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COMMONWEALTH of LEARNING

A Basic Guide to Open Educational Resources (OER)

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Overview of the Guide

This Guide comprises three sections. The first – a summary of the key issues – is presented in the form of a set of 'Frequently Asked Questions'. Its purpose is to provide readers with a quick and user-friendly introduction to Open Educational Resources (OER) and some of the key issues to think about when exploring how to use OER most effectively.

The second section is a more comprehensive analysis of these issues, presented in the form of a traditional research paper. For those who have a deeper interest in OER, this section will assist with making the case for OER more substantively.

The third section is a set of appendices, containing more detailed information about specific areas of relevance to OER. These are aimed at people who are looking for substantive information regarding a specific area of interest.

A Basic Guide to Open Educational Resources: Frequently asked questions

What are Open Educational Resources (OER)?

In its simplest form, the concept of Open Educational Resources (OER) describes any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees.

The term OER is largely synonymous with another term: Open CourseWare (OCW), although the latter may be used to refer to a specific, more structured subset of OER. An Open CourseWare is defined by the OCW Consortium as 'a free and open digital publication of high quality university-level educational materials. These materials are organized as courses, and often include course planning materials and evaluation tools as well as thematic content'[1].

OER has emerged as a concept with great potential to support educational transformation. While its educational value lies in the idea of using *resources* as an integral method of communication of curriculum in educational courses (i.e. resource-based learning), its transformative power lies in the ease with which such resources, when digitized, can be shared via the Internet. Importantly, there is *only* one key differentiator between an OER and any other educational resource: its *licence*. Thus, an OER is simply an educational resource that incorporates a licence that facilitates reuse, and potentially adaptation, without first requesting permission from the copyright holder.

Is OER the same as e-learning?

OER is *not* synonymous with online learning or e-learning, although many people make the mistake of using the terms interchangeably.

[1] www.ocwconsortium.org/aboutus/whatisocw.

Openly licensed content can be produced in any medium: paper-based text, video, audio or computer-based multimedia. A lot of e-learning courses may harness OER, but this does not mean that OER are necessarily e-learning. Indeed, many open resources being produced currently – while shareable in a digital format – are also printable. Given the bandwidth and connectivity challenges common in some developing countries, it would be expected that a high percentage of resources of relevance to higher education in such countries are shared as printable resources, rather than being designed for use in e-learning.

Is OER the same as open learning/open education?

Although use of OER can support open learning/open education, the two are not the same. Making 'open education' or 'open learning' a priority has significantly bigger implications than only committing to releasing resources as open or using OER in educational programmes. It requires systematic analysis of assessment and accreditation systems, student support, curriculum frameworks, mechanisms to recognize prior learning, and so on, in order to determine the extent to which they enhance or impede openness.

Open learning is an approach to education that seeks to remove all unnecessary barriers to learning, while aiming to provide students with a reasonable chance of success in an education and training system centred on their specific needs and located in multiple arenas of learning. It incorporates several key principles:

- Learning opportunity should be *lifelong* and should encompass both education and training;
- The learning process should *centre on the learners,* build on their experience and encourage independent and critical thinking;
- Learning provision should be *flexible* so that learners can increasingly choose, where, when, what and how they learn, as well as the pace at which they will learn;
- *Prior learning, prior experience* and *demonstrated competencies* should be recognized so that learners are not unnecessarily barred from educational opportunities by lack of appropriate qualifications;
- Learners should be able to *accumulate credits* from different learning contexts;
- Providers should create the conditions for a *fair chance* of *learner success.* (Saide, n.d.)

As this list illustrates, while effective use of OER might give practical expression to some of these principles, the two terms are distinct in both scope and meaning.

Is OER related to the concept of resource-based learning?

There has been significant emphasis placed in OER discussions on the *quality* of OER. This makes the concept of resource-based learning of particular interest. Despite this, debates over OER have typically made little reference to the concept of resource-based learning until recently. This may be because the emphasis in most global OER discussion has been on the sharing and licensing of existing materials, a significant proportion of which has included simply sharing lecture notes and PowerPoint presentations used in face-to-face lectures.

What does the notion of resource-based learning mean, in essence? It means moving away from the traditional notion of the 'talking teacher' to communicate curriculum; a significant but varying proportion of communication between students and educators is not face to face but rather takes place through the use of different media as necessary. Importantly, the face-to-face contact that does take place typically does not involve simple transmission of knowledge from educator to student; instead it involves various forms of student support, for example, tutorials, peer group discussion, or practical work.

Resource-based learning is *not* a synonym for distance education. Rather, resource-based learning provides a basis for transforming the culture of teaching across all educational systems to enable those systems to offer better quality education to significantly larger numbers of students. Many courses and programmes at all levels of education now incorporate extensive use of instructionally designed resources, as educators have learned the limitations of lecture-based strategies for communicating information to students.

The use of resource-based learning does not of course imply any intrinsic improvements in quality of learning experience. The extent to which shifting the communication of curriculum to instructionally designed resources leads improves the quality of education depends entirely on the quality of the resources developed.

To summarize:

- There is no direct relationship between OER and resource-based learning.
- Many OER available online have not explicitly been designed as part of a deliberate strategy to shift to resource-based learning.
- Likewise, most practice in resource-based learning currently uses fully copyrighted materials rather than OER.

Nevertheless, linking OER and resource-based learning provides an opportunity to leverage both most effectively.

How open is an open licence?

A common misconception is that 'openly licensed' content belongs in the public domain, and that the author gives up all of their rights to this material. This is not so. In fact, the emergence of open licences has been driven strongly by a desire to *protect a copyright holder's rights* in environments where content (particularly when digitized) can so easily be copied and shared via the Internet without asking permission.

A broad spectrum of legal frameworks is emerging to govern how OER are licensed for use. Some of the legal frameworks simply allow copying, but others make provision for users to adapt the resources that they use. The best known of these is the Creative Commons licencing framework (see www.creativecommons.org). It provides legal mechanisms to ensure that authors of materials can retain acknowledgement for their work while allowing it to be shared, can seek to restrict commercial activity if they wish, and can aim to prevent people from adapting it if appropriate. Thus, an author who applies a Creative Commons (CC) licence to their work specifically seeks to retain copyright over that work, but agrees – through the licence – to give away some of those rights.

A bit about Creative Commons (CC):

- The CC approach provides user-friendly open licences for digital materials and so avoids automatically applied copyright restrictions.
- The CC licences take account of different copyright laws in different countries or jurisdictions and also allow for different language versions.
- To make the licensing process as simple as possible for users, the Creative Commons site makes use of a licence generator that suggests the most appropriate licence based on a user's response to specific questions regarding how their work can be used.
- All of the CC licences include basic rights that are retained by the authors, asserting the author's right over copyright and the granting of copyright freedoms.
- Within this framework, the CC licences allow authors, in a user-friendly way, to grant other people the right to make copies of their work and, if they wish, to allow other people to make changes to their work without seeking permission.
- The CC licences also allow users to apply some restrictions on these permissions, for example, requiring attribution of the authorship of the original work, or restricting reuse of the resource for commercial purposes.

See Appendix One for a full overview of the Creative Commons licences.

What is the difference between OER and open access publishing?

Open access publishing is an important concept, which is clearly related to – but distinct from – that of OER.

Wikipedia notes that the term 'open access' is applied to many concepts, but usually refers either to:

- 'open access (publishing)'; or
- 'access to material (mainly scholarly publications) via the Internet in such a way that the material is free for all to read, and to use (or reuse) to various extents'; or
- 'open access journal, journals that give open access to all or a sizable part of their articles'.[2]

Open access publishing is typically referring to *research publications* of some kind released under an open licence. OER refers to *teaching and learning materials* released under such a licence. Clearly, especially in higher education, there is an overlap, as research publications typically form an important part of the overall set of materials that students need to access to complete their studies successfully, particularly at postgraduate level.

Nevertheless, the distinction seems worth applying because it allows more nuanced discussion and planning about which kinds of open licences would be most appropriate for different types of resources.

Shouldn't I worry about 'giving away' my intellectual property?

A key concern for educators and senior managers of educational institutions about the concept of OER relates to 'giving away' intellectual property, with potential loss of commercial gain that might come from it. This is often combined with a related anxiety that others will take unfair advantage of their intellectual property, benefitting by selling it, plagiarizing it (i.e. passing it off as their own work), or otherwise exploiting it. These concerns are completely understandable.

In some instances, of course, when educators raise this concern, it actually masks a different anxiety – namely, that sharing their educational materials will open their work to scrutiny by their peers (and that their peers may consider their work to be of poor quality). Whether or not the concern is justified, it is important to

[2] http://en.wikipedia.org/wiki/Open_access.

determine what is truly driving the concerns of educators. When the concern is the loss of commercial opportunity, this requires a particular response (engaging with the incentives for sharing). But when this is masking a concern about peer and student scrutiny, this needs to be dealt with differently (and will usually involve some policy or management drive to overcome resistance to change).

As more institutions around the world are, at different levels, requiring their educators to share more materials under open licences, experiences clearly demonstrate that this opening of intellectual property to peer scrutiny is having the effect of *improving* quality of teaching and learning materials. This happens both because educators tend to invest time in improving their materials before sharing them openly and because the feedback they receive from peer and student scrutiny helps them to make further improvements.

While a small percentage of teaching and learning materials can – and will continue to – generate revenue through direct sales, the reality has always been that the percentage of teaching and learning materials that have commercial re-sale value is minimal; it is also declining further as more and more educational material is made freely accessible on the Internet. Much of the content that was previously saleable will lose its economic value while the niches for sale of generic educational content will likely become more specialized.

However, if a resource truly has potential to be exploited for commercial gain through sale of the resource, then it should be possible – and encouraged – for an educator (or an institution) to retain all-rights reserved copyright over that resource. Intellectual Property Rights (IPR) and copyright policies for education need to be flexible enough to allow the educator and/or institution to retain all-rights reserved copyright for resources that have this potential commercial value.

It is becoming increasingly evident that, on the teaching and learning side, educational institutions that succeed are likely to do so predominantly by understanding that their real potential educational value lies not in content itself (which is increasingly available in large volumes online), but in their ability to guide students effectively through educational resources via well-designed teaching and learning pathways, offer effective support to students (whether that be in practical sessions, tutorials, individual counselling sessions, or online), and provide intelligent assessment and critical feedback to students on their performance (ultimately leading to some form of accreditation). Although it may seem counter-intuitive, therefore, as business models are changed by the presence of ICT, the more other institutions make use of their materials, the more this will serve to build institutional reputation and thereby attract new students.

Given this, it is important for copyright holders of educational materials to consider carefully what commercial benefits they might find in sharing their materials openly. Of course, the primary benefits of harnessing OER should be educational (see 'How can education benefit by harnessing OER?' below), but

the issue of sharing content openly may also be considered a strategy to protect oneself commercially.

The following benefits can accrue from sharing content under an open licence:

- As digitized content can so easily be shared between students and institutions, sharing it publicly under an open licence is the safest way to protect the author's IPR and copyright; the licence can ensure that, when content is shared, it remains attributed to the original author. Open sharing of content can more rapidly expose plagiarism, by making the original materials easy to access. In addition, releasing materials under an open licence also reduces the incentive for others to lie about the source of materials because they have permission to use them.
- Sharing of materials provides institutions opportunities to market their services. Educational institutions that succeed economically in an environment where content has been digitized and is increasingly easy to access online are likely to do so because they understand that their real potential educational value lies not in content itself, but in offering related services valued by their students. These might include: guiding students effectively through educational resources (via well-designed teaching and learning pathways); offering effective student support (such as practical sessions, tutorials, individual counselling sessions or online); and providing intelligent assessment and critical feedback to students on their performance (ultimately leading to some form of accreditation). Within this environment, the more other institutions make use of their materials, the more this will serve to market the originating institution's services and thereby attract new students.
- For individual educators, proper commercial incentives for sharing content openly are most likely to flow when institutions have policies to reward such activity properly. Up to now, many institutional and national policies and budgetary frameworks have tended, at worst, to penalize collaboration and open sharing of knowledge (by removing possible streams of income when knowledge is shared openly) or, at best, to ignore it (as so many universities do by rewarding research publication over other pursuits). Thus, for most educators, the incentives lie in changing the institutional and national policies and budgetary frameworks so that they reward collaboration and open sharing of knowledge.
- Even if institutional and national policies and budgetary frameworks do not reward collaboration and open sharing of knowledge, there are still incentives for educators to share their resources openly. Open licences maximize the likelihood of content-sharing taking place in a transparent way that protects the moral rights of content authors. Furthermore, people who seek to ring-fence, protect, and hide their educational content and research will likely place limits on their educational careers. They will also increasingly be excluded from opportunities to improve their teaching

practice and domain-specific knowledge by sharing and collaborating with growing networks of educators around the world. Those who share materials openly already have significant opportunities to build their individual reputations through these online vehicles (although, of course, the extent to which they manage this will remain dependent on the quality of what they are sharing).

Who will guarantee the quality of OER?

This question is possibly reflective of a deeply entrenched notion of educational materials as being 'publications', the quality of which is controlled by educational publishers. This notion has been – and remains – valid but reflects a partial understanding of the scope and diversity of educational materials used in many teaching and learning contexts. It also reflects a false delegation of responsibility for quality to a third party. This mindset shifts into the OER space in the form of an unstated assumption that one or more dedicated agencies should take full responsibility for assuring that OER shared in repositories online are of a high quality. In addition to this being practically impossible, it masks the reality that the definition of quality is subjective and contextually dependent.

