach will probably have lower costs, as they depend more on voluntary work by community members.

Although it is important to point out that real costs can be met with resources other than money, most initiatives need to raise some money some of the time. To this end a number of funding models can be considered. Dholakia (2006) and Downes (2006) have identified a variety of options to explore.

- The *replacement model*, in which open content replaces another model and can benefit from the cost savings resulting from the replacement. This model has a natural limit since it can only generate the amount of resources it replaces.
- The *foundation, donation or endowment model*, for which the funding for operations is provided by an external actor. It is primarily a start-up model that will most likely not be viable in the long run, but might be transferred to a *government-support model*, which can be a long-term option in some countries.

- The *segmentation model*, in which the provider provides resources for free but also provides "value-added" services to user segments and charges them for services such as sales of paper copies, training and user support, ask-an-expert services, etc. This model, together with the conversion model, is currently among the most used in the education sector.
- The *conversion model,* by which "you give something away for free and then convert the consumer to a paying customer".
- The *voluntary support model*, which is based on fund-raising campaigns. Another version of this model is the *membership model* according to which a group of interested parties – organisations or individuals – is invited to contribute a certain sum as seed money or on an annual basis (see Box 6.1).
- The *contributor pays model* in which the contributors pay the cost of maintaining the contribution, which the provider makes available for free. This basic open access model may also be used by OER projects.

Other options include advertising and sponsorship. Since each initiative is unique no single model will fit all. Instead there is a need to discover different approaches that might be useful in a local context. Dholakia (2006) also stresses that growing competition among initiatives creates a need to develop strong brands, user communities, increased site usability and improved quality of the resources offered. Community "marketing" is important because it enables users to form strong connections to the website, and the institution can in turn learn from the community about what works and what does not work on the website. The "community" also offers possibilities for rapid diffusion, and a strong community influences user behaviour and increases the likelihood that users will come back to the repository.

Policy issues regarding the sustainability of open educational resources projects

A variety of policies can enable or hinder OER projects. Since the community model builds on voluntary work and enthusiasts, sustainability is not so much a matter of financial resources as of dismantling barriers that hinder the flourishing and growth of the community. Tentative policy actions could seek alternatives to the existing intellectual property rights regime and work to encourage donors to fund not only institutional initiatives but also loosely organised communities.

Box 6.1. The case for Creative Commons textbooks

According to a report from the General Accounting Office the cost of commercial textbooks for undergraduate students is now approaching USD 900 a year in the United States. In this situation one may wish to consider whether higher education institutions and students could save money by using a substitute for commercial textbooks.

Beshears (2005) has argued that schools should form a consortium (see the "membership model" above) to develop and acquire textbook content from one or more strategic partners (*e.g.* the UK Open University) and distribute that content as digital textbooks, which could replace commercial textbooks. Beshears' calculations indicate that a coalition of 1 000 higher education institutions could "buy out" the UK Open University (*i.e.* cover their annual development costs) for around USD 75 000 a year per institution. If the institution would like to recover the annual membership dues (USD 75 000) by charging a student fee, the fee would come to around USD 3.75 a year per student for an institution with 20 000 students (USD 75 000 divided by 20 000 students), far less than the current annual cost of textbooks. In some cases university libraries pay around USD 75 000 for a subscription to a single academic journal.

Beshears presents three local models to encourage faculty to switch from commercial textbooks to OER. In brief, they are:

- *The jawbone*: A simple library resource model that assumes that if we build it, and if we tell them about it (jawbone them), then they will come.
- *The stick*: An administrative fiat model, whereby faculty are told they have to use open content as a substitute for commercial textbooks. This model may be used in developing countries where students cannot afford commercial textbooks.
- *The carrot*: A financial incentives model that would involve student fees and faculty stipends.

If a school adopts the carrot model, it could, for example, establish a course materials fee for their biggest courses that use textbooks. The fee would be based on the cost of textbooks for these courses. So, if students were currently paying an average of USD 500 a year for the 100 biggest courses, then the course materials fee for these courses would be USD 500 a year. Students would not have to buy textbooks for these courses. Faculty would be still free to assign commercial textbooks; and, in that case the books would be purchased with the fee. However, if the faculty elects to use the open content from the OpenTextbook consortium, they could apply for a grant that would give them a stipend to customise the material for their course. These grants would be paid out of the revenue from the fee. Content developed by faculty paid through the grant would be made available for public use under the terms of a Creative Commons licence. If faculty decide to use open content but do not apply for a grant, then the savings could be refunded to students as a patronage refund (i.e. a refund similar to those distributed by consumer co-operatives).

Source: Beshears (2005).

While institutions can co-ordinate such projects, faculty who voluntarily share their creative works are the primary force behind the success of these projects. According to Wiley (2006b), the most salient policy question a higher education institution can ask is what can be done to provide incentives for faculty to participate in an OER initiative. One action that would both improve transparency and accountability in teaching would be to include teaching portfolios or similar requirements as part of the tenure process and to promote the conversion of at least one course into an OER format as part of the documentation of excellence in teaching.

The next most salient institutional policy question for champions of OER in higher education is: "What current institutional policies create obstacles for faculty who wish to open access to one or more of their courses?" Examples of such policies may include those that discourage faculty from engaging in online teaching activities before tenure and policies by which institutions control intellectual property developed by their faculty.

From a national or regional point of view increased funding to encourage institutions of higher education to work on OER projects is still unusual. However, policies that provide institutions with explicit permission to use previously allocated monies for this purpose may encourage engagement. National or regional discussions regarding institutional policies that can promote faculty engagement, or at least lower barriers to faculty engagement, may be useful.

Summing up issues relating to sustaining open educational resources projects

Sustaining work the results of which are given away for free is difficult. There is no way around this conclusion. However, careful consideration of the following list of factors, offered by Wiley (2006b), should increase an OER project's chances of long-term survival in order to continue to meet its goals over many years.

- OER projects must explicitly state their goals and focus strongly on them. If sustainability is a project's ongoing ability to meet its goals, then without a clear understanding of its goals no OER project can be sustainable.
- The next several factors must be addressed conjointly. In the context of project goals, an OER project must make decisions about:
    - Its organisation: size, structure and degree of centralisation. Smaller organisations or more decentralised organisations are less expensive to sustain, but may be less able to create large numbers

of resources in a short period of time. They may be less able to move in a specific, predetermined direction.

- The types of resources it will offer and the media formats in which these resources will be shared. The easiest format for capturing resources will sometimes be a difficult format for users willing to adapt the resources. However, when resources are not originally designed for digital publishing there is a trade-off between publishing as many resources as possible and using formats more open for adaptation and reuse.
- The types of end user reuse that are most likely to help the project meet its goals. Decisions must be made about how much explicit support will be provided to users in support of their reuse of the content. Will the website link to these tools offsite? Will they be integrated into the website itself? If the project is centralised, explicit support is always available but becomes expensive. If it is decentralised across a network of volunteers, explicit support is inexpensive but somewhat unreliable.

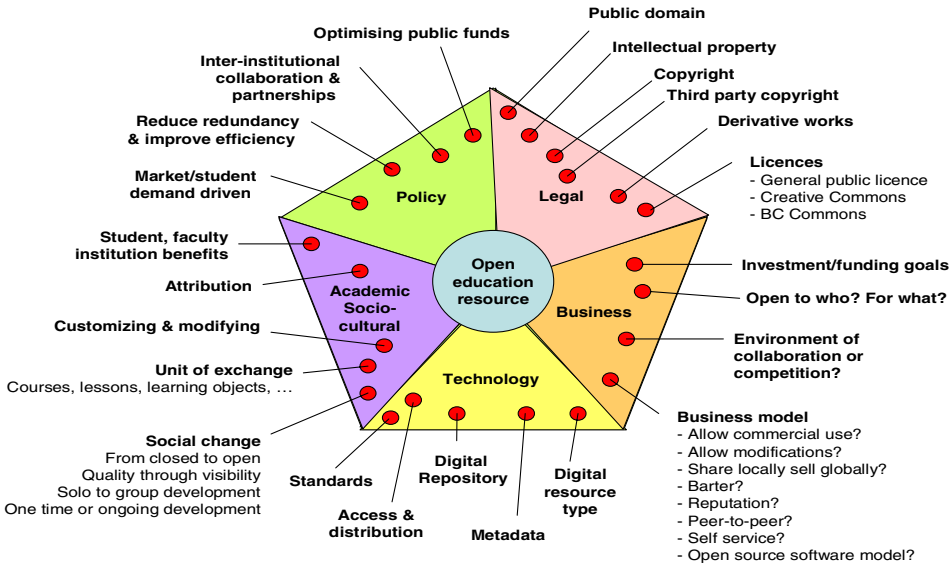
- Finding and utilising non-monetary incentives to engage as many participants as possible. Utilising student volunteers in production, decentralising support responsibilities across the group of users, and leveraging organisational rewards for participation are all ways of reducing costs, though they involves some trade-offs.
- Ways to reduce costs while still meeting project goals. Smaller teams, establishing a policy of replacing or rejecting all third-party licensed content instead of attempting to license it, and integrating open publishing directly into existing online course development processes are all ways to reduce costs, although they involve some trade-offs.
- Which of the many available funding models is most likely to result in levels of funding sufficient to allow the project to continue meeting its goals in an ongoing manner?