In the final analysis, responsibility for assuring the quality of OER used in teaching and learning environments will reside with the institution, programme/course coordinators, and individual educators responsible for delivery of education. As they have always done when prescribing textbooks, choosing a video to screen, or using someone else's lesson plan, these agents are the ones who retain final responsibility for choosing which materials – open and/or proprietary – to use. Thus, the 'quality of OER' will depend on which resources they choose to use, how they choose to adapt them to make them contextually relevant, and how they integrate them into teaching and learning activities of different kinds.

This task of assuring quality has been complicated by the explosion of available content (both open and proprietary). This is both a blessing, as it reduces the likelihood of needing to develop new content, and a curse, as it demands higher level skills in information searching, selection, adaptation, and evaluation. As institutions share more educational content online, they will want to ensure that this content reflects well on the institution and may thus invest in improving its quality before making it available in repositories. In the OER environment, quality assurance will thus be assisted by the development of such repositories, which will provide at least first levels of quality assurance.

But these investments on the part of institutions will simply serve, over time, to create more opportunities for finding good materials to use. The primary responsibility for finding the right materials to use, and for using them to support effective education, still resides with the institutions and educators offering the education.

How can education benefit by harnessing OER?

The most important reason for harnessing OER is that openly licensed educational materials have tremendous potential to contribute to improving the quality and effectiveness of education. The challenges of growing access, combined with the ongoing rollout of ICT infrastructure into educational institutions, indicates that it is becoming increasingly important for them to support, in a planned and deliberate manner, the development and improvement of curricula, ongoing programme and course design, planning of contact sessions with students, development of quality teaching and learning materials, and design of effective assessment – activities all aimed at improving the teaching and learning environment while managing the cost of this through increased use of resource-based learning.

Given this, the transformative educational potential of OER revolves around three linked possibilities:

1. *Increased availability of high quality, relevant learning materials can contribute to more productive students and educators.* Because OER removes restrictions around copying resources, it can reduce the cost of accessing educational materials. In many systems, royalty payments for text books and other educational materials constitute a significant proportion of the overall cost, while processes of procuring permission to use copyrighted material can also be very time-consuming and expensive.
2. *The principle of allowing adaptation of materials provides one mechanism amongst many for constructing roles for students as active participants in educational processes,* who learn best by doing and creating, not by passively reading and absorbing. Content licences that encourage activity and creation by students through re-use and adaptation of that content can make a significant contribution to creating more effective learning environments.
3. *OER has potential to build capacity by providing institutions and educators access, at low or no cost, to the means of production to develop their competence in producing educational materials and carrying out the necessary instructional design* to integrate such materials into high quality programmes of learning.

Deliberate openness thus acknowledges that:

- Investment in designing effective educational environments is critically important to good education.
- A key to productive systems is to build on common intellectual capital, rather than duplicating similar efforts.
- All things being equal, collaboration will improve quality.
- As education is a contextualized practice, it is important to make it easy to adapt materials imported from different settings where this is required, and this should be encouraged rather than restricted.

Is OER really free?

The issue of freedom and its definition has been widely debated since the advent of open licences, possibly most significantly in the Free and Open Source Software environment. Open Source and Free Software definitions specify four types of freedom:

- The freedom to run the programme, for any purpose (freedom 0).
- The freedom to study how the programme works, and adapt it to your needs (freedom 1).
- The freedom to redistribute copies so you can help your neighbour (freedom 2).
- The freedom to improve the programme, and release your improvements to the public, so that the whole community benefits (freedom 3).[3]

Similar considerations apply when considering licences for OER. However, there is another specific dimension of OER 'freedom' that warrants explicit discussion, and that is the notion of *cost*. Many proponents of OER advocate that a key benefit of open content is that it is 'free' (i.e. it does not cost anything to download – leaving aside costs of bandwidth, of course – and use). This is literally true: by definition, open content can be shared with others without asking permission and without paying licence fees. However, simplistic assertions that OER is free – and by extension that use of OER will cut costs of educational delivery – mask some important cost considerations.

Educational institutions that are serious about teaching and learning will need to ensure that their spending on personnel and other related expenses reflects a sustained effort to invest in creating more effective teaching and learning environments for their students. This will require investment in, among other things, the following:

- Developing and improving curricula.
- Ongoing programme and course design.
- Planning of contact sessions with students.
- Development and procurement of quality teaching and learning materials.
- Design of effective assessment activities.

Many educational institutions do not yet make such investments in a planned and deliberate way, but it is an essential part of their core function.

So, how does this relate to OER? As educational institutions make strategic decisions to increase their levels of investment in design and development of better educational programmes, the most cost-effective way to do this is to embrace open licensing environments and harness existing OER.

[3] Taken from www.openclinical.org/opensource.html.

Thus, commitment to OER implies increased investment in teaching and learning, but promises to increase the efficiency and productivity of those investments by providing new ways of developing better programmes, courses and materials. Importantly, this implies a *demand-driven approach* to OER, where the initial rationale for embracing open licensing environments is not to release an institution's own intellectual capital, but rather to draw in the growing wealth of openly available OER to improve the quality of the institution's own teaching and learning.

Taking a demand-driven approach can be justified in terms of the improvements in quality that can flow from it. In addition, though, this approach to materials development is cost effective. A further advantage is that, as an obvious by-product, it will typically lead to institutions starting to share a growing percentage of their own educational materials online, released under an open licence. Most institutions and educators are instinctively nervous about this, but evidence is now starting to emerge that institutions that share their materials online are attracting increased interest from students in enrolling in their programmes. This in turn brings potential commercial benefits, because the sharing of materials online raises an institution's 'visibility' on the Internet, while also providing students more opportunities to investigate the quality of the educational experience they will receive there. As students in both developed and developing countries are relying increasingly heavily on using the Internet to research their educational options, sharing of OER may well become an increasingly important marketing tool for institutions.

Most importantly, harnessing of OER requires institutions to *invest* – in programme, course and materials development. Costs will include the time of people in developing curricula and materials, adapting existing OER, dealing with copyright licensing and so on. (See Appendix Nine for a full list of the skills related to OER.) Costs also include associated costs, such as ICT infrastructure (for authoring and content-sharing purposes), bandwidth, running content development workshops and meetings, and so on.

However, these costs are a function of investing in better teaching and learning environments, not a function of investing in OER. All governments and educational institutions in all education sectors, regardless of their primary modes of delivery, need to be making these investments on an ongoing basis if they are serious about improving the quality of teaching and learning. Within the framework of investing in materials design and development, though, the most cost-effective approach is to harness OER. This is because:

- It eliminates unnecessary duplication of effort by building on what already exists elsewhere;
- It removes costs of copyright negotiation and clearance; and
- Over time, it can engage open communities of practice in ongoing quality improvement and assurance.

Does use of OER preclude use of commercial content?

While it may be a worthy, if somewhat idealistic aspiration to make all educational content available free of charge, in-principle decisions to exclude commercial content from consideration in teaching and learning environments are likely to be inappropriate. Such a stance ignores the reality that there are many high quality educational materials available for purchase and that, in certain circumstances, their use may be more affordable than attempts to produce that content openly. Thus, the most cost-effective way to develop and procure resources for use in teaching and learning is to explore all available options, rather than excluding some on principle.

OER and commercial content can thus be used together in courses and programmes, although course developers need to be careful not to create licensing conflicts by integrating materials with different licensing conditions when designing teaching and learning materials. It thus seems a worthwhile practice, however, during design and development of educational courses and programmes, to consider all possibilities when developing and procuring content. Of course, as a consequence of digitization of content and the growth of openly available content online, educational publishing business models will shift and the mix of open content and commercial content will continue to change.

What policy changes are needed for institutions to make more effective use of OER?

To be effective and sustainable, institutional decisions to harness OER will likely need to be accompanied by review of policies. There are at least four main policy issues:

1. *Provision in policy of clarity on IPR and copyright* on works created during the course of employment (or study) and how these may be shared with and used by others.
2. *Human resource policy guidelines* regarding whether or not the creation of certain kinds of work (e.g. learning resources) constitutes part of the job description for staff and what the implications are for development, performance management, remuneration, and promotion purposes.
3. *ICT policy guidelines* regarding access to and use of appropriate software, hardware, the Internet and technical support, as well as provision for version control and back-up of any storage systems for an institution's educational resources.

4. *Materials development and quality assurance policy guidelines* to ensure appropriate selection, development, quality assurance, and copyright clearance of works that may be shared.

A good starting point for consideration of OER is to have clear policies in place regarding *IPR and copyright*. A clear policy would for example, plainly lay out the respective rights of the institution and its employees and sub-contractors, as well as students (who might become involved in the process directly or indirectly through use of some of their assignment materials as examples) regarding intellectual capital. As part of this policy process, it is worth considering the relative merits of creating flexible copyright policies that automatically apply open licences to content unless there are compelling reasons to retain all-rights reserved copyright over those materials. Simultaneously, though these policies should make it easy for staff to invoke all-rights reserved copyright where this is justified.

A logical consequence of reconsidering *human resource policy* will be development or updating of costing/resourcing and performance management systems so that they reward staff for the following:

- Time spent in developing educational resources.
- Using resource-based learning where it is more effective than lecturing.
- Harnessing other people's materials when it is more cost-effective than producing materials from scratch.
- Sharing their intellectual capital through global knowledge networks to improve their resources and to raise both their and their institution's profile.

What are the best ways to build capacity in OER?

The skills required for institutions to harness OER effectively are many and varied. A fuller list is provided in Appendix Nine, but they include the following:

- Expertise in advocacy and promotion of OER as a vehicle for improving the quality of learning and teaching in education.
- Legal expertise relating to content licensing.
- Expertise in developing and explaining business models that justify, to institutions, individual educators, and other creators of educational content (including publishers), the use of open licensing.
- Programme, course and materials design and development expertise.
- Technical expertise.
- Expertise in managing networks/consortia of people and institutions to work cooperatively on various teaching and learning improvement projects.
- Monitoring and evaluation expertise.

- Expertise in curating and sharing OER effectively.
- Communication and research skills to be able to share information about OER.

Capacity building should also focus on the people and institutions required to enable effective use of OER. This would involve:

- Raising awareness of the potential of OER and the requirements for successful use.
- Supporting policy-makers and heads of institutions to understand the key elements necessary to create supportive policy environments, develop materials, use technology, and conduct research.
- Identifying best-practice examples of use of OER and facilitating institutional visits, so that participants have an opportunity not only to observe effective use of OER in practice but also to start developing support networks and communities of practice.

Where do I find OER?

The scope and availability of OER is ever expanding. Every week, new resources are being added to the global body of resources. A current problem arising out of this growth is that there is no single comprehensive listing of all OER (nor, given the rapid expansion of content online, is there ever likely to be one). This means that, in order to find appropriate OER, the searcher will need to employ a number of search strategies:

1. *Use a specialized OER search engine*: While search engines such as Google and Bing are a good general starting point for finding content online, there are also some specialized search engines that search specifically for OER. Their listings, however, are selective based on different search criteria so it is a good idea to try more than one. Here are a few of the popular ones:
   - Global Learning Objects Brokered Exchange (GLOBE) Alliance: www.globe-info.org.
   - Folksemantic: www.folksemantic.com.
   - DiscoverEd: http://discovered.labs.creativecommons.org/search/en.
   - Creative Commons Search: http://search.creativecommons.org.
   - Open Courseware Consortium: www.ocwconsortium.org/courses/search.
2. *Locate a suitable OER repository*: Searchers should also access the major OER repositories to search for OER. Most are institutionally based, focusing on the materials released by that organization. A famous example is the Massachusetts Institute of Technology Open Courseware Repository (MIT OCW). Some repositories, such as MedEd PORTAL, have a specific subject focus, in this

instance, medical photos and multimedia. Below are a few of the more significant OER repositories (with many more described in Appendices Five and Six):

- OpenLearn: http://openlearn.open.ac.uk.
- MedEd PORTAL: http://services.aamc.org/30/mededportal (medical focus).
- MIT OCW: http://ocw.mit.edu.
- China Open Resources for Education (CORE): www.core.org.cn/en.
- AgEcon Search: http://ageconsearch.umn.edu (agricultural focus).
- Teacher Education in sub-Saharan Africa: www.tessafrica.net (teacher education focus).

3. *Use OER directory sites*: There are many sites that have a search facility whose results point to places elsewhere on the Internet where resources match search criteria. They themselves do not act as a repository, but have identified quality resources and store them in a database of web links. Their databases usually have a particular focus. In the case of OER Africa, for example, they highlight quality resources developed in and about Africa. Here are just a few (with many more provided in Appendices Five and Six):
   - OER Commons: www.oercommons.org.
   - Commonwealth of Learning: www.col.org/OER.
   - OER Africa: www.oerafrica.org.

How can I share my OER with others?

Once a resource has been developed and an open licence has been selected (see Appendix One for information on the various options), the resource will need to be stored in an online repository in order for others to access it.

There are various options with regard to where these resources might reside:

1. *Use the institutional repository*: Many organizations, and especially universities, are setting up their own collections and making them available online as OER or OCW. If the writer or developer works for such an institution, the expectation will be that OER developed under the auspices of that institution should reside within their repository. Seek guidance from the repository administrator.
2. *Select an open repository*: Various repositories welcome contributions from multiple locations. JORUM (www.jorum.ac.uk/share), for example, welcomes submissions that support the British curriculum at further and higher education levels. OER Commons has a facility (www.oercommons.org/contribute) to allow users to contribute materials. Generally, open repositories require the person submitting the resource to register and log in before

uploading the resource. They will also require information about the resource to allow it to be catalogued and tagged. This is necessary in order to allow search facilities to find it. The submitted resource will be vetted by a review team to ensure quality before being added to the repository's database.

3. *Build the OER online*: It is also possible to build a resource online. A few sites encourage development of OER within their online environments. They can then automate processes such as acquiring a Creative Commons licence and adding the resource to the database. One such example is Connexions (http://cnx.org), which allows teams to develop modules of learning on their site. Users open an account, develop the materials online, and then publish them once they are satisfied. WikiEducator (http://wikieducator.org) uses a similar method to allow educators to develop teaching materials collaboratively online.
4. *Exploit social networks*. The world of social networking has also opened new possibilities for publishing OER online. A site such as Flickr (www.flickr.com) allows its users to publish photographic materials with Creative Commons licenses, while YouTube (www.youtube.com) allows the same for digital video materials. Networks like Twitter and Facebook can be used to spread awareness of the materials posted on the Internet by sharing the links.

How much can I change OER for my own purposes?

In most instances, a user has enormous latitude to adapt OER to suit contextual needs where the licence allows adaptation. If, however, the licence restricts adaptation (as, for example, the Creative Commons licence with a 'No Derivatives' restriction does), others may not alter the resource in any way. It has to be used 'as is'. This right is not reserved often in OER.

The vast majority of published OER welcome users to adapt the original resource. Common ways in which OER can be changed include the following:

- *Mixing:* A number of OER are mixed together and additional content is added to create an altogether new resource. This is common when course designers need to develop materials and resources to match a local curriculum or programme. A common concern is that it is rare to find existing OER that fit perfectly 'as is'.
- *Adaption:* This occurs when one OER is used and multiple adaptations are developed to suit multiple contexts. It could be that the language is translated into others but usually adaptation requires local case studies/examples to be added to make the materials relevant to students in a particular context.

- *Asset extraction:* It is also possible to extract only some of the assets of a resource or course and use them in a completely different context. This is especially true of media elements such as photos, illustrations, and graphs, as developers often lack the skills or resources to develop their own versions of commonly used visual aids.

In many ways, the fact that changes may be made to the original is what makes OER – compared with other forms of copyrighted materials – especially useful to programme developers.

Making the Case for Open Educational Resources

Introduction

The concept of Open Educational Resources (OER) was originally coined during a UNESCO Forum on Open Courseware for Higher Education in Developing Countries held in 2002. During a follow-up, online discussion, also hosted by UNESCO, the initial concept was further developed as follows:

> *Open Educational Resources are defined as 'technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes.' They are typically made freely available over the Web or the Internet. Their principle use is by teachers and educational institutions to support course development, but they can also be used directly by students. Open Educational Resources include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabuses, curricula, and teachers' guides. (Wiley 2006)*

Since that time, the term has gained significant currency around the world and become the subject of heightened interest in policy-making and institutional circles, as many people and institutions explore the concept and its potential to contribute to improved delivery of higher education around the world. This section of the Guide examines the concept of OER in more detail, offering a simple, clear definition, and explaining the economic and educational potential behind that definition and the origin of OER in longstanding educational and technological developments globally. It then uses this platform to provide an overview of key issues that educational planners and decision-makers need to take into account in order to harness OER effectively, including issues of policy, curriculum and materials development, quality, and sustainability. This section of the Guide is accompanied by a series of appendices that provide further details such as introducing examples of OER practices around the world and exploring legal and licensing considerations for OER.

Defining the concept

At its core, OER denotes a very simple concept, the nature of which is first legal, but then largely economic: it describes educational resources that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees. A broad spectrum of frameworks is emerging to govern how OERs are licensed for use; some licences allow only copying while others make provision for users to adapt the resources that they use. The best known of these are the Creative Commons licences. They provide legal mechanisms to ensure that authors of work can retain acknowledgement for their work while allowing it to be shared, can seek to restrict commercial activity if they so wish, and can aim to prevent people from adapting work if appropriate (although this may be difficult to enforce in legal terms at the margins). A more detailed discussion of licensing options is presented in Appendix One.

Two dimensions of OER: The pedagogical and the digital

As the concept of OER has been discussed and explored in a growing number of educational debates, discussions, and conferences, there have been two key dimensions highlighted in papers on the topic. These are summarized in a Wikipedia article on OER, as follows:

> *The OER movement originated from developments in open and distance learning (ODL) and in the wider context of a culture of open knowledge, open source, free sharing and peer collaboration, which emerged in the late 20th century.*

These two dimensions – the educational and the digital – are critical to understanding the real educational potential of OER, so are worth exploring briefly. As its origins are older, this is best begun by exploring briefly the history of the concept of ODL, or distance education.

OER, distance education and resource-based learning

The growth of 'distance education' methods of delivery was a key feature of education in the 20th century, for reasons that are outlined in more detail in Appendix Two. Initially, these methods were developed as distinctly different from face-to-face education, with the unfortunate consequence that they were regarded as inferior to face-to-face educational methods. Distance education came to be seen as provision for those people denied access to face-to-face education (either because they cannot afford the latter or because circumstances demand that they study on a part-time basis). The growth of new communications technologies, however, has begun to make the notion of 'distance' difficult to interpret, while opening a great number of educationally and financially viable means of providing education. Simultaneously, awareness is growing that elements

of distance education have almost always existed in 'face-to-face' programmes, while educators involved in distance education are increasingly recognizing the importance of different types of face-to-face education as structured elements of their programmes. This renders rigid distinctions between the two forms of delivery meaningless.

To deal with the growing combination of distance and face-to-face educational methods in many programmes, the notion of a continuum of educational provision has emerged in some circles. This continuum has, as one of its imaginary poles, provision only at a distance, while at the other end of the continuum falls provision that is solely face-to-face. The reality is that all educational provision exists somewhere on this continuum but cannot be placed strictly at either pole. Re-conceptualizing methods of educational provision as existing somewhere on this imaginary continuum has the result that certain methods of provision are no longer chosen to the exclusion of others, depending on whether they are 'distance' or 'face-to-face' educational opportunities. Rather, educational providers, when constructing educational courses, are able to choose, from a wide variety, those methods that are most appropriate for the context in which they will be providing learning opportunities.

Another major advantage of this 'blurring' is that 'distance educators' and 'face-to-face educators' can turn from meaningless debates about the relative virtues of particular methods of educational provision, to consideration of the nature of learning and the educational value of a course's structure and content. Educators often find it necessary to equate particular methods of education with good quality education, in an effort to market the programmes they are offering and give them added status over programmes using different methods of provision. The notion of this continuum is free of such premature and unnecessary judgements about quality.

It needs to be made clear that no method of educational provision is intrinsically better than another; rather, the appropriateness of a particular method or combination of methods selected is determined entirely by the context in which they are to be used and the educational needs they are intended to fulfil. This conceptual shift is vital in changing the structure of the higher educational system. In particular, it will allow for greater flexibility and open up possibilities of collaboration, which are vital to an improvement in educational quality and in the cost-effectiveness of educational provision.

A shift to resource-based learning

A logical consequence of the collapse of simplistic distinctions between contact and distance education, together with the increasingly exciting variety of media available and decline in production and reception costs of these media, has been the emergence of resource-based learning. The concept is not new; it is based on the principle that educators should select, from the full range of educational provision, those resources and methods most appropriate to the context in

which they are providing education. This principle is, however, augmented by the understanding that managing the process of learning by using a 'talking lecturer' to transmit content is in many cases neither educationally nor financially effective. This is especially important in contexts in which quality solutions to educational problems are required on a massive scale.

In essence, the notion of resource-based learning means that a significant but varying proportion of communication between students and educators is not face to face, but takes place through the use of different media as necessary. In fact, a recent study undertaken as part of the South African Survey of Student Engagement (Strydom & Mentz 2010) reveals that students involved in traditional contact-based study spend on average only 16 hours a week, or 40% of their time, on scheduled campus-based activities, including face-to-face contact based on varied student support activities like tutorials, peer group discussion and practical work.

The introduction of resource-based learning emerged strongly in the second half of the 20th century as more 'contact' institutions (particularly universities and colleges) became 'dual-mode' institutions, offering both distance and face-to-face educational programmes. While there are many motives for this shift, contact institutions have most often been making this move both to cope with increasing pressure on places and to find more cost-effective ways of providing education in a context of dwindling funds. As the distinctions between the two 'modes' of education has continued to collapse, however, it is becoming increasingly difficult to identify which programmes are being offered in which mode, particularly as resources developed for 'distance education' programmes are now being used in many 'contact' programmes. The emergence of Information and Communications Technology (ICT), which allows for much easier and cheaper production and dissemination of knowledge through various media, has made this even more complex to define.

The possibilities of resource-based learning

Some years ago, in a report written for the South African Institute for Distance Education (Saide), renowned South African educationist and educational theorist Wally Morrow described a fundamental problem in higher education as follows:

> *The traditional culture of Higher Education is based on a picture of teaching and an idea of Higher Education institutions which, in combination with each other, constitute a (perhaps the) major barrier to the accessibility and availability of Higher Education. (Saide 1996: 97)*

He went on to suggest that the principal recommendation that can contribute to the dismantling of this barrier is to think of teaching in terms of resource-based learning.

In the report to which Morrow contributed, Saide argued that the term 'resource-based learning' emerges as a logical consequence of the collapse of distinctions between contact and distance education, together with the increasingly exciting variety of media available and decline in production and reception costs of these media. In essence, it means that a significant but varying proportion of communication between students and educators is not face to face, but takes place through the use of different media as necessary. Importantly, the expensive face-to-face contact that does take place need not involve simple transmission of knowledge from educator to student; instead it involves various other strategies for supporting students, for example, tutorials, peer group discussion or practical work. In this respect, therefore, resource-based learning draws significantly from the lessons learned in international distance education provision throughout the 20th century. *Critically, resource-based learning is not a synonym for distance education.* Rather, it provides a basis for transforming the culture of teaching across all education systems to enable those systems to offer better quality education to significantly larger numbers of students in a context of dwindling funds.

Thus, to summarize:

- *Distance education* describes a set of teaching and learning strategies (or educational methods) that can be used to *overcome spatial and temporal separation* between educators and students. These strategies or methods can be integrated into any educational programme and potentially used in combination with other teaching and learning strategies in the provision of education (including with strategies that demand that students and educators be together at the same time and/or place). More information on components of well-functioning distance education systems is provided in Appendix Two.
- *Resource-based learning* involves communication of curriculum between students and educators through *use of resources* (instructionally designed and otherwise) that harness different media as necessary. Resource-based learning strategies too can be integrated into any educational programme, using any mix of contact and distance education strategies. Resource-based learning need not imply any temporal and/or spatial separation between educators and students, although many resource-based learning strategies can be used to overcome such separation.

Efforts to integrate use of instructionally designed resources into courses and programmes have been influenced by various motives. It is worth noting that these objectives have often incorporated efforts to overcome temporal and spatial separation, but not always. When they have incorporated this aim, the result has generally been an integration of distance education and resource-based learning strategies. The key motives/objectives, might usefully be described as follows:

1. *Breaking down the traditional notion that a talking teacher is the most effective strategy for communicating curriculum*. While this motive has not been exclusive to distance education programmes, it has been most systematically applied in such programmes. Nevertheless, many face-to-face courses and programmes at all levels of education incorporate use of instructionally designed resources, as educators have learned the limitations of lecture-based strategies for communicating information to students. It is important to stress that this motive does not imply any intrinsic improvements in quality of learning experience. The extent to which shifting communication of curriculum to instructionally designed resources leads to improvement in the quality of education is entirely dependent on the quality of the resources developed. Experience has demonstrated that, while spending more money on educational resource development does not necessarily lead to improvements in quality, under-investment in design of such resources is very likely to diminish the quality of the final resource. Many educational programmes operate under severe financial constraints, and are not able to make investments of sufficient scale in the resources that they develop. Thus, while the motive may be to use resources to communicate curriculum more effectively, investments made in designing those resources often do not allow for achievement of the intended goal.
2. *Directing a significantly larger proportion of total expenditure to the design and development of high quality resources, as a strategy for building and assuring the quality of educational provision*. This motive is linked to the previous one, but contains notable differences. Importantly, many people motivated by the desire to use resources to communicate curriculum are not similarly motivated by a desire to shift patterns of expenditure in this way (or are unable to do so because institutional financial policies make it impossible). This can lead to the problems outlined above, where communication of curriculum via resources rather than a talking teacher does not lead to improvements in the quality of pedagogy. There is, however, another tension that this motive creates when people do seek to shift patterns of expenditure in this way. This can occur when additional money is actually invested in design of resources, but this investment is then still spread over very small student numbers. The consequence of this can be to drive up significantly the per-student cost of the educational experience, leading to unsustainable educational practices. This practice is prevalent in many traditionally contact educational institutions. Its impact on public education may be profoundly unsettling in the long term, as it is proliferating unsustainable educational programmes.

3. *Implementing strategies to shift the role of the educator*.[4] This motive has been important in many educational programmes, where educators have sought to maximize the educational impact of contact time with students. As this time is generally the most significant component of variable educational costs, many educators have sought to use it to stimulate engagement and interaction rather than simply talking to mostly passive students. Again, though, this shift is not a feature of all education. Many educators continue to use contact time to perform very traditional functions, leaving no space for meaningful engagement between educators and students. As importantly, many educators do not embed the logic of engagement into resources themselves, often simply creating resource-based versions of traditional lectures. This trend is also pervasive in resources being shared under open licences, where many courses simply involve electronic mark-up of lecture notes into formats that can be shared online.
4. *Investigating the potential that the integration of new educational technologies into teaching and learning environments has for supporting, improving or enhancing those environments*. Given the explosive growth in the use of ICT in education around the world, it is important to add this motive to the list of motives for engaging in resource-based learning. This leads then onto the second dimension of OER, which has been driven by the rapid digitization of content made possible by ICT.