A similarly global approach to sustainability is taken by Stacey and Rominger (2006) on the basis of the BCcampus project (Figure 6.2).

In the end, as Wiley (2006b) points out, it may be that neither funding models nor national policy are necessary to promote higher education's engagement in OER projects. After all, no national policies encourage or require higher education institutions to maintain publicly accessible websites with information about their admissions policies, programmes, courses and faculty, and yet almost every higher education institution spends a significant amount of human and capital resources providing such services.

After a few early adopters showed the benefits of providing this kind of information via the Internet, other universities had to follow suit in order to stay competitive.

Figure 6.2. An OER project's attributes and decision points



Source: Stacey and Rominger (2006).

Ideally, OER projects will become another service that the public expects of every institution of higher education, and each institution will find the will and the resources to engage in these projects. Until that time comes, pilot OER projects must navigate the highly contextual waters of sustainability.

Chapter 7

How to Improve Access to and Usefulness of Open Educational Resources

This chapter examines a number of issues relating to better access to and usefulness of open educational resources, such as quality management, translation and localisation of content, and improved web access for disabled people. It examines a number of technical issues relating to accessibility such as the use of open source software, increasing interoperability by using open standards and emerging technologies that affect the open educational resources movement.

Validation of quality of open educational resources

One challenge facing the OER movement is very much due to its own success. The rapidly growing number of learning materials and repositories makes the issue of how to find the resources that are most relevant and of best quality a pressing one. There is a need for effective search and discovery tools. Items of interest to a teacher or researcher may not be part of library catalogues, federated databases or online journal subscriptions. Many reside in local databases, available via the web but difficult to locate and essentially invisible to the scholar. There are technical solutions to this problem, such as attaching metadata (data about data or descriptive information about materials) to the resources to make them easier to find for harvesting machines utilised by users via search interfaces, just as library cards help people to find the right books in a library. Yet, adding metadata to a resource is time-consuming and faces the same problem software programmers do – the person adding metadata does not know the circumstances under which people will use the resource, *i.e.* the search for the resource may be done from a perspective totally different from what the person adding the metadata expected, so that it will be difficult or impossible to find the resource.

The evaluation report of a major project carried out by the European Schoolnet gives an example of the difficulty involved in finding an intuitive and transparent terminology for learning resources. It concluded that the classification of resources used in the project was not a particularly accurate reflection of how the learning resources would actually be used by teachers.

> "It is possible to conclude, on the basis of the evaluation evidence, that it is possible to support a constructivist or advanced pedagogy through the use of LOs [learning objects], but that this is more likely to be a feature of a teacher's classroom than the LO. Clearly the LO type may have some impact on this (*i.e.* it has affordances), but it is evident that even the most apparently 'non-constructivist' or 'non-advanced' LO (*e.g.* drill and practice) could be used as part of advanced pedagogy, if the teacher has the skill of use and the repertoire of approaches in her teaching." (McCormick, 2004, cited in European Schoolnet, 2006)

The metadata problem grows the smaller the resources are, since the time adding metadata will be proportionally larger for small resources and possible ways of using them probably more diverse than for a large resource

such as a scientific article. Although a lot of work has been put into creating metadata schemes that can work across countries, languages and cultures, the lack of a common taxonomy is another significant barrier that needs to be overcome to improve the possibility of finding relevant learning resources. An alternative approach might be to use folksonomies – to ask users themselves to add metadata to resources while using them. This approach is so far untested on a large scale although a pioneering project in this area, called Metadata Ecology for Learning and Teaching (MELT), has recently been launched by the European Schoolnet (see Box 7.1).

Box 7.1. European Schoolnet's work on metadata for learning objects

During October 2006 the European Schoolnet started a project, funded by the European Commission's eContentplus programme, to explore the synergies between two different approaches to the enrichment of learning content involving *a priori* metadata (before use) added by expert indexers and *a posteriori* metadata (after use) gathered from teachers/learners and machines. A key goal is to enrich the available content with metadata that reflects the actual use of each resource by teachers/learners in different learning contexts, in order to support wider use of this content and the development of a European content market. Using federated searching from a number of commercial and non-profit providers of learning materials, more than 37 000 learning resources and 95 000 learning assets in different languages will be made freely available to schools all over Europe from a specially designed website. Within the project, called Metadata Ecology for Learning and Teaching (MELT), new approaches to social tagging and "folksonomies" will be used by asking teachers to add their own metadata to the content. A framework for automatic metadata generation will further increase the quantity of metadata.

The European Schoolnet is a consortium of 28 European ministries of education which provide education portals for teaching, learning and collaboration. The MELT project includes 18 partners from 13 countries, including 12 ministries of education. ARIADNE is a key partner and associated partners also include GLOBE, MERLOT, EdNA, MIT OCW and others.

Together with the CALIBRATE project, MELT will help European Schoolnet to launch a Learning Resource Exchange service in 2007 offering a critical mass of OER for schools.

Source: European Schoolnet: *http://info.melt-project.eu*, *http://calibrate.eun.org*, *http://lre.eun.org*.

Scholarly materials can be found by using OAIster, a service using metadata to facilitate the search for open access articles. OAIster was developed to make it easier for metadata to be shared among institutions. Institutions have to apply a certain protocol for how the information about its resources should be displayed so that an automatic harvest can be done regularly. OAIster co-operates with both Yahoo! and Google, so that OAIster metadata is also available through commercial search engines. In January 2007 OAIster gave access to almost 10 million objects from 729 institutions.

A corresponding service for OER is provided by repositories such as the Global Learning Objects Brokered Exchange (GLOBE), an international alliance consisting of the ARIADNE Foundation, Education Network Australia (EdNA Online), LORNET Canada, MERLOT, and the National Institute of Multimedia Education (NIME) in Japan. They have developed use cases, specifications, business rules and technologies to enable searches across all member repositories. Similar services are provided on a smaller scale by a British repository called Intute, the Dutch DAREnet, and the US-based Gateway to Educational Materials, among others. Searches for materials can typically be done on the basis of discipline, and sometimes on criteria such as resource category, most downloads, etc. These different search categories illustrate the problem of relevance and quality. When there are too many results from a search for learning materials, it is difficult and time-consuming to find the resources that are most relevant and of highest quality. That is why techniques and technologies are developed to help give teachers and students options for narrowing their search.

Relevance is but one aspect of the elusive concept of quality and there are many ways of defining other aspects and how to address them. In the context of e-learning there is a large European network, called the European Foundation for Quality in e-Learning (EFQUEL), whose mission is to enhance the quality of e-learning in Europe by providing services and support to all stakeholders in the European e-learning community. They offer a roadmap for quality development in organisations such as universities or schools, consisting of four steps: needs analysis, decision process, realisation and incorporation.

Open source software projects often adopt a meritocratic system whereby the more skilled and experienced programmers review the code delivered by less experienced community members. Open access journals normally use peer review to decide which articles should be published. As described in Box 3.2, some repositories, such as MERLOT, offer the same opportunity for OER. The peer review process is one of the most used quality assurance processes in academia. As well as being well-known and well-understood, there are other arguments for using peer review schemes to

guarantee the quality of a repository's resources. Taylor (2002) argues that the process can be used to come to terms with the lack of a reward system for educators by recognising and rewarding the creator of a learning resource, as well as a basis for dissemination. Furthermore, Taylor claims, it is necessary to make review decisions credible, and open peer review according to agreed criteria is well suited to the purpose. As already mentioned, however, it is both expensive and time-consuming. In addition, the system is sometimes criticised for being less impartial than alleged and for having a conservative impact on research. This has created some interest in alternative models such as the possibility for anyone to publicly comment on articles, *e.g.* a form of open review. *Nature* conducted a four-month trial of open peer review during June-September 2006, but the trial was abandoned with the conclusion that:

> "Despite the significant interest in the trial, only a small proportion of authors opted to participate. There was a significant level of expressed interest in open peer review among those authors who opted to post their manuscripts openly and who responded after the event, in contrast to the views of the editors. A small majority of those authors who did participate received comments, but typically very few, despite significant web traffic. Most comments were not technically substantive. Feedback suggests that there is a marked reluctance among researchers to offer open comments." (*Nature*, 2006)

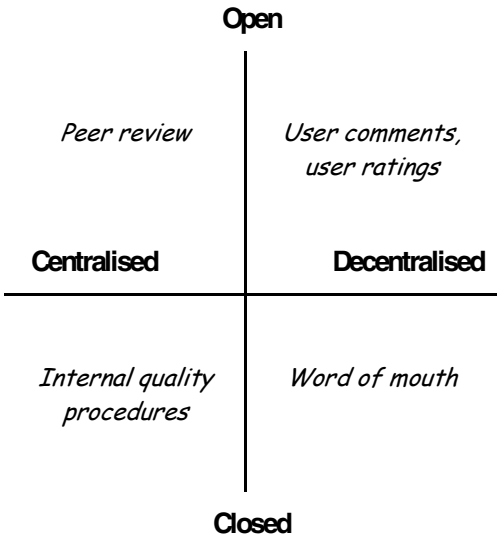
Another quality management approach, used by institution-based providers such as the OCW initiatives and Open University projects such as OpenLearn in the United Kingdom and OpenER in the Netherlands, is to use the brand or reputation of the institution to persuade the user that the materials on the website are of good quality. If not, the prestige of the institution is at risk. Institutions most probably use internal quality checks before they release the courses, but these processes are not open in the sense that users of the resources can follow them.