The digital dimension

The past 20 years have seen rapid development in ICT, and an accompanying explosion of ICT-related activity in education, as educational institutions and

[4] This changing role can be summarized as follows:

- Educators will become facilitators and managers of learning in situations where they are no longer the source of all knowledge.
- Educators will plan, negotiate for, and manage the integration of learning in formal institutions, in the workplace, and in communities.
- Many educators may spend a considerable proportion of their workloads contributing to the preparation of courseware.
- Many educators will interact with students at a distance through any one, or any combinations, of a variety of media (of which real-time face-to-face interaction is only one of many possibilities).
- Educators time spent in preparation, management and logistics will vary greatly between the following modes of communication:
  - Interaction with students;
  - Presentation of one-way television broadcast;
  - Video conference that hooks up a number of remote sites;
  - Online facilitation;
  - Written response to a student's assignment; and
  - Face-to-face facilitation.
- It will be essential that educators design and administer record-keeping systems (online or offline) that keep track of students' progress through their individual learning pathways – pathways that reflect individual variations in learning content, learning sequence, learning strategies, the learning resources, media and technologies chosen to support them, and the pace of learning.
- Increasing proportions of educators'work will involve them as members of teams to which they will contribute only some of the required expertise, and of which they will not necessarily be the leaders, managers or coordinators.

national systems grapple with the challenge of how best to deploy the potential of ICT to the benefit of students, educators and countries. A wide range of digital applications exist that can be used to create and distribute educational materials. (Details are provided in Appendices Three and Four.)

The long-term impact of ICT on education is still largely a matter of conjecture (often driven by ideological determinism or commercial marketing), and will only really start to become fully clear over the next 15 to 20 years. Nevertheless, certain trends in ICT use that are relevant to education have emerged that have a bearing on discussions about OER:

1. ICT use is expanding the range of options available to educational planners in terms of the teaching and learning strategies they choose to use, providing an often bewildering array of choices in terms of systems design options, teaching and learning combinations, and strategies for administering and managing education.
2. ICT use is allowing for exponential increases in the transfer of data through increasingly globalized communication systems, and connecting growing numbers of people through those networks.
3. ICT networks have significantly expanded the potential for organizations to expand their sphere of operations and influence beyond their traditional geographical boundaries.
4. ICT use is reducing barriers to entry of potential competitors to educational institutions, by reducing the importance of geographical distance as a barrier, by reducing the overhead and logistical requirements of running educational programmes and research agencies, and by expanding cheap access to information resources.
5. There has been an explosion in collective sharing and generation of knowledge as a consequence of growing numbers of connected people, and the proliferation of so-called Web 2.0 technologies.[5] Consequently, collective intelligence and mass amateurization are pushing the boundaries of scholarship, while dynamic knowledge creation and social computing tools and processes are becoming more widespread and accepted.

[5] Wikipedia notes that 'Web 2.0...refers to a supposed second generation of Internet-based services – such as social networking sites, wikis, communication tools, and folksonomies – that emphasize online collaboration and sharing among users... In the opening talk of the first Web 2.0 conference, Tim O'Reilly and John Battelle summarized key principles they believed characterized Web 2.0 applications:

- The Web as a platform
- Data as the driving force
- Network effects created by an architecture of participation
- Innovation in assembly of systems and sites composed by pulling together features from distributed, independent developers (a kind of "open source" development)
- Lightweight business models enabled by content and service syndication
- The end of the software adoption cycle ("the perpetual beta")
- Software above the level of a single device, leveraging the power of The Long Tail.'

Reference: http://en.wikipedia.org/wiki/Web_2. (Accessed 18 November 2006).

6. Digitization of information in all media has introduced significant challenges regarding how to deal with issues of intellectual property and copyright. Copyright regimes, and their associated business models, that worked effectively prior to the development of ICT are increasingly under threat, and in some cases rapidly becoming redundant.
7. Systemically, ICT use is tending to accentuate social disparities between rich and poor.

Increasingly, investment in ICT is being seen by educational planners as a necessary part of establishing competitive advantage, because it is attractive to students (particularly in those parts of the world where young people have increasingly ubiquitous access to ICT) and because it is deemed essential by governments, parents, employers and other key funders of education. Despite this, it is becoming clear that there is no direct correlation between increased spending on ICT and improved performance of educational systems. Benefit and impact, to the extent that they can be reliably measured at all, are more a function of *how* ICT is deployed than *what* technologies are used. Hopefully, as this knowledge becomes more widespread, it will help educational systems around the world – whatever their current resourcing constraints – to harness ICT over the coming years to improve educational delivery and reduce its cost, rather than creating additional expenses, exacerbating operational complexities and generating new problems.

As part of the development of ICT, e-learning continues to grow in importance worldwide. Indeed, some educational planners see it as one of the few relatively unrestricted avenues for innovation in teaching and learning. The European *eLearning Action Plan* defines e-learning as follows:

> *The use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration. (Commission of the European Communities 2001)*

There has been a growing tendency to use 'distance education' and 'e-learning' interchangeably. However, the use of distance education and e-learning as interchangeable or composite phrases introduces a confusing conflation of the terms, which has sometimes led to poor quality strategic planning. It is true that introduction of ICT introduces a new range of educational strategies, but it remains a relatively simple matter to establish whether specific uses of ICT incorporate temporal and/or spatial separation. Thus, for example, students working independently through a CD-ROM or online course materials are clearly engaged in a distance education practice, while use of satellite-conferencing, although it allows a degree of spatial separation, has more in common with face-to-face education because it requires students to be in a specific place at a specific time. Many people harnessing ICT seem to think they are harnessing the benefits of good quality distance education, when often they are simply finding technological alternatives for replicating traditional, face-to-face educational models.

The only complexity within this is that ICT has created one specific new form of contact, which is not easily classified as either face-to-face or distance. *Online communication* allows students and academics to remain separated by space and time (although some forms of communication assume people congregating at a common time), but to sustain an ongoing dialogue. Online asynchronous discussion forums, for example, reflect an instance where the spatial separation between educator and students is removed by the 'virtual' space of the Internet, but where there remains temporal separation. As a discussion forum allows sustained, ongoing communication between academics and students, it is clearly a form of contact, not a form of independent study. Thus, there may be cause to introduce a new descriptor for educational methods of direct educator–student contact that are not face-to-face, but are mediated through new communication technologies.

While the pedagogical potential of OER is deeply tied to the concept of resource-based learning and its origins in well-designed distance education course materials, it would simply not have been conceivable before the ICT explosion. This is because the network of connected digital devices that is the Internet has made it possible to share information globally on a scale and at speeds that were largely unimaginable before the 1990s. The ease with which digital content can be created, shared online and copied by others, however, also introduced problems regarding copyright and intellectual property protection – problems that have affected, and continue to transform, most industries based on protection of intellectual capital as an economic model, including education and educational publishing. Simultaneously, however, the knowledge economy saw the rise of alternative models of licensing, most well known in the software industry.

The emergence of open source

As a Wikipedia article on the topic notes,

> *The concept of open source and free sharing of technological information existed long before computers. For example, cooking recipes have been shared since the beginning of human culture. Open source can pertain to businesses and to computers, software and technology.*[6]

However, the term 'Open Source' really came to prominence with the world of software development (where it was launched in 1983 as the Free Software Movement), coming to describe computer software for which, as a JISC[7] Briefing Paper notes:

- The source code is available to the end-user;
- The source code can be modified by the end-user;
- There are no restrictions on redistribution or use;

[6] http://en.wikipedia.org/wiki/Open_source.
[7] Historically, JISC stood for Joint Information Software Committee (a UK-based initiative).

- The licensing conditions are intended to facilitate continued reuse and wide availability of the software, in both commercial and non-commercial contexts.8

The JISC Briefing Paper notes that:

> *In every other respect there is no difference between this and conventionally-licensed software. The key differentiator is the licence. The term 'open source' is reserved for licences which are certified by the Open Source Initiative (OSI) to meet the criteria of the Open Source Definition (OSD). (JISC, n.d.)*

Open source on the Internet began when the Internet was just a message board, and progressed to more advanced presentation and sharing forms like a website. There are now many websites, organizations and businesses that promote open source sharing of everything from computer code to the mechanics of improving a product, technique or medical advancement. Being organized effectively as a consumers' cooperative, the idea of open source is to eliminate the access costs to the consumer and the creator by reducing the restrictions of copyright. It is intended that this will lead to creation of additional works, which build upon previous works and lead to greater social benefit. Additionally some proponents argue that open source also relieves society of the administration and enforcement costs of copyright. Organizations such as Creative Commons have websites where individuals can file for alternative 'licences', or levels of restriction, for their work (see Appendix One). These self-made protections free the general society of the costs of policing copyright infringement. Thus, on several fronts, there is an efficiency argument to be made on behalf of Open Sourced goods.[9]

These ideas have subsequently found their way into many spaces. From a higher educational perspective, they emerged, for example, in the concept of 'open access'. As Wikipedia notes, while the term 'open access' is applied to many concepts, it usually means the following:

- Open access (publishing), access to material (mainly scholarly publications) via the Internet in such a way that the material is free for all to read, and to use (or reuse) to various extents.
- Open access journal, journals that give open access to all or a sizable part of their articles.[10]

The relevant Wikipedia article notes that active debate over the economics and reliability of various ways of providing Open Access publishing of scholarly journals continues among researchers, academics, librarians, university administrators, funding agencies, government officials, commercial publishers and academic/professional society publishers. Notwithstanding this, an empirical

[8] List taken from www.jisc.ac.uk/publications/briefingpapers/2006/pub_ossbp.aspx.
[9] This section is adapted from the Wikipedia article on open source: http://en.wikipedia.org/wiki/Open_source, as accessed on 18 January 2011. This text of this article is available under the Creative Commons Attribution/Share-Alike Licence.
[10] http://en.wikipedia.org/wiki/Open_access.

study published in 2010 showed that, of the total output of peer-reviewed articles, roughly 20% could be found as Openly Accessible.[11] It is worth noting also that, increasingly, the performance of senior academics is based not only on their research outputs but also, and more importantly, on their citations. It seems logical therefore, from both a social and a personal perspective, to open access to research outputs as widely as possible.

In parallel, a notion emerged of 'Open Source' learning materials, facilitated by growing exploration by educators and educational content developers of the possibilities of developing digital materials that could be designed to allow easy reuse in a wide range of teaching and learning situations. Thus, the notion of OER has 'Open Source' parallels in several areas: OER and Open Source Software have many aspects in common, a connection first established in 1998 by David Wiley, who introduced the concept of open content by analogy with Open Source.[12] As already noted, the term OER itself was first adopted in 2002 at a UNESCO forum on Open Courseware (OCW), university educational materials that are shared freely in an open virtual learning environment.

OER: An economic value proposition with potential for educational transformation

Bringing these two dimensions – the pedagogical and the digital – together, the concept of OER has emerged as having powerful transformative potential. Pedagogically, the concept is underpinned by the notion of using resources as an integral method of communication of curriculum in educational courses. However, it is the ease with which digitized content can be shared via the Internet that has the potential to unleash the full power of resource-based learning without bankrupting educational systems. Importantly, as with 'Open Source', the key differentiator between an OER and any other educational resource is its licence. Thus, an OER is simply an educational resource that incorporates a licence that facilitates reuse – and potentially adaptation – without first requesting permission from the copyright holder.

Importantly, OER is not synonymous with online learning or e-learning. Indeed, particularly in developing country contexts, it might be anticipated that many educational resources produced –while shareable in a digital format (both online and via offline formats such as CD-ROM) – would be printable. Thus, a very high percentage of resources of relevance to education might be shared digitally as Rich Text Format (RTF) or similar files (for purposes of adaptation) and packaged as Portable Document Format (PDF) files (for purposes of printing).

[11] This section is adapted from the Wikipedia article on Open Access Publishing: http://en.wikipedia.org/wiki/Open_access_%28publishing%29, as accessed on 18 January 2011. This text of this article is available under the Creative Commons Attribution/Share-Alike Licence. The empirical study reference is provided as: www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0011273.

[12] http://en.wikipedia.org/wiki/Open_educational_resources.

While the concept of OER is denotatively a legal one, its implications are first and foremost *economic*. Open licensing frameworks pose two primary economic propositions:

- Primary economic proposition #1: Educational institutions and educators will need to create different services (given the rapidly transforming market for traditional educational content).
- Primary economic proposition #2: Abandon a free-market approach to education in favour of collaborating to build and share knowledge.

Primary economic proposition #1

As Appendix Five of this Guide illustrates, a wave of open sharing of content is building online with astonishing speed. In this context, the key question for educators and educational decision-makers is really: 'how do we ride it rather than being drowned by it?'

There is a direct comparison to be made between what is happening in the music, film and newspaper industries – among others – and the future of content in education. For example, file-sharing software applications, such as BitTorrent clients, have led to an explosion in the free transfer of music and video files, creating an apparent crisis of business models in the music and film industries. Similarly, running a search on the right Torrent websites will generate, in a few seconds, an extensive list of key medical textbooks freely (if illegally) available for download, together with passwords to access password-restricted journals. This does not mean, though, that the market for educational content and publications will disappear altogether; but it will be comprehensively transformed and different services will need to be created within those transformed markets. The niches for sale of generic educational content will likely become more specialized, while much previously saleable content will lose its economic value.