A third approach is not to have a centrally designed process, but to let individual users decide on whatever grounds they like whether a learning resource is of high quality, useful or good in any other respect. This can be done by letting users rate or comment on the resource or describe how they have used it, or by showing the number of downloads for each resource on the website. This is a kind of low-level or bottom-up approach often used on Internet-based market places, music sites, etc. The argument for such an approach would be that quality is not an inherent part of a learning resource but contextual. It is only the specific learning situation that determines whether a resource is useful or not, and therefore the user should be the judge. Connexions is a repository which has chosen this approach. It opens up the

editorial process to third-party reviewers for post-publication review. Users have access to all the content (of any quality), but they can also review the materials. The strength of this approach, according to Connexions, is that the same content may be viewed by a number of different users each of whom has an individual focus. The material is viewed through various "lenses", such as professional societies, universities, school boards, publishers, consumer unions, colleagues and peers, most popular content, most linked, highest user ratings, and learning assessment rating.

To sum up, there are several alternative ways of approaching quality management issues. As shown in Figure 7.1, it can be a centrally designed or decentralised process, and the process may be open or closed. Arguments can be made for all these approaches, depending on which kind of OER initiative or programme is being considered. All sorts of combinations might also be used.

Figure 7.1. Quality management processes



Translation and localisation of content

A report from an online discussion on OER, organised by the UNESCO International Institute for Educational Planning, concluded that OER are "cultural as much as educational, in that they give users 'an insight into culture-specific methods and approaches to teaching and learning'" (Albright, 2005). The vast majority of OER are in English and tend to be based on Western culture. This limits the relevance of the materials for non-English, non-Western settings. There is a risk that language barriers and

cultural differences may consign less developed countries to the role of consumers of OER rather than contributors to the expansion of knowledge. Concern is also voiced that institutions in developing countries might become dependent on externally generated content, rather than have the content serve as a catalyst for the production of new, local OER.

Furthermore, the report states that 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. These may be remote from the understandings of other cultures and lead to *i)* dysfunctional education, and *ii)* a reduced potential for developing countries to contribute research, training, experience and understanding that invigorates the value and scope of OER. Language translation offers at least a partial solution to this two-pronged problem. Partial, for "if the full benefits of these [open educational] resources are to be realised, 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". Localising OER is not only a question of language but also one of culture.

According to Albright (2005), both Universia, a consortium that maintains higher education portals for Spanish- and Portuguese-speaking countries, and China Open Resources for Education (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 organisations have also addressed issues of cultural awareness and responsiveness and local content generation. Universia has shifted its focus away from translation to helping member universities to publish their own OER, by funding the creation of OCW offices (Pedró, 2006c). CORE, while continuing to support the translation of materials, also works to promote the OER movement in China and bring Chinese content to the rest of the world. A major challenge is to build instructional design capacity in the developing world. As long as this is lacking, a handful of international "brands" will probably dominate the scene. 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.

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, thus raising quality control problems. In addition, translators are not necessarily instructors and may not have the pedagogical background needed to contribute new content effectively. Possible solutions would be to develop partnerships with local academics and institutions, to embed volunteer

translators in OER service communities, and to create a multilingual platform that supports knowledge sharing between different parts of the world. Another approach is investigated by the European Schoolnet in the CALIBRATE project. One part of this project is to test whether learning resources can be developed in a way that makes translation unnecessary and the need of localisation minimal. Resources that use much animation and illustration, perhaps with the possibility to turn off the attached text, might "travel well" across countries at least within similar cultural spheres.

The troublesome imbalance now existing between the provision of OER and its utilisation is aggravated by other barriers for lower-income countries such as poor connectivity, inadequate infrastructure, funding constraints, local resource shortages, technical inadequacies and lack of training and support. On the other hand, it was recognised in the online discussion that "something is better than nothing and that the OER that are being developed are an extremely valuable resource". A wealth of multicultural and multilingual educational resources in Africa is 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 under way in all of those areas to create resources that are culturally sensitive, educationally and locally relevant, technically feasible and accessible (see Box 7.2). In this context it is worth recalling the discussion in Chapter 6 regarding the trade-off between using highly flexible but resource-demanding publication formats and using less flexible formats in order to have more resources published.

Box 7.2. The African Virtual University

Acknowledging the concept of OER as one of the most promising developments in education and training today, the African Virtual University (AVU) has developed a collaborative and co-ordinated strategy for the creation, organisation, dissemination and utilisation of OER in Africa. The AVU initiative was inspired by the belief that knowledge and education are for the common good, and not owned, that OER will significantly contribute to the advancement of human knowledge, creativity and welfare and that by sharing it is possible to avoid needless duplication of limited resources. The AVU has developed a conceptual framework and architecture to join the needs of learners, teachers and researchers in Africa to the OER movement worldwide.

A number of OER initiatives already exist within the AVU, such as the Development Gateway OER topic page, MIT OCW materials, the WiderNet-eGranary initiative, Commonwealth of Learning STAMP materials, TESSA programme materials, AVU Digital Library, and others. One purpose of the architecture is to unite all these initiatives under one strategy.

Starting with a gap analysis, the AVU outlined four prominent views among African academics regarding the promotion of open content:

- Lack of support from the relevant governing bodies would exacerbate already poor participation.
- Lack of clear quality assurance mechanisms would result in unclear standards ("if it's free it must be rubbish").
- Potential for open content to be a "white elephant" so that significant start-up costs diminish enthusiasm.
- Ambiguous intellectual property rights policies leading to lack of faculty participation.

In a pilot project local mirror sites were installed with opencourseware material from MIT, supported by workshops at each of the sites. Although the pilot resulted in strong support for the open licence concept several obstacles preventing educators and learners from accessing and using the MIT opencourseware website were identified, such as a general lack of familiarity with OER, insufficient technological resources, including access to computers and a fast Internet connection at affordable rates, and low computer literacy and a need for capacity enhancement.

The architecture is grounded in an analysis of existing theories and perspectives concerning the global OER movement and the AVU's own experience in establishing processes, systems and frameworks of design, development, managing and sharing OER on the African continent. This architecture has four parts:

- *Creation*: Developing capacity to create OER "from scratch"; structured communities of "users and producers"; interoperability and compliance; iterative processes for creation of OER; localisation and contextualisation of OER.
- *Organisation*: Governance and management schemes; storage and portal mechanisms; tagging and metadata systems; repository development; institutional development; developing a knowledge sharing culture.
- *Dissemination*: Sensitisation (awareness and responsiveness to cultural issues); delivery methods for remote and local access to OER; packaging and marketing; scalability of delivery; decentralisation vs. centralisation or a combination of both.
- *Utilisation*: Mechanisms for accessing and updating OER repositories; using and reusing content; re-authoring and re-purposing content; quality assurance mechanisms; accreditation of materials; sustainability and business modelling.

The architecture has been discussed with several organisations, and implementation is under way. A modular approach is taken to the development and implementation, which is planned to end in September 2008.

Source: Bateman (2006) and *www.avu.org*.

Examples of partnerships to promote capacity building and training of local staff include an initiative to foster the development of OER among

22 small states of the Commonwealth ("small states" being defined as those with fewer than 4 million inhabitants). The Virtual University for Small States of the Commonwealth is designed to build a network allowing 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. The Development Gateway Foundation's OER portal is another initiative to equalise access to education and "help people in developing countries improve their chances for a better life".