By way of example, the University of Michigan's on-campus bookshop closed in June 2009 because it could no longer generate sufficient sales. Likewise an article from Tim Barton of Oxford University Press, published in 2009 in the *Chronicle of Higher Education*,[13] relates an example of students from Columbia University who cited a book published in 1900 rather than the many up-to-date books on the reading list, primarily because its full text was online. Of this, he opined, 'if it's not online, it's invisible'. Bandwidth constraints may make this kind of downloading difficult for some students today (although the costs already make sense if one compares price of bandwidth with the price of some of the more expensive textbooks required in higher educational studies), but the trend towards cheaper bandwidth is clear and will be used by students to access materials, whether this is legal or not.

[13] Barton T, Saving texts from oblivion: Oxford U. Press on the Google book settlement. *Chronicle of Higher Education*. Accessed January 2011, http://chronicle.com/article/Saving-Texts-From-Oblivion-/46966

There has been a proliferation of facilities, content and services available online. This is clearly evident by the examples illustrated in Appendix Five. Organized according to categories such as Open Courseware (OCW) OER repositories, University OCW initiatives, content creation Initiatives, subject specific OCW and OCW search facilities, these OER sources provide a useful starting point with regard to the extent of content publicly available. Appendix Five is drawn from an online catalogue maintained by OER Africa, and accessible at:

www.oerafrica.org/FindingOER.

Thus, educators who ask, 'why should I share my educational content?', should be aware that the real question is, 'how can I stay in control of the process of my educational content being shared?' And, the more useful the content is to students, the more likely it is to be shared, with or without the author's permission. Those academics and publishers who seek to fight against this trend have been likened to the Spanish army fighting the Apaches or the music industry fighting music pirates (as described in a book titled *The Starfish and the Spider: The Unstoppable Power of Leaderless Organization*) – the harder one tries to destroy the leaders of these decentralized movements, the more one ends up strengthening them (Brafman & Beckstrom 2007).

Consequently, on the teaching and learning side, educational institutions that succeed economically are likely to do so predominantly by understanding that their real potential educational value lies in their ability to provide effective support to students (whether that be in practical sessions, tutorials, individual counselling sessions, or online) and in their ability to provide intelligent assessment and critical feedback to students on their performance (ultimately leading to some form of accreditation). The market has not shifted fully yet, but it will. The efforts of universities like the Massachusetts Institute of Technology and the Open University, UK, to release their content as OER reflects an understanding of this shift, as well as an effort to lead it and benefit from the publicity that such leadership generates. In such an environment, it is foreseeable that reputation will grow by making content available as a way of publicizing competence in providing support, assessment, and accreditation. Increasingly, people who seek to ring-fence, protect and hide their educational content and research will most likely place limits on their academic careers. They will also increasingly be excluded from opportunities to improve their teaching practice and domain-specific knowledge by sharing and collaborating with growing networks of academics around the world.

A new initiative called the *Open Education Resource (OER) for assessment and credit for students* (Technology Enhanced Knowledge Research Institute, Athabasca University 2011) aims to take the next logical step, given the proliferation of free tuition courses using OER. The aim of the project is to create 'flexible pathways for learners using open learning materials hosted on the Internet to earn credible credentials from accredited higher education institutions' (TEKRI 2011: 1).

In terms of the initiative's envisaged model of an 'open university' created by innovative partnerships among like-minded higher education institutions, the aim is to offer 'robust and credible solutions for providing assessment and credentialisation services' (TEKRI 2011:2) so that students may 'readily have their learning assessed and subsequently receive appropriate academic recognition for their efforts' (TEKRI 2011:1).

Primary economic proposition #2

The second economic proposition posed by OER is a riskier challenge – to abandon the pervasive economic logic that education should be treated as a business, governed by the same rules and incentives as the commercial and retail sector. The notion of education as a free market has had many negative consequences. For the past few decades, educators and educational institutions have been rewarded for competing with one another and withholding their intellectual property from others. Considered critically, this seems clearly antithetical to the notions of building and sharing knowledge, notions that are central, at least in principle, to the core function of educational institutions (at least, public ones). Over the past few decades, education has increasingly come to be understood as a business and a cost centre, the objective of which is to drive costs down – whether it be the cost of running universities and schools or the price of producing graduates.

Although the concept of OER itself will do nothing to change these realities, it offers an opportunity to reconsider the economic value proposition of education. It provides a reason to change institutional and national policies and budgetary frameworks so that they reward collaboration and open sharing of knowledge, rather than either penalizing it (by removing possible streams of income when knowledge is shared openly) or ignoring it (as so many universities do by rewarding research publication over other pursuits such as time spent in designing educational programmes, participating in collaborative materials development processes, and making produced materials freely available for others to use). This suggests a need to place strong emphasis on institutional policy engagement, because, until rewards systems are restructured, there is little prospect for persuading people to change their behaviour.

No matter what technologies or methodologies may be used, the simple reality is that good education cannot be created or sustained without spending properly on it. Investment in education can only ever be meaningfully justified in terms of the long-term social and economic benefits that it will bring societies, not in terms of how those investments will help to enrol more students at progressively declining unit costs.

Of course, if OER is understood as just another mechanism to cut costs, this time by providing free content, its potential to contribute to improving education will be lost and it will be consigned to the long list of faddish jargon and buzzwords that have plagued higher education for so many years. If such a path were to

be pursued, OER might well flood educational systems with cheaply available content – some good, some relevant, but much not – without doing anything to developing institutional capacity to deliver cost-effective, high quality educational programmes and courses.

Harnessed strategically, however, the concept of OER has tremendous potential to contribute to improving the quality and effectiveness of education. This potential revolves around three linked possibilities:

- *Increased availability of high quality, relevant, need-targeted learning materials can contribute to more productive students and educators*. Because OER removes restrictions around copying resources, it holds potential for reducing the cost of accessing educational materials. In many systems, royalty payments for textbooks and other educational materials constitute a significant proportion of the overall cost, while processes of procuring permission to use copyrighted material can also be very time-consuming and expensive (although some commentators have tended to overestimate the extent to which content is a cost driver in education by assuming that free content is almost synonymous with free education).
- *The principle of allowing adaptation of materials provides one mechanism among many for constructing roles for students as active participants in educational processes who learn best by doing and creating, not by passively reading and absorbing*. Content licences that encourage activity and creation by students through reuse and adaptation of that content can make a significant contribution to creating more effective learning environments.
- *OER has the potential to build capacity by providing institutions and educators with access, at low or no cost, to the means of production with regard to high quality materials*. This includes building institutions' and educators' competence in producing educational materials and completing the necessary instructional design to integrate such materials into high quality programmes of learning. Many educational systems are foundering because their employees have become so overwhelmed by administrative tasks that they have lost the time and space to exercise this critical creative capacity, and it will take time and investment to rebuild it. The concept of OER has potential to facilitate this if the *process* of developing educational materials is seen as being just as important as – and maybe more important than – the final product.

Problematically, though, many people in the 'OER movement' seem to assume that simply making content freely available for use and adaptation will improve educational delivery. This simplistic position ignores the obvious reality that content is only one piece of the educational puzzle, and that effective use of educational content demands, among other requirements, good educators to facilitate the process. Importantly, OER provides an opportunity to engage educational institutions and educators in structured processes that build capacity to design and deliver high quality higher educational programmes and courses

without increasing cost. Without this growing institutional and human capacity, OER will not be able to fulfil its transformative potential.

Thus, the challenge is to persuade people that making openness work productively requires financial investment, time and energy, but that these are justified by the wealth of positive outcomes that openness can generate. This is because deliberate openness acknowledges the following:

- Investment in designing effective educational environments is critically important to good education.
- A key to productive systems is to build on common intellectual capital, rather than duplicating similar efforts.
- All things being equal, collaboration will improve quality.
- As education is a contextualized practice, it is important to make it easy to adapt materials imported from different settings where this is required, and this should be encouraged rather than restricted.

It is unclear which direction educational systems will take. Will OER be co-opted as another in a long line of ultimately failed cost-cutting exercises? Or will it be harnessed as part of a strategy to invest more wisely and effectively in education, in the belief that producing intellectual leadership through free and open development and sharing of common intellectual capital is a worthwhile and socially essential activity for a healthy society?

With this in mind, the remainder of this section of the Guide focuses on presenting a set of practical guidelines for educational planners and decision-makers on how to create environments that embrace the economic and educational possibilities of OER to create better quality teaching and learning environments.

The implications for educational planners and decision-makers

The key issues of relevance when considering the potential applications of OER can be summarized as follows:

1. Educational systems and organizations that are serious about teaching and learning will need to ensure that spending on personnel and other related expenses reflects a sustained institutional or systemic effort to invest in creating more effective teaching and learning environments for their students. This will entail investment in developing and improving curricula, ongoing programme and course design, planning of contact sessions with students, development and procurement of quality teaching and learning materials, design of effective assessment activities and so on. Many educational systems and institutions do not yet make such investments in a planned and deliberate way, but it is an essential part of their core function.

2. As educational systems and institutions make strategic decisions to increase their levels of investment in design and development of better educational programmes, the most cost-effective way to do this is to embrace open licensing environments (for the reasons already mapped out, in the earlier sections of this Guide). Thus, commitment to OER implies increased investment in teaching and learning, but promises to increase the efficiency and productivity of those investments by harnessing new ways of developing better programmes, courses and materials.
3. To be effective and sustainable, such strategic decisions will most likely need to be accompanied by review of institutional policies. Most importantly, institutions will need to review their policies pertaining to intellectual property (by ensuring that they support open licensing models) and staff remuneration and incentives (by ensuring that time spent on course design and development and other related activities is appropriately rewarded through salary increases and promotions, as part of broader policies covering staff remuneration and incentives).

To facilitate this, supportive policy environments – whether at a national or institutional level – are fundamental to any sustainable effort to harness the potential of OER.

Creating the conditions for success: The need for policy change

In developing curricula and learning resources, educators have always engaged with what is already available – often prescribing existing textbooks and creating reading lists of published articles for example. Even in distance education institutions with a long history of materials development, it is arguably a rare and strange occurrence to develop completely new materials with no reference to what already exists. The increasing availability of OER widens the scope of what is available, but, perhaps more importantly, opens greater possibility for adapting existing resources for a better fit with local contextual and cultural needs without the requirement to spend time in lengthy copyright negotiation processes or, failing that, to duplicate development of the same core content. This is usually most effectively and efficiently managed if educators work within a team in which disciplinary expertise is combined with expertise in content sourcing, learning design, resource development, materials licensing, and so on. If the new/ revised learning resources that emanate from such a process are then shared back with the wider higher education community as OER, the possibility exists for further engagement and refinement in the form of constructive feedback. The end result should be better curricula and better materials developed more quickly and renewed more often.

It should be clear that employment contracts with the various contributors to the development of new or revised learning resources – from whole programmes

down to individual learning objects – should expressly acknowledge the right for the individual contribution to be recognized but also the intention for the final product to be made available under an open licence. Given the marketing potential of learning resources released under the institution's imprint, a policy commitment to clear criteria and robust processes for quality assurance would seem of particular importance.

It is important to stress the hierarchy implied here. Engagement with OER originates from the need to address curriculum needs within the institution; the development and sharing of new OER is a product of meeting that need and not an end in itself.

Within this context, the following issues justify consideration by educational institutions:

1. *To what extent do current policies motivate educators to invest at least a portion of their time in ongoing curriculum design, creation of effective teaching and learning environments within courses and programmes, and development of high quality teaching and learning materials?*

   Some institutions already have policies that encourage such investments, either through inclusion of these elements in job descriptions, inclusion of these activities in rewards, incentives, and promotions policies, and/or appointment of people and units dedicated to these tasks.

   While different institutions may wish to incentivize these activities in different ways, according to their specific mission and vision, all would benefit from ensuring that their policies provide structural support to investment of time by educators in these activities, as part of a planned process to improve quality of teaching and learning. A policy recognition of and support for the development of curriculum and learning resources in multi-skilled teams should obviate the overload of educational staff whose primary function would be the identification and quality assurance of existing OER, and where necessary development of new content.

   A policy commitment to the use, adaptation, and creation of appropriate OER, in support of ongoing curriculum and materials review cycles, would help to ensure that teaching and learning is seen as a continuing process of renewal.

2. *Does the institution have a defined IPR and copyright policy in place?*

   A good starting point for consideration of OER is to have clear policies in place regarding intellectual property rights (IPR) and copyright. A clear policy would for example, plainly lay out the respective rights of the institution and its employees and sub-contractors, as well as students (who might become involved in the process directly or indirectly through use of some of their assignment materials as examples) regarding intellectual capital.

3. *Do institutional policies and practices reward creation of materials more highly than adaptation of existing materials? How much is collaboration valued?*

Whilst there is no universal way of dealing with these issues, the reality is that incentives structures often reward individual, rather than collaborative, activity and encourage production of 'new' materials. While there are sometimes good reasons for a faculty member to develop materials from scratch, such processes may often duplicate ongoing work taking place in global knowledge networks that are engaged in facilitating increasingly creative forms of collaboration and sharing of information. The history of development of materials for distance education purposes illustrates clearly that, all other things being equal, collaboration by teams of people producing materials tends to produce higher quality results than individuals working in isolation.

Consequently, it is opportune for educational institutions to think strategically about the extent to which their policies, practices, and institutional cultures reward individual endeavour over collaboration and create inefficiencies by prizing, in principle, creation of 'new' materials over adaptation and use of existing materials and content. As the amount of content freely accessible online proliferates, such approaches to procuring materials increasingly seem unnecessarily wasteful. Thus, there may be merit in ensuring that incentives structures and quality assurance processes make provision for judicious selection and use of existing content (particularly that which is openly licensed and hence free to procure), as well as development of new content.

4. *What is an appropriate starting point for initiating a sharing culture and encouraging movement towards OER publishing?*

   Historically, educational institutions and educators have often been actively encouraged to protect their intellectual capital closely. Thus, sharing teaching practices, approaches, and materials will not necessarily be a common practice. Consequently, inviting colleagues to share materials with each other may be met with resistance and scepticism. Recognizing that this is an historical legacy of how education has tended to function, it is important to find ways to shift this culture, and to encourage ways of sharing materials that are not threatening to educators. One way that some institutions have begun this has been to encourage educators to share their lecture notes and/or slide shows used in particular courses online. In this way, they do not feel pressurized to develop full scale programmes – or the equivalent of a text book. Rather, they are sharing notes they create for their students, in a way that first benefits their current students – as they can access to the materials digitally – and then benefits colleagues in their own, and other institutions, as their notes may be used and adapted for other purposes. Lowering the expectation of what constitutes an OER – and not expecting the equivalent of textbooks to be available immediately – may be an important step towards shifting the culture of sharing in education.

   Similarly, institutions may require that all formal assessments for courses are published as OER. This would mean that a repository of tests, problems sets, assignments, essay questions, and examinations would be available under open

licenses. Like lecture notes, assessments are something that educators have to create as part of their job functions. There is little additional work required to publish these under open licence. However the contribution to the institution, as well as to the educational community, could be significant. Release of this would also force educators to invest in ongoing re-design of assessment strategies, thus keeping assessment practices current and helping to reduce plagiarism (because the temptation of teaching staff to re-use old assessment activities would be reduced given that they would be openly accessible).

5. *Do staff members understand copyright issues and the different ways in which they can harness openly licensed resources?*

   By virtue of their core functions, educational institutions are positioned to be at the forefront of knowledge societies. In many institutions, though, educators have limited knowledge of or exposure to issues around copyright and the proliferation of online content, much of which is openly licensed. These issues are growing in importance, as they are central to the rapid growth and development of new, increasingly global knowledge networks, driven by the growing functionality and reach of the Internet.

   These emerging knowledge networks – effectively niche groups of specialized areas of interest sharing and developing knowledge across national boundaries – are complex and diverse, but have become an essential feature of the knowledge economy and of many academic endeavours. This means that educators increasingly need to understand the complex issues surrounding these knowledge networks and how they may be changing the ways in which content is both created and shared. Accordingly, it is becoming increasingly important for institutions to ensure that they invest in awareness-raising exercises to bring these issues to the attention of their staff and to explore how the institution and the educators can benefit from them.

6. *Are there compelling reasons to retain all-rights reserved copyright over curricula and teaching and learning materials?*

   Assuming that institutions have copyright policies that vest the copyright of such materials in the institution, their next consideration may be whether they derive better value from retaining all-rights reserved copyright or from releasing some of the rights. While a small percentage of teaching and learning materials can – and will continue to – generate revenue through direct sales, the reality has always been that the percentage of teaching and learning materials that have commercial re-sale value is minimal; it is also declining further as more and more educational material is made freely accessible on the Internet.

   It is becoming increasingly evident that, on the teaching and learning side, educational institutions that succeed are likely to do so predominantly by understanding that their real potential educational value lies not in content itself (which is increasingly available in large volumes online), but in their ability to guide students effectively through educational resources via well-

designed teaching and learning pathways, offer effective support to students (whether that be in practical sessions, tutorials, individual counselling sessions, or online), and provide intelligent assessment and critical feedback to students on their performance (ultimately leading to some form of accreditation). Although it may seem counter-intuitive, therefore, as business models are changed by the presence of ICT, the more other institutions make use of their materials, the more this will serve to build institutional reputation and thereby attract new students.

In this changing environment, there is a strong case to be made for considering the marketing value and added exposure that can be derived from making this intellectual capital easily accessible under open licences, rather than seeking to retain all-rights reserved copyright. However, as there will be instances in which institutions and academics will need to protect all-rights reserved copyright, it remains important to create provisions in copyright policies to assert full rights over specific materials where this is considered commercially or strategically important. Having noted this, it is worth adding that a policy which requires staff to justify the assertion of all-rights reserved copyright can help to eliminate the corrupt practice of teaching staff selling their own teaching and learning materials to their students as a separate commercial activity.

Conclusion

OER encapsulates a potential vision for educational systems globally wherein individual educators, and then increasingly entire departments and institutions, come together in common online spaces (which, like the most successful Internet phenomena, are not 'owned' by any one institutional or corporate interest) to start sharing the materials they have produced, in an effort ultimately to ensure that all the material which students need to complete their studies successfully can be accessed – legally – without any costs of licensing. There are vast quantities of such material already available across the world, from which no-one is generating any meaningful commercial return – and many more being produced every week. These represent a common intellectual capital that should be unlocked to drive and support education rather than being kept locked away.

The potential of OER includes bringing transparency to educational processes, facilitating collaborations between educators and students at different institutions, and establishing a new economic model for procuring and publishing learning materials. Ultimately, a key to its success will be to demonstrate that, in the medium to long term, OER will help over-stretched educators to manage their work more effectively, rather than adding new work requirements to their job description. However, successful OER initiatives will be those that can work immediately and add educational value within the *existing* ICT infrastructure constraints of any participating institutions (including those from the developing world). Proving the potential of a concept that will only have an impact when

these infrastructural constraints are removed is of little value to higher educational institutions in the short to medium term.

Thus, the value of OER projects and initiatives should be measured, in practical terms, against the extent to which they advance core educational objectives; and the principles of operation that govern OER communities should be driven by this imperative. Education is a social investment, and should be protected as such if it is truly to fulfil its potential in creating a more equal world. This makes it critical to find practical ways to build business models that will ensure the success of the online educational commons. Critically, we would do well to accept that – until this new model is established – it is likely that we will need to retain open minds and a spirit of compromise in engaging the interests of different parties seeking to open access to educational content.

At its most effective, creating and sharing OER is essentially about working together towards a common cause, whether this be within a single faculty or across a global network. Sharing materials that others can adapt and use recognizes the value inherent in team work and the improvements in thinking that will emerge from such collaboration. Doing this openly, using the already proven innovations of the Internet to facilitate sharing of content, presents a practical way to use cooperation to find simple solutions to pressing problems we face in education. If educators start doing this in large numbers, the values of the systems for which they work *will* catch up, as all systems ultimately are simply a codification of how people have agreed to work and interact with one another. Consequently, rewards and incentives will shift to reflect appreciation for sharing and communal building at the expense of individualism and unhealthy competition. Conversely, if we wait for systemic policies to change before we start collaborating, then we have only ourselves to blame if the system's values are never shifted.

As with all such communal processes, the initial results will be messy – and there will be many problems to solve, such as how to create appropriate curriculum frameworks for storing content, and mechanisms to help with assessing quality. But online communities have demonstrated the now indisputable power and value of lots of people working collaboratively towards a common cause. And doing this in education has the potential to re-focus educational systems, restoring the core values of building and sharing knowledge that underpin good education, and systematically encouraging us to work with and learn from one another.

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Appendix One: Overview of Open Licences[14]

Introduction

When considering open licences, it is useful to remember that these are legal tools that make use of existing copyright laws. In particular the exclusive right copyright law that allows a copyright holder to license material with the licence of their choice (Hofman & West, 2008). Liang (2004) notes that:

> *While phrases such as 'free software' and 'copyleft' conjure up an image of alternatives to copyright, it is relevant to note that it is not a model that abandons copyright. In fact quite the opposite, it relies on copyright law, but uses it creatively to articulate a positive, rather than a negative rights discourse (Liang, 2004, p. 24).*

Open licences for content developed out of the success of the licensing approach being used for open source software. One of the earliest open licences for non-software material was published in 1998 by David Wiley. This licence is no longer used, since newer alternatives are now more appropriate and adaptable to different conditions. In 2000, the Free Software Foundation released its first version of an open licence for non-software materials. Essentially this licence was to allow open-source software developers to produce open manuals and support materials, free of standard copyright restrictions. This licence is known as the GNU FDL (Free Documentation Licence). Although it was used by the popular site Wikipedia until recently (having been replaced by the Creative commons licence), this licence is not widely used within the OER movement partly because it is technically confusing and cumbersome in terms of procedural requirements (Liang, 2004). In some cases, authors also create their own copyright conditions, although this is noted to be legally challenging in many instances and so tends not to be recommended for OER materials (Hofman & West, 2008). Instead the focus has turned to the Creative Commons (CC) set of licence options. Since CC licences are most commonly used, they are described in greater detail in this paper.

A range of other open licences exist such as licences specifically for music and art. Given the focus of this paper on OER this review has not presented details of the full range of open licences. For a comparative analysis of a wide range of open licences please see Liang (2004).

[14] This Appendix is sourced from Wilson, M. 2009. *The Potential of Open Educational Resources*. Johannesburg. SAIDE.

Creative Commons Licences (www.creativecommons.org)

The most developed alternative licensing approach is that developed by Larry Lessig of Stanford University in 2001, called Creative Commons (CC). The CC approach provides user-friendly open licences for digital materials and so avoids the automatically applied copyright restrictions. The popularity of CC licences has grown incrementally since its launch in 2002 and by 2006 it was estimated that 45 million web pages had been licensed with a CC licence (Smith & Casserly, 2006). Liang (2004, pg. 78) describes the philosophy of Creative Commons as follows:

> *Inspired by the free software movement, the Creative Commons believes that a large vibrant public domain of information and content is a pre-requisite to sustained creativity, and there is a need to proactively enrich this public domain by creating a positive rights discourse. It does this by creating a set of licenses to enable open content and collaboration, as well as acting as a database of open content. Creative Commons also serves to educate the public about issues of copyright, freedom of speech and expression and the public domain.*

The CC licences take account of different copyright laws in different countries or jurisdictions and also allow for different language versions. To make the licensing process as simple as possible for users the Creative Commons site makes use of a licence generator that suggests the most appropriate licence based on a user's response to specific questions regarding how their work can be used. In order to facilitate searching for resources licences in a particular way, the CC licence is expressed in three versions:

- *Commons deed:* this is a plain language version of the licence, with supporting icons (see table below);
- *Legal code:* the legal fine print that ensure the licence is recognised in a court of law; and
- *Digital code:* a machine readable translation that allows search engines to identify work by its terms of use ('About–Creative Commons'; Liang, 2004).

All CC licences include 'Baseline Rights': the rights to copy, distribute, display, perform publicly or by digital performance, and to the change the format of the material as a verbatim copy (Hofman & West, 2008, p. 11). In addition, all CC licences assert the author's right over copyright and the granting of copyright freedoms and require licensees to:

- Obtain permission should they wish to use the resource in a manner that has been restricted;
- Keep the copyright notice intact on all copies of the work;
- Publish the licence with the work or include a link to the licence from any copies of the work;

- Not change the licence terms in anyway;
- Not use technology or other means to restrict other licences' lawful use of the work (Liang, 2004, p. 82).

Licence Conditions[15]

Creators choose a set of conditions they wish to apply to their work.

Attribution by	**Share Alike** sa	**Non-Commercial** nc	**No Derivative Works** nd
You let others copy, distribute, display, and perform your copyrighted work — and derivative works based upon it — but only if they give credit the way you request.	You allow others to distribute derivative works only under a license identical to the licence that governs your work.	You let others copy, distribute, display, and perform your work — and derivative works based upon it — but for non-commercial purposes only.	You let others copy, distribute, display, and perform only verbatim copies of your work, not derivative works based upon it.

The Licences

The following are the key CC licences:

Attribution

cc by

This licence lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licences offered, in terms of what others can do with your works licensed under Attribution.

[15] The following two sections are copied directly from the Creative Commons website – see http://creativecommons.org/about/licenses.

Attribution Share Alike

cc by-sa

This licence lets others remix, tweak, and build upon your work even for commercial reasons, as long as they credit you and license their new creations under the identical terms. This licence is often compared to open source software licences. All new works based on yours will carry the same licence, so any derivatives will also allow commercial use.

Attribution No Derivatives

cc by-nd

This licence allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to you.

Attribution Non-Commercial

cc by-nc

This licence lets others remix, tweak, and build upon your work non-commercially, and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.

Attribution Non-Commercial Share Alike

cc by-nc-sa

This licence lets others remix, tweak, and build upon your work non-commercially, as long as they credit you and license their new creations under the identical terms. Others can download and redistribute your work just like the by-nc-nd licence, but they can also translate, make remixes, and produce new stories based on your work. All new work based on yours will carry the same licence, so any derivatives will also be non-commercial in nature.

Attribution Non-Commercial No Derivatives

cc by-nc-nd

This licence is the most restrictive of our six main licences, allowing redistribution. This licence is often called the "free advertising" licence because it allows others

to download your works and share them with others as long as they mention you and link back to you, but they can't change them in any way or use them commercially.