Web access for disabled people

Since many OER projects have as their mission to broaden access to digital learning resources, people with disabilities of different kinds should be considered. Even though the Internet offers unprecedented access to information and interaction, most websites and web software still have accessibility barriers that make it difficult or impossible for millions of people with disabilities to use the Internet. The accessibility barriers to print, audio and visual media can be overcome. The Web Accessibility Initiative of the World Wide Web Consortium, looks at how different disabilities affect access to the Internet and what can be done to overcome these difficulties. As more accessible websites and software become available, people with disabilities will be able to use and contribute to the Internet more effectively.

A key principle of web accessibility is to design websites and software that are flexible enough to meet different user needs, preferences and situations. This also benefits people without disabilities in certain situations, such as people using a slow Internet connection, people with "temporary disabilities" such as a broken arm, and people with changing abilities due to aging. One of the roles of the Web Accessibility Initiative is to develop guidelines and techniques describing accessibility solutions for Internet software and developers that could be very useful for OER initiatives. Examples of design requirements for people with different kinds of disabilities include:

- *Visual*: Descriptions of graphics or video; well marked-up tables or frames; keyboard support, and screen reader compatibility.
- *Hearing*: Captioning for audio, supplemental illustration.
- *Physical, speech*: Keyboard or single-switch support; alternatives for speech input on voice portals.

- *Cognitive, neurological*: Consistent navigation, appropriate language level; illustration; no flickering or strobing designs.

Accessible web design contributes to better design for other users as well. Illustrations given by the Web Accessibility Initiative include multi-modality (support for visual, auditory, tactile access) which benefits users of mobile phones with small display screens and Web-TV. It also increases usability of websites in situations with low bandwidth (images are slow to download); noisy environments (difficult to hear the audio); screen glare (difficult to see the screen); driving (when eyes and hands are "busy"). Other illustrations of accessible web design are redundant text, audio and video which can support different learning styles, low literacy levels and second-language access. Additionally, style sheets can support more efficient page transmission and site maintenance. Captioning of audio files supports better machine indexing of content and faster searching of content.

Technical issues related to accessibility

Open source software

The reason for the OER movement to promote open source software goes back to the definition and core idea of openness. Apart from its close relationship to OER, open source software is making headway in higher education for other reasons. Although use of open source software is very common today, many non-expert users may unfamiliar with it because it has not yet made significant inroads on the personal computer desktop in the form of an operating system or office applications, such as word processors or spreadsheets. Even so, many users are unaware that they may be regularly using open source software and data formats simply by browsing the Internet (Apache) and using e-mail (Sendmail). Major information technology companies such as IBM, Hewlett Packard, Sun Microsystems, Novell, Computer Associates and others have now integrated open source software into their core strategies. A Google inquiry is answered by thousands of computers, all running on open source software (Linux) and Yahoo! employs it in its core business of directories. A study released by the European Commission shows that open source software applications are first, second or third-rung products in terms of market share in several markets, including web servers, server operating systems, desktop operating systems, web browsers, databases, e-mail and other information technology infrastructure systems (UNU-MERIT, 2006). Broadly defined, by 2010 open source software-related services could reach a 32% share of all information technology services and the open source software-related share of the economy could reach 4% of European GDP.

A comparative study of tertiary education institutions in Australia, New Zealand and the United Kingdom showed "that open source software is already being used by all tertiary education institutions that responded to the survey and that the major reason for this was lower total cost of ownership and freedom from software vendor dependence" (Glance *et al.*, 2004). The British OSS Watch (2006) reports "a positive picture of the use of open source software emerges in both higher education institutions and further education institutions". It is said that "although only 25% of institutions mention open source software in institutional policy, in practice 77% of institutions consider open source software when procuring software". An American study shows that 57% of all higher education institutions in the United States are using some form of open source infrastructure software (including operating systems and databases) (Abel, 2006). One-third of institutions have implemented open source application software (including course management systems and portals), yet about the same share of institutions have yet to give "serious consideration" to open source software although few reject it outright. Abel concludes that higher education institutions are looking for alternatives to commercial software and are concerned about whether commercial providers can meet their "unique needs". OECD (2005) reports that even though commercial vendors of software have attained significant market share in the higher education sector, development of in-house software and use of open source software are noteworthy trends. The appeal of in-house open source software lies in the perceived inadequate functionality or pedagogic limitations of commercial offerings, even though platform functionality is becoming increasingly customisable.

What makes open source software so attractive? Why do people and institutions not professionally involved in software development care about open source? A growing number of reports indicate that open source software offers several benefits. A symposium arranged by the European Commission (2001) concluded that there is extensive experience in the use of open source software in the public sector in Europe and that open source software is used because of adaptable functionality, lower overall costs, vendor independence and adherence to open standards, interoperability and security. UNESCO's International Institute for Educational Planning lists the following advantages of open source software:

- Increases choice and competition.
- Aligns open source with open standards objectives.
- Positions software as a public good.
- Increases technological self reliance.

- Reduces vendor lock-in.
- Increases transparency.
- Minimises security risks.

Assertions that open source software is superior to proprietary software are of course questioned. It has been argued that the rationales for open source have rarely been carefully justified or studied (Tuomi, 2005). This has left room for proprietary software developers to make the counter-argument that, when the total lifetime costs for installing, operating and maintaining software are taken into account, the purported low cost of open source becomes questionable. In this argument, licence costs are in any case a minor part of total costs. Furthermore, it is sometimes pointed out that for large organisations such as universities, the challenges of implementation, support and maintenance of open source software can be very problematic. As a Chief Information Officer at an American university puts it: "Design and development are fun and exciting. Moreover, at some point in the process, you can declare success and move on. Maintenance and support have neither the glamour nor the defined end points. They're not as much fun, and they last forever." (Stunden, 2003) She concludes that universities need to develop creative collaborative solutions to the issue of maintenance and support very soon if they want their open source software initiatives to succeed. A similar point of view has been expressed in case studies conducted by the OECD, where the need for related services, trustworthiness and reliability of proven applications was given as reasons for using proprietary software. One well-placed observer of the role of technology in higher education calls the mindset regarding open source software "affirmative ambivalence" (Powers, 2006). Chief information officers are confident that open source software will be a part of the future but are still taking a wait-and-see approach.

Interoperability

Since the concept of OER builds heavily on the idea of reusing and repurposing materials created somewhere else by someone else, interoperability is a key issue. With respect to software, the term "interoperability" is used to describe the capability of different programmes to exchange data via a common set of procedures, and to read and write the same file formats and use the same protocols. Software applications developed at different points in time and by different developers should be able to operate together. Learning resources need to be searchable across repositories, and it must be possible to download, integrate and adapt them across platforms. Many learning resources are still locked up in learning management systems. Sometimes it is the need for passwords that hinders

outsiders from using the resources, sometimes it is the lack of interoperability between platforms. A particular case is the growing use of e-portfolios which might create problems for a learner, teacher or researcher moving from one institution to another and wanting to bring his or her portfolio along and use it in the new setting.

Open standards create interoperability. A standard is a specification, a practice or a reference model which is used to define an interface between two or more entities such that they can interact in a predictable fashion (Walli, 2005). It is said that "the very best example of open standards is the Internet itself" (CED, 2006). There are two kinds of standards – *de facto* and *de jure*. A *de facto* standard typically emerges as a result of a single vendor having an overwhelming market share or monopoly. *De jure* standards are produced by organisations and committees with established processes for adopting a standard. They are open in the sense that they are built in a public or "inclusive", consensus-based process and can be used by anyone free of charge. The development of new standards is a specialised task which needs financial support. As the US Committee for Economic Development (CED, 2006) states in a recent report: "The development of standards needs to be supported by governments (or at least public funding) because 'nobody makes money off standards but everyone makes money because of standards'." It goes on:

> "A key benefit of open standards is that they foster interoperability, allowing disparate devices, applications and networks to communicate. Such interoperability is critical to the development of network effects and the operation of Metcalfe's law. Metcalfe's law demonstrates that the value of a network increases as users are added to it; interoperability allows the full benefits of each addition to be realised. In some cases, the benefits can be enormous. The National Institute of Standards and Technology has estimated that the lack of interoperability in information systems costs the construction industry more than USD 15 billion each year; the lack of interoperability in the supply chains of the automobile and electronics industries costs an additional, combined USD 8.9 billion annually."

Another example of increased costs because of the lack of open standards comes from an OECD case study of Australia, in which it is said that the lack of a real standard for learning management systems means that many resources produced by one educational institution will not be able to be exported or imported easily into other systems. This means that much content in Australia, and elsewhere, is locked up not only because of a reluctance to share, but also because it is very difficult and costly to get material out of existing systems (Suzor, 2006b). There are solutions to the

problem that learning resources developed by different authors will probably never have the same size or look and feel or be created within the same kind of authoring environment. The Sharable Content Object Reference Model (SCORM) is a collection of standards and specifications for web-based e-learning which defines communications between client-side content and a host or learning management system to enable interoperability, accessibility and reusability of web-based learning content. The SCORM model consists both of general information about the resource – such as its title, language and keywords – as well as lifecycle information, data about its metadata, technical information, educational information and pedagogical characterisation of the resource, information regarding copyright, and more. But again, it will require skill, time and resources to attach SCORM metadata to learning resources.