CC Licensing Considerations

The aspect of CC licensing that is most controversial is the *non-commercial* (NC) clause (Commonwealth of Learning, 2007; Hofman & West, 2008; Rutledge, 2008). There are several reasons for this, including at the most basic level, what 'non-commercial' in fact means. Since CC licences are a new phenomenon within copyright law, little previous case history exists to assist in interpreting this clause. The most extreme interpretation of non-commercial is that no money should change hands as part of the process of using of the materials. However, Hofman and West (2008) note that this is not how non-commercial is usually interpreted. A transaction is not commonly seen as commercial when it includes refunding for expenses such as travel, for example. The transaction becomes commercial when making a profit is the purpose of the transaction. Similarly, writing from the CC perspective, Rutledge notes that:

> *CC considers intent to be the primary test of whether a use is non-commercial. If the intent of a particular use is to generate profit, that use is commercial. Under this reasoning, cost recovery per se is not a commercial use (Rutledge, 2008).*

While this approach may seem intuitive, many legal examples could be found demonstrating the complexity of defining 'intent'. The Commonwealth of Learning (COL) Copyright Guidelines specifically address the issue of the NC clause and note that profit and cost recovery, which includes operating costs, should not be confused. This means that an organisation may still charge registration fees, recover materials duplication costs and overhead costs incurred during customisation, duplication and distribution of materials. The COL guidelines continue to note that:

> *If an institution declares and/or pays a net profit to shareholders, and a part of the net profit emanates from the sale of learning materials marked with the NC clause, a calculation should be done to determine the amount of net profit that has been earned by that section of the materials that has been marked with the NC clause. This is the critical point when the NC and non-NC materials differ. Organisations that provide materials without the NC clause have accepted that the materials they offer may be used to profit any other organisations' stakeholders (in addition to covering all reproduction costs) (Commonwealth of Learning, 2007, p. 2).*

In working to better understand how the non-commercial clause is applied in different contexts, Creative Commons is conducting research into this issue (Rutledge, 2008). Rutledge ends her commentary by suggesting that readers

should also seriously consider whether the non-commercial clause is really necessary.

Rutledge (2008) notes that some believe that any for-profit businesses should not be able to charge course fees or make use of open content, hence the NC restriction. However, this would imply that a private school may not use NC materials (Hofman & West, 2008), nor potentially a for-profit organisation using materials for non-profit work such as a corporate social investment project. Other arguments against using the NC restriction include that it makes the materials incompatible with materials licensed without this restriction (see for example Bissell & Boyle, 2007; Moller, 2005).

While it is understandable that an author who openly releases their materials would not want others to make a profit from them, this can be achieved in other ways. For example, it could be argued that, when materials can be freely accessible via the internet, charging for the materials themselves becomes irrelevant, and to make a profit the individual or company would need to add sufficient additional value beyond what is available for free to make it worthwhile for users to pay. Work released under an attribution-share alike licence requires that any work that is derived from the original work is released under the same licence. Thus, the value added by the for-profit individual/company would itself need to be released freely under an attribution-share alike licence (Moller, 2005).

Appendix References

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Appendix Two: The Components of a Well-Functioning Distance Education System

The Components

1. Course Design and Development

a. Well-designed courses

In good distance education, the course, rather than the educator, provides an appropriate learning environment for students. Rather than simply referring to a set of materials, however, the course is the structure of learning that is designed into the materials. It has three basic elements:

i. Conceptual pathways to command of its knowledge, conceptualizing skills and practical abilities.

ii. Educational strategies for helping the student find his or her way through these pathways.

iii. Summative and formative assessment should be integral to the learning process.

The materials and presentation of the course as a whole must excite, engage, and reward the student. Courses should be designed so as to involve students actively in their own learning and should allow students quick access and clear movement through them. Although there is no need for courses to use advanced technologies, most, but not necessarily all, will make use of a variety of media. Provision should also be made, in the design of courses, for the necessary practical work. In order to be as flexible and open as possible, courses should be organized in modules.

b. Programme and course development in a team

An essential component in the successful design of courses is collaboration. This can be achieved by using an approach where a group of people, each with particular skills and competencies, develop a course as a team. Although there is no golden mean, nor indeed an absolute minimum,

a substantial ratio of staff course design time to student study time will be inevitable in developing courses. Some of the better courses in more challenging subjects, however, might have ratios of fifty to one hundred hours of design time to one hour of student study time. This has clear implications for courses designed for small numbers of students: they are simply not financially viable if collaborative design processes are to be used.

2. Counselling and Support

a. Counselling

Provision should be made by distance education providers to advise and help individuals who would otherwise be isolated throughout the learning process, and, in particular, to help them to make choices before enrolling for educational programmes. It should be made easily available through a variety of devices including, most importantly, human intervention.

b. Learner support

If students are to adapt to the special requirements of guided self-study, they require various forms of support, for example satisfactory access to tutors and facilitators, opportunity to interact with other students, and access to the necessary facilities.

c. Provision of adequate administrative support to students

This would involve administrative support on a number of levels, including enrolment procedures, payment of fees, delivery of materials, and in keeping channels of communication open. The aim, throughout, should be to keep administrative procedures few and simple.

3. Quality Assurance

a. Quality assurance in all learning programmes

Several mechanisms need to be established to ensure the quality of learning programmes and their capacity for self-improvement. One of the most critical of these is a mechanism which enables meaningful and reliable feedback from students and tutors into the ongoing performance of the institution.

b. Research, evaluation, and development

As with all aspects of education, continuing research, evaluation, and development is necessary for the improvement of distance education provision. Distance education providers also need to have effective research as the basis for improving the quality of their performance.

4. Effectively Managed Distance Learning

Effectively managing distance education involves establishing performance criteria and targets for the institution, together with mechanisms for publicly and regularly evaluating performance and incorporating lessons learned into

improved practices. It also includes ensuring that governance structures are representative of South African society and that the student body is adequately represented in such structures.

The Rationale for Use of Distance Education Methods

Whether consciously or unconsciously, attempts to make use of distance education methods have generally been driven by a desire to build on some or all of the following lessons emerging from the history of distance education practices:

1. *Providing access to students who would–either because of work commitments, geographical distance, or poor quality or inadequate prior learning experiences–be denied access to traditional, full-time contact education opportunities*. This motivation has possibly been the key motivating factor behind use of distance education methods. The drive has been motivated partly by growing awareness of the importance of lifelong learning and corresponding attempts to respond to market needs. It has also been motivated by dwindling student numbers in some of the more traditional areas of educational provision, and a corresponding need to find new educational markets.
2. *Seeking to expand access to educational provision to significantly larger numbers of students*. This motivation is linked to, but not the same as, the previous one. Its difference lies chiefly in the scale of programmes. Many programmes motivated by a desire to provide access to students who would be denied access to traditional full-time contact education do not really have goals of reaching significantly larger numbers of students. Indeed, it is notable that large-scale distance education programmes are, in general, confined to very few educational sectors, most notably nursing and teacher education. Most other programmes tend to be small-scale interventions, although it is fair to suggest there may be a change in this regard as alignment between industry/commerce and programme providers gathers momentum.
3. *Shifting patterns of expenditure to achieve economies of scale by amortizing identified costs (particularly investments in course design and development and in effective administrative systems) over time and large student numbers*. This motivation draws together the above two motivations, and has been an underlying economic rationale for many distance education institutions around the world. Its success depends on limiting numbers of courses, while maximizing enrolments on these courses. Many distance education programmes we have worked with simply have no intention or capacity to exploit these economic benefits. Reasons for this are varied, but are most commonly because market demand is simply not big enough to create programmes enrolling thousands of students or because institutions or programmes have neither the financial nor human capacity to make large-scale venture capital investments in course design

and development or administrative systems to support large-scale distance education implementation. The latter problem is exacerbated by the reality that administrative systems at these institutions have been so narrowly designed to support full-time, contact education that the investments necessary to adapt these systems would often be more than would be necessary to set up new systems from scratch.

Appendix Three: Technology Applications

Note: This Appendix is taken from another report written by Neil Butcher for the Global e-Schools and Communities Initiative (GeSCI) African Leaders in ICT (ALICT) capacity building programme. The original report can be located at:

www.gesci.org/assets/files/12.Sharing%20Knowledge%20Based%20Society%20Perspectives%20The%20ICT,%20Education%20Development%20Perspective%20Neil%20Butcher%20and.pdf.

This Appendix provides a quick guide to some of the technology applications which are available to support education and development initiatives and that are helping to stimulate creation and use of openly licensed or, at least openly available, educational resources. [16]

- Social network sites – social network sites are web-based services that allow people to construct a public or semi-public profile within a bounded system, define a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system. Possibly the most well known of these sites are Facebook and MySpace, although many such sites exist. Some also focus on specific dimensions of social networking. For example, social bookmarking sites such as Del.icio.us allow people to save bookmarks to websites and tag them with keywords, generating community-driven, keyword-based classifications known as 'folksonomies'. Likewise, photo-sharing websites such as Flickr allow people to upload, tag, browse, and annotate digital photographs, as well as participate in self-organizing topical groups. While social networking sites have massive potential for influencing the way in which we organize and find information and how we interact with people, it is important to note that the for-profit sector is selling itself as the provider of choice for these Web 2.0 collaboration capabilities, predominantly in an effort to create new platforms for funding consumers and selling advertising.
- Blogging – blogging is remarkable for the speed with which it has grown as an online communication vehicle. Blog is an abbreviated version of 'weblog', which is a term used to describe websites that maintain an

[16] The descriptions contained in this section have drawn heavily on documentation prepared by the Educause Leaning Initiative – www.educause.edu/eli–and especially its '7 Things You Should Know About…' series.

ongoing chronicle of information. A blog is a frequently updated, personal website featuring diary-type commentary and links to articles or other websites (and, in the case, of video-blogging, video). Given the personal perspectives presented on blogs, they often generate ongoing discourse and a strong sense of community. Blogs provide diverse, alternative sources of information for higher education, as well as providing tools that can be used by academics and students for a wide range of educational purposes.

- Wikis – a wiki enables documents to be written collaboratively, in a simple mark-up language using a web browser. A defining characteristic of wiki technology is the ease with which pages can be created and updated. This ease of interaction and operation makes a wiki an effective tool for mass collaborative authoring, the most famous example of which is Wikipedia, an online phenomenon that has played a massive role in challenging notions of what constitutes 'expertise' and about reliability of information. Wikis are already extensively used in many higher education programmes for educational purposes, and are one of the authoring tools being used to generate 'open' content (see below).
- RSS – Real Simple Syndication (RSS) is a protocol that allows users to subscribe to online content by creating lists of preferred sources of information in a 'reader' or 'aggregator' that automatically retrieves content updates, saving users time and effort. RSS feeds can be very helpful in managing information and undertaking ongoing research.
- Podcasting – 'podcasting' refers to any combination of hardware, software, and connectivity that permits automatic download of (usually free) audio and video files to a computer, smart phone, or MP3/MP4 player to be listened to or watched at the user's convenience. This is typically done by subscribing to an RSS feed linked to the specific podcast, so that when new editions of a podcast are made available, they are automatically downloaded by podcasting software. Podcasting has made available a very broad spectrum of educationally useful audio and video material, including radio programmes from around the world, lectures, conference speeches, and custom-produced podcasts created by enthusiasts. Growing numbers of universities and academics are making lectures available as podcast series, usually making these freely available to anyone around the world with Internet access.
- Virtual Worlds – virtual worlds are immersive online environments whose 'residents' are avatars representing individuals who participate via the Internet. Some, such as the very popular World of Warcraft, are explicitly focused on gaming and entertainment. However, possibly the most well known of these from an educational perspective is Second Life, a fully three-dimensional world where users with many varying interests interact, but within which many universities and businesses are now constructing virtual campuses for their students.

- Voice-Over Internet Protocol (VOIP) – VOIP is a protocol optimized for the transmission of voice through the Internet or other packet-switched networks. VOIP is often used abstractly to refer to the actual transmission of voice (rather than the protocol implementing it). VOIP facilitates applications such as Skype, which allow users to make free telephone calls between computers.
- Instant messaging (IM) – IM is a form of online communication that allows real-time interaction through computers or mobile devices. It is often bundled into applications such as Skype and social networking sites, so that it can be used seamlessly while within those applications. It has become such an integral part of students' lives that many universities are working to move IM beyond the social sphere into teaching and learning.
- Online applications – these are web-based programmes that run in web browsers and typically replicate the functionality currently available on desktop-based applications. A good example is Google Apps, which provides access to office productivity, communication, and file storage tools. Another more specialized example is Lulu, which offers online access to the tools one needs to design, publish, and print original material, facilitating inexpensive production of publications. The online nature of such tools is intended also to facilitate collaboration, peer review, and collective generation of knowledge.
- Wielding the applications – by drawing on the potential of the above technologies, several new possibilities are emerging that are worth documenting:
    - Mashups, which are web applications that combine data from more than one source into a single integrated tool. The power of mashups for education lies in the way they help us reach new conclusions or discern new relationships by uniting large amounts of data in a manageable way. Web-based tools for manipulating data are easy to use, usually free, and widely available.
    - Digital storytelling, which involves combining narrative with digital content to create a short movie or presentation.
    - Data visualization, which is the graphical representation of information to find hidden trends and correlations that can lead to important discoveries.
    - Open journaling, which manage the process of publishing peer-reviewed journals online, allowing authors to track submissions through the review process, which creates a sense of openness and transparency uncommon in traditional, peer-reviewed publications.
    - Google jockeying, which involves a participant in a class surfing the Internet during the class for terms, ideas, websites, or resources mentioned by the presenter. These searches are then displayed simultaneously with the presentation.

- Virtual meetings, which are real-time meetings taking place over the Internet using integrated audio and video, chat tools, and application sharing.
- Grid computing, which uses middleware to coordinate disparate IT resources across a network, allowing them to function as a virtual whole, providing remote access to IT assets and aggregating processing power.

Note: A version of the material in this appendix is available in a thematic paper:

ICT, Education, Development, and the Knowledge Society, prepared for GeSCI by Neil Butcher & Associates. This paper is available on: www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society%281%29.pdf.

Appendix Four: Open Source Software Applications in Education

Open source is the concept and practice of enabling access by both users and developers, to the programme source code, enabling both developers and users to be able to modify or add features to the source code and redistribute it.[17] In this regard, collaboration and circulation are central tenets to the open source movement. Open source software offers an alternative to proprietary courseware, in education. Open source software is cost effective as it does not entail licence fees, has open standards that facilitate integration with other systems and can be easily customised. Aberdour[18] has highlighted that the low cost of open source Learning Management Systems (LMSs) allows institutions to dedicate funds they would otherwise have spent on licensing, to the development of the open source LMSs or on professional development for efficient use of the LMSs. Further, open source LMSs open up spaces for participation in communities of practice that support each other in the development of the software.