Emerging technologies affecting the OER movement

As described in the Introduction, it has become easier to create digital content. Software tools are becoming more user-friendly, and it is now possible to create a website, blog or wiki in a few minutes using online tools, which are sometimes provided for free. And, as pointed out by Wiley (2006), it is increasingly easy to participate in the OER movement. Some of the technological advances supporting this development are:

- Easier infrastructure or software for managing open resources (such as eduCommons in United States, Austria, Netherlands, Japan, China).
- Easier infrastructure for linking and federating OER repositories (such as the European Schoolnet LIMBS open source brokerage system).
- Easier production of resources, because of the possibilities to do podcasting, screencasting, videocasting, blogs, wikis, etc.
- Easier storage exemplified by Video iPod, a very small device which has the capacity to hold a full academic programme of materials.
- Easier-to-mirror repositories which make it possible to use resources without broadband connections (eGranary with approximately 40 partner sites in developing countries).
- Easier distribution (RSS and ATOM are techniques which have made distributing and reusing metadata popular).
- Easier-to-reuse resources because of software that simplifies the assembly, contextualisation and aggregation of resources.

Looking at the impact of technology on higher education in the near future, the annual *Horizon Report* (2006) describes a growing trend towards

using personal devices that students already own such as mobile phones and mp3 players to deliver educational content. It is also said that students are increasingly expecting individualised services and open access to media, knowledge information and learning. Alexander (2006) gives a similar picture when he describes new technological trends and their impact on higher education, as does Hilton (2006). Unbundling of content, as in the music industry, where sales of separate tunes are replacing sales of CDs, and personalisation of the educational offer is expected to become more frequent. Both these trends – growing expectations of individualised services and the unbundling of content – speak of challenges to today's higher education which offers a specified curriculum delivered to large groups of students to be completed at a predetermined pace.

Other features of interest to the education community include collaborative filtering, facilitating the finding of "most interesting" resources through filtering techniques, but also ongoing conversations, recommendations and cross-linking of resources in social networks; services based on RSS feeds, which are continually updated websites, as well as personal libraries of end-users with information about, and links to, thematically relevant content (which can also be podcasts or videocasts (OLCOS, 2007). Already noted is the increasing use of social software, such as blogs and wikis, social bookmarking, social tagging, collaborative authoring platforms with real-time interaction, etc. These tools lower the bar to entry for average users since participating is a matter of contributing small posts, rather than pages, and voice messages and pictures, not only texts. Small pieces of information are made into larger entities developed in a collaborative and often open way. These trends are part of Web 2.0, which is partly the emergence of new applications and partly new user habits and attitudes, sometimes described in terms of the Internet shifting "from being a medium, in which information is transmitted and consumed, into being a platform, in which content is created, shared, remixed, repurposed and passed along" (Downes, 2005). This development also shows that e-learning applications are beginning to look and behave like networks rather than one-way delivery tools, with content created, used and distributed in a much more open and collaborative way on the learner's rather than the institution's terms.

Another development underpinning this trend is the emergence of personal learning environments. E-portfolios have been around for some years now as means for students to store, present and sometimes discuss the results of their work. A new step in this development is taken by the open source project ELGG, which has created an online personal learning space, based on personal publishing and social networking. ELGG might be seen as an early version of what is sometimes called personal learning

environments, complements or competitors to learning management systems which are becoming gradually more common in higher education institutions. It is through a learning management system or similar applications that institutions handle course administration, publish courses and digital resources, etc. Personal learning environments that focus on the learner rather than the course offer the learner more autonomy than traditional learning management systems, and are particularly well suited for independent, self-directed styles of learning (as in higher education). This development points to a shift of power from the institution to the learner and a situation in which the student or learner manages his/her learning to a greater extent. Easy access for the learner to a growing number of OER will probably reinforce this trend. As O'Hear (2006) writes, the traditional approach to e-learning tends to be structured around courses, timetables and testing. This is an approach that is too often driven by the needs of the institution rather than the individual learner. In contrast, e-learning 2.0 takes a "small pieces, loosely joined" approach that combines the use of discrete but complementary tools and web services – such as blogs, wikis and other social software – to support the creation of *ad hoc* learning communities.

Data storage and long term preservation – ethics and risks

An increasing number of educators are developing new teaching practices that make use of the kind of social software described in the previous section. Commercial social software and websites for collaborative drawing or writing or hosting content for free are increasingly used in teaching. The main reasons are that students are pushing to use these tools which they often already use in their recreational activities. Many teachers also see the advantages of using them since they are free although few universities can offer such tools inside their own IT infrastructure. There are, however, ethical, legal as well as security issues relating to their use.

Using commercial services for free as hosts for ongoing work or for long-term storage can be disastrous as users have very little control over data in case of changes in the cost recovery model, acquisition of the company by a third party or bankruptcy. There is no assurance that services will continue to be free under the same conditions or that stored data will be available to users in times of change. The US National Academy of Science called this the digital dilemma: "While a digital information product can be created, modified, perfectly duplicated in innumerable quantities, and distributed to millions of people around the world at little or no cost, it can also be locked down, made inaccessible, or controlled completely, at least temporarily." (CED, 2006) Personal security issues related to children's use of social network sites are well-known. Problems with bullying and harassments on religious, sexual or racial grounds might also occur among

students in higher education. Ethical and even legal problems might arise if individual students produce and store illegal content (child pornography, racist content or materials with copyright infringements) not on the university server but on the commercial service provider. Responsibilities of individual teachers and institutions might be unclear if this happens in the course of regular studies, using tools and services advised by an instructor, but on websites or with the use of software outside the control of the institution. Serious incidents of this kind, which are only briefly mentioned here, will be further investigated in the coming OECD New Millennium Learner project. Other ethical issues relate to the potential clash of ethics between education and shareholders' interests in the use of data produced during university courses which may be used for commercial purposes.

Long term issues of data preservation and storage go far beyond the risk of the disappearance of individual companies. Scholarship is built on the cumulative record of the past and the well-tended, authentic and readily accessible data of the present. Current efforts in most countries to build a digital information preservation infrastructure assume that research institutions responsible for producing large quantities of research data will take responsibility for ensuring long-term access. Given the speed of technological development, very few institutions seem to be taking measures to allow future researchers or students to obtain such data ten, fifty or hundred years from now. As JISC phrases it:

> "Print materials can survive for centuries and even millennia without direct intervention. In contrast, digital materials may need active management and preservation in order to survive even a decade." (JISC, 2006)

Although a growing number of stakeholders realise the need to capture materials of value and at risk of being lost in the long run, in a way that is sustainable and legal, not many countries have developed strategies to deal with these issues. For educational institutions this relates both to research data, administrative records for individuals (exams, certificates, etc.) and learning materials. There are technical as well as policy and economic issues involved, including rights and restrictions, economic models to support preservation, and lack of clarity about what is important to collect and preserve. What probably is needed is a distributed storage platform, so that the actual storage is distributed using the same standards, metadata and other technical protocols that enable safe transfer and storage.

Chapter 8

Conclusions, Policy Implications and Recommendations

This chapter briefly presents the main topics covered in previous chapters of the report, before describing the implications of the OER movement and the policy actions needed to facilitate its growth, broken down according to the level at which they can best be taken: international, national, intermediate or institutional.

Conclusions

Although the OER phenomenon is very recent, it is the subject of growing interest. No definite statistics are available, but it has expanded in terms of number of projects, number of people involved and number of resources available. It is a global development, although most resources are currently produced in developed countries. In spite of the lack of reliable figures, it can also be said that OER fosters international co-operation between institutions as well as peer-to-peer collaboration. OER initiatives, particularly those based in institutions, encourage transparency and can stimulate more quality control and competition to benefit individual learners as well as taxpayers generally. Furthermore, the movement seems to grow both top-down and bottom-up; new projects are started at institutional level and individual teachers and researchers use and produce OER on their own initiative. The OER concept strengthens traditional academic values of sharing and collaborative creation of knowledge. While this general description of OER is positive, it builds on scattered data and somewhat anecdotal evidence. This clearly demonstrates the need for further research on the OER movement in general, for more evaluations of individual projects as well as better user statistics to build a better knowledge base.

In the discussion of incentives and barriers, a number of basic drivers and inhibitors were identified, as well as arguments for government funding of such projects and reasons for individuals and institutions to use and produce OER. It was concluded was that with a strong technological push for more user involvement, and opportunities for both economic and non-economic benefits for institutions as well as individuals, even minor changes in institutional strategies or policies might have a positive effect on the OER movement. Another conclusion from a major institution was that universities and colleges should act and join the OER movement sooner rather than later because of the risk involved in doing nothing when developments are so rapid. From the perspective of individual researchers and educators, publishing teaching materials openly offered a number of possible positive effects, although restrictions imposed by copyright law and the lack in many institutions of a reward system that fosters the development and use of OER remain important inhibitors.

The survey of copyright issues related to open publishing and use of digital resources showed that the existing copyright regime is probably the most serious barrier to faster growth of the OER movement and possibly to the use of information technology in education generally. The fact that some OER projects spend half of their budget on clearing rights to third-party content illustrates the problem. Studies suggest that most researchers are

happy to share the fruits of their work with others as long as their contribution is recognised and their work is not used commercially without their consent. The rapid growth of open access publishing of research articles is an obvious sign of this view. Still, many individual researchers and teachers, as well as institutions, seem insufficiently well informed on copyright issues. Increased awareness and clear policies on copyright should be high on the agenda of every higher education institution.

The growing number of OER initiatives has intensified competition for funding and created a situation in which initiatives have to look closely at possibilities for obtaining revenue and covering their costs, including ways of establishing loyal user communities, developing strong brands, increased site usability and improved quality of resources. New cost recovery models have emerged over the last years. Technological advances facilitate the production, distribution and use of OER. Novel and more flexible licensing schemes, such as Creative Commons, give authors and institutions opportunities to reserve some, but not all, rights, opening the way to new cost recovery and business models for open content. Taken together, these examples suggest improved possibilities for sustaining initiatives beyond the initial funding period. As was pointed out, OER projects may become another service that the public simply expects of every institution of higher education, and each institution will find the will and the resources within itself to engage in these projects.

For anyone interested in promoting the OER movement it is not enough to look at ways to increase the number of initiatives. There is also a need to increase access to and the usefulness of existing resources. Various ways of improving access and usefulness have been introduced. One seeks to make it easier for users to find relevant resources of good quality, particularly those that "travel well", by using different quality management processes and metadata to facilitate the search for resources A second is to find ways to increase access for groups that so far have limited or no access to these resources, such as disabled people and learners in developing countries. A third involves technological means such as the use of open source software and open standards for increased reusability and interoperability of resources across platforms. Efforts to increase access also include improved awareness of the need for localisation – not only translation – of learning resources, and the application of Web Access Initiative rules when designing websites and learning resources. Emerging technologies and their impact on the role of higher education institutions, as well as ethical risks and the need to rethink long-term preservation of digital data are also issues of importance for the OER movement.

Policy implications and recommendations

Policy issues related to the OER movement can be looked at from different angles. One is to identify implications of the growing OER movement for individuals, institutions and countries. Another is to look at recommended policy actions to promote further growth in the use and production of OER. Finally these issues should be divided according to jurisdictional level: institutional, intermediate (*i.e.* regional, state or province), national and international. To identify the most salient policy issues and assign them to the appropriate policy level, two grids are used (see Annex B). The first identifies general policy issues and assigns them to the appropriate policy level. The second lists actions that should be taken at different levels, depending on the distribution of responsibilities in each case. The following list of issues and recommended actions is the result of such a process.

International level

Although most issues regarding OER are subject to national, intermediate or institutional jurisdiction, some topics are ideally dealt with on the international level. Interoperability issues, including harmonisation of copyright legislation, which is dealt with by the World Intellectual Property Organization (WIPO), and agreements on standards, which is the work of several organisations such as the International Organisation for Standardization (ISO), the World Wide Web Consortium (W3C), the American National Standards Institute (ANSI), the Internet Engineering Task Force (IETF) and others, need to be solved at an international level to have any effect. This work needs financial and other support and funding bodies on all levels are recommended to support this work.

Another issue that needs a global or at least international view is the development of a sound knowledge base on the production and use of OER. Research, co-ordination of web statistics and other kinds of user evaluations should be done at an international level, such as the initiative by the OCW Consortium. It is recommended that granting parties, whether government agencies or private foundations, should be open to requests for funding for evaluation activities. Furthermore, it is recommended that they demand that grant-receiving OER projects devote a share of the funding to evaluation activities. The OpenLearn initiative from the Open University in the United Kingdom, for example, devoted 12% of the budget to research and evaluation (Schuller, 2006).

Promotion of OER and awareness-raising activities, such as the online discussion forum on virtual universities, open source software in higher

education and OER organised by the UNESCO International Institute for Educational Planning, can and should take place at the international level to leverage expertise and experience from around the world. Another example of international collaboration with immediate benefits for users is the possibility to search for content across all OCW courses and a similar initiative developed by the GLOBE alliance or the Learning Resource Exchange service developed by the European Schoolnet to make it possible to carry out federated searches for resources across repositories on four continents.

National level

The task of issuing recommendations to a broad set of countries, such as OECD members, faces a number of challenges. The most obvious relates to the varied circumstances of higher education in the various countries. Also, national and sometimes intermediate level governments have different spheres of authority regarding higher education. Some countries have only publicly funded higher education institutions and governments have broad authority over the sector. In other countries institutions are more independent and privately funded. Taking this into account, the following general recommendations are made for national governments in this section and in the next for intermediate level governments.

OER represent a further blurring of the borders between formal and informal learning. As user statistics show, many users of OER are self-learners and informal learning using OER can be expected to grow as the supply of resources increases. From a national policy perspective, this is an opportunity to further promote lifelong learning. The challenge of aging population in OECD countries, described in Chapter 1, necessitates longer working lives with more career changes and puts new demands on higher education in terms of accommodating the needs of older students and people changing careers. So far most higher education systems have been slow to adjust to this challenge. It is recommended that countries study closely the OER projects described in Chapter 4, which are set up to widen participation in higher education, bridge the gap between non-formal, informal and formal learning and promote lifelong learning. Using existing resources or content which needs smaller adjustments rather than creating resources from scratch may prove to be a cost-effective way to meet some of the need for increased lifelong learning.

OER can make an important contribution to a diversified supply of learning resources. A wealth of digital learning resources supports methodological diversity, which is a prerequisite for promoting the individualisation of the learning process, a pedagogical philosophy that most

countries embrace. From the national point of view, the most natural perspective might very well be not to have a particular policy regarding OER in higher education, but to take a holistic approach to all kinds of digital learning resources and to all parts of the education system (Johannesen, 2006). In addition to OER, such a policy might embrace commercial digital learning materials and the national cultural heritage in digital format. National policy could include a general aspiration to ensure a profusion of digital resources for learning.

A review of the existing copyright regime as it affects OER might be needed as would the build-up of a better knowledge base on the production and use of digital learning resources in general, including OER. Countries wanting to take a neutral stand towards open or commercial educational resources should be aware that in most countries today's copyright regime is out of line with digital technologies and sometimes shows partiality towards commercial players. Taking a neutral stand might imply altering the balance in the copyright legislation towards a more generous way of looking at educational use of digital materials. When initiating new legislation in this area, countries are also advised to consider the test or rules developed by the Adelphi Charter (see Chapter 5).

It is further recommended that countries keen to promote OER consider the idea developed by the open access movement: that academic and research output as well as the national cultural heritage made available in digital format with the use of public funds should also be available for free for education. Higher education institutions receive significant funding, often from national or intermediate level governments, to develop new knowledge. These funds seldom come with a requirement to share the findings with the general public. The open access movement has gained considerable ground during the last years with its claim that publicly funded research should be made publicly accessible shortly after publication (Suber, 2006). Some funding bodies, such as the Wellcome Trust in the United Kingdom, the world's largest medical research charity, has adopted a policy to provide grant holders with additional funding to cover the costs of open publishing. A similar model could be applied to funds for educational purposes; a small amount (*e.g.* 0.5-1%) of funds made available for education could be earmarked for open publishing of learning materials developed within the institution. Furthermore, the opening up of national archives and museum collections of digital resources for use "as is" or adapted in educational settings would be of great importance to the education sector. This might in some countries be a decision made at national level and in others by individual institutions. Also some archives and museums might be administered by the state, regional or local level.

Funding issues may also be important at the national level, depending on whether countries want to take a neutral or positive stand regarding OER and whether or not funding falls under the jurisdiction of the national level. Funding may involve research and development on the production and use of OER, the development of new or amelioration of existing open standards, and investments in information technology infrastructure. Funding as a way to encourage partnerships between higher education institutions should also be considered. JISC in the United Kingdom is a good example of a government-initiated programme that gives funding, strategic advice and services to higher education institutions, helping them to adapt to challenges raised by technological developments.

Promotion of public-private partnerships may also be an issue for this level as well as the intermediate level. Combining know-how and resources from both sectors can be very efficient as well as a way of sharing and reducing risks when entering new domains, such as the development of digital learning resources.

As mentioned, the important issue of widening access to OER may need to be addressed at the national level in some countries. Countries are strongly recommended to issue guidelines or policies fostering the use of Web Access Initiative principles for web-based resources developed with public funding. In Norway, all public web portals are expected to adhere to the Web Access Initiative principles.

In their "Roadmap 2012" to open educational practices and resources, the OLCOS project (2007) makes a number of recommendations to education policy makers and funding bodies. One is to foster the development of OER by demanding that academic and educational resources that are fully or largely publicly funded be made freely accessible under an appropriate open content licence. To achieve this goal, policy makers and funding bodies should work to create a favourable environment for open access, for example in negotiations with academic and educational publishers, learned societies, educational associations and others. More specifically, they should demand that content should be liberally licensed for reuse in educational activities, preferably free from restrictions to modify, combine and repurpose the content. To enhance reusability, regulations should also emphasise that open content standards and formats should be employed in content creation and provision.

With respect to software-based systems and tools that are developed by, or acquired for use in, academic and educational institutions, the OECD Secretariat also supports the OLCOS recommendation that policy makers and funding bodies require, wherever possible and reasonable, the use of open standards and open source software licensing. Regarding publicly

funded Internet-based applications and services, open application programming interfaces and authorisations to reuse services should be made available.

Intermediate level

The authority of the provincial, state, or regional – *i.e.* intermediate – level is probably the one most subject to variation across countries. In some countries this level does not exist or has no authority for higher education, while in other countries it is the most important policy level.

Issues at this level, and not already mentioned above, include setting policies and developing guidelines regarding copyright and co-ordinating work on open standards. The examples of British Columbia in Canada and Extremadura in Spain are commendable, as is the Indian Knowledge Commission's argument that India should invest in developing open educational resources on a large scale, make these available through a national education portal and join the OCW Consortium (Kumar, 2006). It is recommended that other countries, provinces, states and local authorities engage in OER programmes to the benefit of all, but mostly in developing countries.

Institutional level

This chapter argues that stakeholders, policy makers and other players at national or intermediate level will be affected by OER. The same is true for higher education institutions, whether the institution is involved in an OER project or not. The risk of doing nothing has already been mentioned. Growing competition from other institutions, some of which are looking at new business or cost recovery models, including OER projects, is but one example. The growing number of opportunities for collaboration in the production and use of OER, both for institutions and individual researchers and educators, is another. The increase in digital resources available for free educational use is a third. Technological developments and the push from younger generations of students for enlarged use of the Internet and social software is a fourth, and there are others as well. It has also been argued in this report that the policy issues raised by OER are interlinked with general organisational and pedagogical issues, such as opportunities to strengthen co-operation among educators within the institution, to increase transparency and quality in the educational offer to students, to reach out to non-traditional groups of students and to foster pedagogical innovations and promote increased use of information technology in teaching. This calls for institutions to have a well-reasoned information technology strategy, including e-learning issues. Such a strategy should also outline how the

institution will deal with opportunities and threats posed by the OER movement. Increased awareness and clear policies regarding copyright would be an important part of such a strategy.

OER can be expected to affect curriculum, pedagogy and assessment. With thousands of (opencourseware) courses from internationally well-reputed higher education institutions available for free, teachers will need to consider that students compare their curriculum with others. Anecdotal data suggest that this is already happening. Concerning pedagogy, the role of the teacher is already changing from being the "sage on the stage to the guide at the side". OER is likely to accelerate this process since the role of the teacher as a supplier of teaching material and the only guide to knowledge is also diminishing. As regards assessment, the increase in non-formal and informal learning will probably enhance the demand for assessment and recognition of competence gained outside formal learning settings. Private educational providers in some countries already offer such services, and the supply of private providers using OER and offering tutoring, assessment and credits for a fee may be growing. Established higher education institutions may very well need to adapt to such demand and become more and more assessment organisations and less and less teaching establishments.

Institutions prepared to embrace the opportunities offered by OER have a number of additional questions to deal with, many of which were enumerated in Chapter 6 which dealt with sustaining OER projects. To recall the most salient issue: institutions have to ask themselves what can be done to provide incentives for faculty to participate in an OER initiative. One proposed action is to make teaching portfolios or similar requirements part of the tenure process and to make the conversion of at least one course into an OER format part of the requirement to document excellence in teaching. Another item would be to lower the threshold for participation by encouraging the use of OER; this takes less skill than producing digital resources, but will make it more likely that in the long run teachers will also refine those resources. Training should be offered to teachers and researchers on the use and production of digital learning resources and on copyright law. Institutions wanting to foster the use and production of OER should stress the importance of compatibility – meaning not only the use of open standards and open source software in production and dissemination of learning resources but also licences that makes resources compatible with other resources and easier to reuse.

Glossary

ARIADNE	The Alliance of Remote Instructional Authoring and Distribution Networks for Europe, a European association for knowledge sharing and reuse. The core of the ARIADNE infrastructure is a distributed network of learning repositories.
ATOM	The name applies to a pair of related standards. The Atom Syndication Format is an XML language used for web feeds, while the Atom Publishing Protocol (APP for short) is a simple HTTP-based protocol for creating and updating web resources.
CERI	Centre for Educational Research and Innovation (OECD).
CMS	Content Management System.
CMU	Carnegie Mellon University, United States.
EduCommons	An OpenCourseWare management system designed specifically to support OpenCourseWare projects.
ENSTA	École Nationale Supérieure de Techniques Avancées, France.
Flash	Refers to both the Adobe Flash Player and to a multimedia authoring programme used to create content for the Adobe Engagement Platform (such as web applications, games and movies).
FLOSS	Free/Libre Open Source Software.
GDP	Gross domestic product, the market value of all final goods and services produced within a country in a given period of time.
GLOBE	The Global Learning Objects Brokered Exchange, an international consortium that provides a distributed network of learning objects that meet quality standards.
GNU GPL	GNU General Public Licence
H2O	A (playlist) shared list of readings and other content about a topic of intellectual interest. It is a way to group and exchange useful links to information.
HTML	HyperText Markup Language, the predominant markup language for the creation of web pages.
IIEP	International Institute for Educational Planning (UNESCO).
IMS	IMS Global Learning Consortium, a non-profit standards organisation concerned with establishing interoperability for learning systems and learning content.

JISC	Joint Information Systems Committee, United Kingdom.
MERLOT	Multimedia Education Resource for Learning and Online Teaching.
MIT	Massachusetts Institute of Technology, United States.
Moodle	Modular Object-Oriented Dynamic Learning Environment, an e-learning platform built on open source software.
NIME	National Institute of Multimedia Education, Japan.
OA	Open Access publishing.
OCW	Open Course Ware. A free and open digital publication of high-quality educational materials, organised as courses.
ODF	OpenDocument or ODF, short for the OASIS Open Document Format for Office Applications, a document file format used for exchanging digital documents such as memos, reports, books, spreadsheets, charts, and presentations.
OKI	The Open Knowledge Initiative, an organisation responsible for the specification of software interfaces.
OLCOS	Open eLearning Content Observatory Services, EU-funded project.
OSLO	Optics Software for Layout and Optimisation, a computer programme used to design and optimise optical systems.
OSS	Open Source Software.
ParisTech	Paris Institute of Technology, an organisation bringing together 11 publicly owned educational and research institutions in France.
PDF	Portable Document Format, an open file format created and controlled by Adobe Systems, for representing two-dimensional documents in a device-independent and resolution-independent fixed-layout document format.
PNG	Portable Network Graphics, a bitmap image format that employs lossless data compression.
Podcasting	A podcast is a media file that is distributed by subscription (paid or unpaid) over the Internet using syndication feeds, for playback on mobile devices and personal computers. Like “radio”, it can mean both the content and the method of syndication. The latter may also be termed podcasting.

RoMEO	Rights MEtadata for Open archiving, a one-year project (2002-03) funded by the Joint Information Systems Committee in the United Kingdom.
RSS	A family of web feed formats used to publish frequently updated digital content, such as blogs, news feeds or podcasts. Users of RSS content use programmes called feed "readers" or "aggregators" the user subscribes to a feed by supplying to their reader a link to the feed; the reader can then check the user's subscribed feeds to see if any of those feeds have new content since the last time it checked, and if so, retrieve that content and present it to the user.
Sakai	A course management system built on open source software.
SCORM	Sharable Content Object Reference, a collection of standards and specifications for web-based e-learning.
SVG	Scalable Vector Graphics, an XML markup language for describing two-dimensional vector graphics.
RTF	Rich Text Format, a proprietary document file format developed by Microsoft in 1987 for cross-platform document interchange.
USU	Utah State University, United States.
Videocasting	Video podcast is a term used for the online delivery of video clip content on demand. The term is an evolution specialised for video, coming from the generally audio-based podcast.
Web feed	A data format used for serving frequently updated content to users. It allows software programmes to check for updates published on a website.
Wiki	A website that allows visitors to easily add, remove and otherwise edit and change available content, typically without the need for registration.
XML	The Extensible Markup Language, a general-purpose markup language that supports a wide variety of applications recommended by the World Wide Web Consortium.

Annex A

Questionnaire on the Use and Production of Open Educational Resources

Introduction

Thank you for participating in the CERI/OECD study on Open Educational Resources in tertiary education. We do not expect it to take more than 10-15 minutes to complete the questionnaire.

This survey is an important part of the OER study. The purpose of the study is to map the scale and scope of OER initiatives in terms of their purpose, content, and funding. It will also look into the technical and legal frameworks as well as cost/benefit models to sustain these initiatives.

The survey elicits quantitative and qualitative information from instructors and researchers using and/or producing open educational resources. Some questions do not apply equally to all participants. As you complete the survey, please indicate where this is the case.

In some questions we ask for specific numbers. If this information is not available, please give an informed estimate. The generic findings will be shared among participants and then on a broader scale.

Your responses will be kept **confidential**. No individual answer will be identified without permission.

Definitions

In this survey we use the following definition of **open educational resources**: *Open educational resources are digitised materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research.*

According to our understanding, open educational resources include:

1. Open courseware and content.
2. Open software tools (*e.g.* learning management systems).
3. Open material for e-learning capacity building of faculty staff.
4. Repositories of learning objects.
5. Free educational courses.

In order to reduce the length of the questionnaire, we will be using the term "**open educational content**" as a single expression for open courseware and content, learning objects and educational courses (compare 1, 3-5 above).

"**Open source software**" will be the term used for software that is used for the development and/or delivery of educational content (compare 2 above). Open source software that is used for tasks other than the development and delivery of educational content is not of interest in this survey.

GENERAL INFORMATION

1. In which country do you work?

2. Size of your institution in terms of students

(Number of students. Please do NOT use comma "," or space between numbers.)

3. Status of your institution

	Public
	Private not-for-profit
	Private-for-profit

4. In which area do you work?

	Education
	Humanities and Arts
	Social sciences and Law
	Business and administration
	Science, Mathematics and Computing
	Engineering, Manufacturing and Construction
	Agriculture and Veterinary
	Health and Welfare
	Services
	Other

5. If you are involved in an open educational resource project or initiative, please give name and/or URL to the project.

Please enter a URL if you have a website with information regarding your project.

PRODUCTION OF OPEN EDUCATIONAL CONTENT

6. Are you involved in any open educational resources (OER) activities?

	Yes, to a great extent				No, not at all
	1	**2**	**3**	**4**	**5**
The USE of open educational content					
The PRODUCTION of open educational content					
The USE of OSS					
The PRODUCTION of OSS					

7. Is the management level of your institution (the senate, rector, chancellor, etc.) supporting:

	Yes, to a great extent				No, not at all
	1	**2**	**3**	**4**	**5**
The USE of open educational content					
The PRODUCTION of open educational content					
The USE of OSS					
The PRODUCTION of OSS					

8. Are you involved in any co-operation with people from other educational institutions for PRODUCING open educational content?

Several answers possible

	No
	Yes, in the same region/state
	Yes, in other parts of the country
	Specify/comment

9. Are you involved in any co-operation with people from other educational institutions for EXCHANGING open educational content?

Several answers possible

	No
	Yes, in the same region/state
	Yes, in other parts of the country
	Specify/comment

10. How would you describe the open educational content you are PRODUCING?

Several answers possible

	As full courses/programmes
	As parts of courses/programmes
	As learning objects
	Specify/comment

11. What are the most significant BARRIERS to the engagement of other colleagues in the PRODUCTION of open educational content?

	Very important				Unimportant
	1	**2**	**3**	**4**	**5**
Lack of skills					
Lack of time					
Lack or hardware					
Lack of software					
Lack of access to computers					
No reward system for staff members devoting time and energy					
Lack of interest in pedagogical innovation among staff members					
Lack of business model for open content initiatives					
No support from management level					

12. When contributing open educational content for use by other instructors and researchers, how important would it be for you to:

	Very important				Unimportant
	1	2	3	4	5
Be acknowledged as the creator of the resource when it is used					
Be acknowledged as the creator of the resource if it is adapted or changed by someone else					
Know WHO uses the resources					
Know HOW the resources are used					
	Very important				Unimportant

	1	2	3	4	5
Know the changes made to the resource					
Be personally financially recompensed for the use of the resource					
Be personally rewarded through your workplan, promotion, awards or other mechanisms for the use of the resource					
Have your group/department/institution financially recompensed for the use of the resource					
Have a quality review of the resource					

13. Do you use any licence to claim copyright for resources you have PRODUCED?

	No
	Yes, Creative Commons
	Yes, other "open content licence"
	Other:

USE OF OPEN EDUCATIONAL CONTENT

14. Do you USE open educational content in your teaching/course delivery?

	No, not at all
	Yes, to a limited extent
	Yes, to some extent
	Yes, to a great extent

15. What goals or benefits are you seeking through the USE of open educational content in your teaching or course delivery?

	Very important				Unimportant
	1	2	3	4	5
Gaining access to the best possible resources					
Promote scientific research and education as publicly open activities					
Bringing down costs for students					
Bringing down costs of course development for the institution					
Outreach to disadvantaged communities					
Assisting developing countries					
Becoming independent of publishers					
Creating more flexible materials					
Conducting research and development					
Building sustainable partnerships					
Other					

16. Comments on the previous question regarding goals or benefits for the USE of open educational resources.

17. How would you describe the kind of open educational content that you USE in your teaching or course delivery?

Several answers possible but please exclude trivial use

	Full courses/programme
	Parts of courses/programmes
	Learning objects
	Other:

18. Within the courses/programmes you teach or deliver, what estimated proportion of the open educational content USED would be:

If you do not know the exact proportions, please try to give an informed estimate.

	Yes, to a great extent				No, not at all
	1	**2**	**3**	**4**	**5**
Produced by yourself					
Produced within your institution					
Freely downloaded from the Internet					
Coming from an established co-operation with other educational institutions					
Purchased from a publisher or corresponding					
Other					

19. What are the most significant BARRIERS to the USE by other colleagues of open educational content in their teaching?

	Very important				Unimportant
	1	2	3	4	5
Lack of skills					
Lack of time					
Lack or hardware					
Lack of software					
Lack of access to computers					
Lack of content of quality and cultural relevance					
Lack of interest in pedagogical innovation among staff members					
No reward system for staff members devoting time and energy					
No support from management level					

20. Do you have any other comments regarding the PRODUCTION or USE of open educational content or OSS?

Annex B

Examples of Policy Grids

Grid 1. Identification of appropriate policy level (building on D'Antoni)

Level / Issues	Institutional	Intermediate	National	International
Promotion/awareness	X	X	X	X
Faculty support/recognition	X			
Localisation/ adaptation/ translation	X	X	X	
Intellectual property	X	X	X	X
Quality assurance	X			
Technology/ Infrastructure	X	X	X	
Guidelines/standards	X	X	X	X
Financial support/sustainability	X	X	X	

Grid 2. Policy actions and responsibilities by level

Level Issues	International	National	Intermediate	Institutional
Legal	- Agreements on IPR and open standards	- Suitable IPR regime - Co-ordinate work on standards and interoperability	- IPR policy and guidelines - Co-ordinate work on open standards	- IPR policy and guidelines - Policy on open standards and OSS
Access		- Infrastructure - Eliminate barriers	- Coordinate access opportunities	- Support
Funding	- Research	- R&D on methods and materials - Sponsor work on standards - Infrastructure - PPP (Public-private partnerships)	- R&D of methods and materials - Teacher training - PPP	- Reward system - Teacher training - PPP
Curation of materials		- Open up archives and museum collections	- Open up archives and museum collections	- Support university library services - Support teachers

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Giving Knowledge for Free

THE EMERGENCE OF OPEN EDUCATIONAL RESOURCES

Learning resources are often considered key intellectual property in a competitive higher education world. However, more and more institutions and individuals are sharing their digital learning resources over the Internet, openly and for free, as Open Educational Resources (OER). This study, building on previous OECD work on e-learning, asks why this is happening, who is involved and what the most important implications of this development are.

The report offers a comprehensive overview of the rapidly changing phenomenon of Open Educational Resources and the challenges it poses for higher education. It examines reasons for individuals and institutions to share resources for free, and looks at copyright issues, sustainability and business models as well as policy implications. It will be of particular interest to those involved in e-learning or strategic decision-making within higher education, to researchers and to students of new technologies.

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