Aberdour specifies that there are over 50 open source LMSs to choose from, but only a few of these are recommended as they

- Have an open source initiative approved licence;
- Have an active development community
- Have released stable versions
- Are SCORM compliant
- Have published details about previous adopters
- Have a stable organization supporting ongoing development
- Have had third party reviews published.

Examples of some commonly used Open Source Educational Software and their compatibility and usage are specified in the following table.

[17] Shaheen E. Lakhan and Kavita Jhunjhunwala. Open Source Software in Education. *EDUCAUSE Quarterly*, vol. 31, no. 2 (April–June 2008)

[18] Aberdour, M. 2007. Open source learning management systems. Available on: www.epic.co.uk/content/news/oct_07/whitepaper.pdf

Examples of Commonly used Open Source Software in Education[19]

LMS Tool	Compatibility	Usage
Moodle www.moodle.org	Linux, UNIX, Windows, Mac OS X, FreeBSD, and any other system that supports PHP	Downloaded about 500 times a day. More than 28,000 registered sites, over a million courses, a learning community of 10 million.
Bodington www.bodington.org	Shibboleth, Linux, Microsoft, Mac OS X, or UNIX	Implemented at University of Leeds, UHI Millennium Institute, and University of Oxford. Provides services to 15,000 users with a single server.
Claroline www.claroline.net	Microsoft, Linux/GNU, Mac OS X; complies with SCORM and IMS/QTI.	Available in 35 languages and has users in more than 80 countries.
Dokeos www.dokeos.com	Supports SCORM import and LDAP. Data can be imported using CSV or XML files.	In 30 languages and more than a thousand organizations. Implemented at Ghent University and Vrije Universiteit Brussel. More than 28,000 users and 3,600 courses.
LRN www.dotlrn.com	LORS Central, Curriculum, LORS Management, .LRN Ecommerce, Project Manager, Page Editor, Staff List, Syllabus, Expense Tracking	Almost half a million users in 18 countries.
ATutor www.atutor.ca	Complies with W3C WCAG 1.0 and W3C XHTML 1.0; supports content developed in IMS or SCORM.	More than 17,000 registered installations worldwide.

[19] Shaheen E. Lakhan and Kavita Jhunjhunwala. Open Source Software in Education. *EDUCAUSE Quarterly*, vol. 31, no. 2 (April–June 2008)

LMS Tool	Compatibility	Usage
OLAT www.olat.org	Microsoft Windows, Mac OS X, Linux, Solaris, and UNIX. Conforms to SCORM, IMS QTI, and IMS Content Packaging.	Popular within the European higher education community.
Sakai www.sakaiproject.org	Complements commercial software like WebCT, Blackboard, ANGEL Learning, and Desire2Learn.	Adopted by many reputable universities worldwide.

The criteria by which software can be licensed as open source are set by the Open Source Initiative as follows:

- Unrestricted distribution. Users can distribute or sell the software without paying royalties.
- Source code distribution. The source code of the entire open source product must be easily modifiable. In the absence of the source code, the product must cite a low-cost resource where users can obtain it.
- Modifications. The license allows modifications, and its terms remain unchanged for distribution of improved versions.
- Author's source code integrity. If the license allows patch file distribution along with the original source code, a user cannot modify the code and distribute it except by giving the new version a new name.
- No personal discrimination. No person or group shall be discriminated against during open source product distribution.
- No restriction on application. Open source software can be used in any field and for any purpose.
- License distribution. The privileges attached to the original programme extend to all who receive the programme, so recipients do not need to apply for a separate license.
- License must not be product-specific. The rights associated with a license extend to products extracted from a larger software aggregate.
- No restriction on other software. No restrictions are allowed on distribution of open source products bundled with products developed on other software platforms.
- Technology neutrality. Licenses should not be issued on the basis of the specific technology involved.20

[20]Shaheen E. Lakhan and Kavita Jhunjhunwala. Open Source Software in Education. *EDUCAUSE Quarterly,* vol. 31, no. 2 (April–June 2008)

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Aberdour, M. (2007). Open source learning management systems. Available on: www.epic.co.uk/content/news/oct_07/whitepaper.pdf

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Appendix Five: Mapping the OER Terrain Online

Introduction

This appendix provides an illustrative description of different kinds of facilities and services available online that are linked to Open Educational Resources (OER) in some form. The analysis is organized according to the following categories:

1. Open Courseware (OCW) OER Repositories;
2. University OCW Initiatives;
3. Content Creation Initiatives;
4. Subject-Specific OCW OER;
5. Open Schooling Initiatives
6. OCW OER Search.

Although the descriptions do not seek to be comprehensive, they provide a good snapshot view of what is available in each category. The appendix is supplemented by a more comprehensive catalogue of online facilities and services presented in Appendix Five.

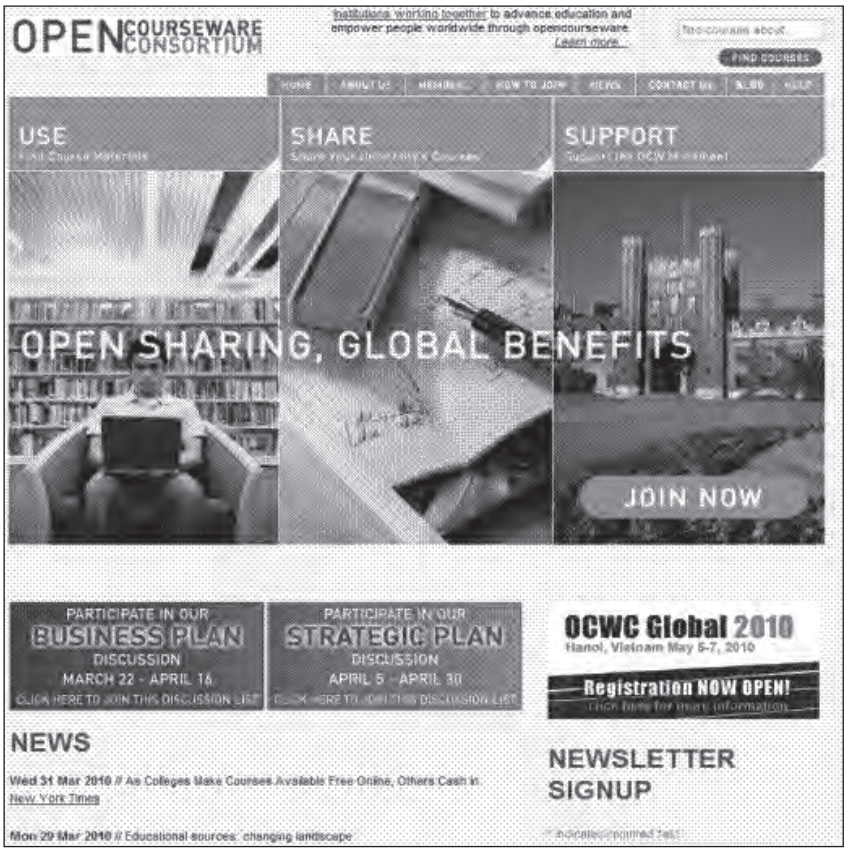
OCW OER Repositories

Much work on OER in higher education has taken place in the United States of America (USA), but practices are growing rapidly internationally. One of the major approaches to promoting OER globally is through OpenCourseWare (OCW), where the focus is on developing and sharing freely available, stand-alone, online course, and teaching materials. OCW usually includes items such as lecture notes, reading lists, course assignments, syllabi, study materials, tests, samples and simulations. Much work in this regard has been done by the OpenCourseWare Consortium (www.ocwconsortium.org):

> *The OpenCourseWare Consortium is a collaboration of more than 200 higher education institutions and associated organizations from around the world creating a broad and deep body of open educational content using a shared model. The mission of the OpenCourseWare Consortium*

is to advance education and empower people worldwide through opencourseware.[21]

Figure 1: OCWC Interface



The consortium has members across the globe, from countries as varied as Saudi Arabia, Spain, Taiwan, China, France, India, Mexico, Portugal, and Japan.22 Materials are available in several languages, including Chinese, Dutch, and Spanish, although most are in English. There are currently over 2,500 open courses available from over 200 universities. Users can find course materials by browsing individual university OpenCourseWare websites or by searching across all courses in the OCW Consortium's website.

Similarly, the Multimedia Educational Resource for Learning and Teaching Online (MERLOT) provides free and open resources designed primarily for faculty and students of higher education (www.merlot.org). MERLOT allows users to find peer reviewed online teaching and learning materials, and share advice and expertise

[21] www.ocwconsortium.org/about-us/about-us.html
[22] See www.ocwconsortium.org/members/consortium-members.html for a full list of members.

about education with expert colleagues. The site is organized by discipline and anyone can use it for free. At the moment, it has more than 22,500 resources.

As indicated above, there is growing interest in and development of OER initiatives in other parts of the world. For example, in China, 451 courses have been made available by 176 university members of the China Open Resources for Education (CORE) consortium. CORE is also involved in translating these courses into English as part of its Chinese Quality Open Courseware (CQOCW) project (see http://ocw.core.org.cn/CORE).

In Japan 1,500 courses have been made available by universities participating in the Japanese OCW Consortium (www.jocw.jp) of which 1,285 are in Japanese and 212 are in English. In France, over 2,000 educational resources from around 200 teaching units have been made available by twelve member universities of the ParisTech OCW project (www.paristech.fr/en)

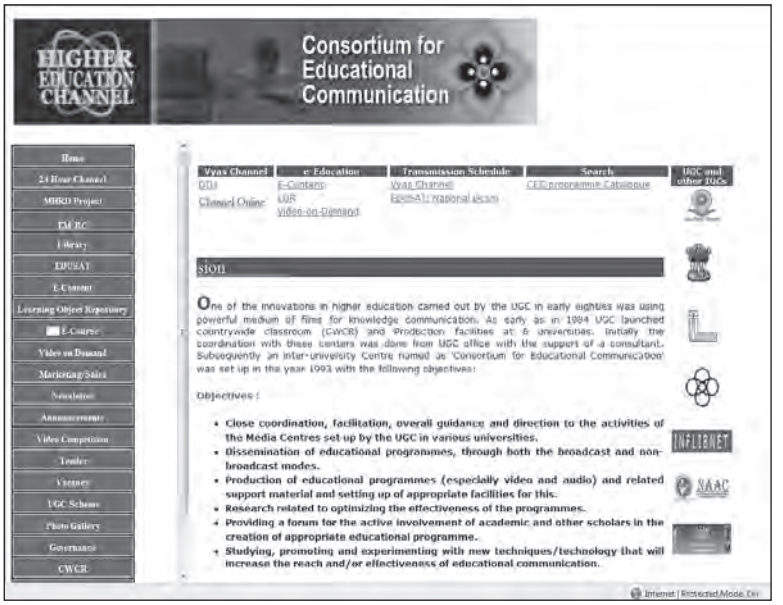
There are also similar HE OER initiatives based in the United Kingdom (UK). One such example is JORUM (www.jorum.ac.uk), which is a free online repository service for teaching and support staff in UK Further and Higher Education Institutions. The JorumOpen collection contains a variety of resources, including OER that are freely available to all. The focus is on helping to build a community for the sharing, reuse and repurposing of learning and teaching materials.

There are also projects underway to make OCW materials available in multiple languages, including Universia's Spanish and Portuguese translations (http://ocw.universia.net/en). This site contains Spanish and Portuguese OCW from over 90 participating institutions. CORE is also involved in providing simplified Chinese translations. In addition, some OCW institutions such as John Hopkins Bloomberg School of Public Health are using Opensource Opencourseware Prototype System (OOPS), a program that translates educational resources into Chinese. OOPS has replicated the School's OCW site in simplified Chinese and in traditional Chinese.

In India, a number of institutions are also digitizing their course materials and a good number of open courseware have been established.

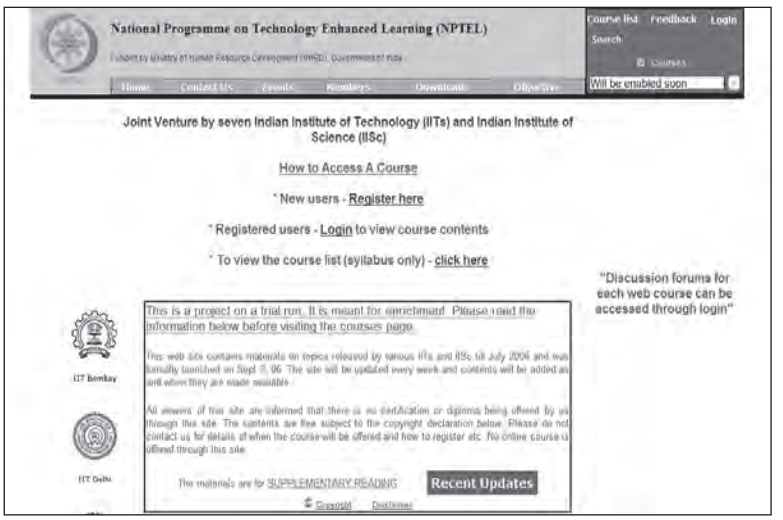
The Consortium for Educational Communication (CEC) is an inter-university centre on electronic media, established by the University Grants Commission (UGC). CEC's Learning Object Repository (LOR) houses educational resources in different subjects such as Archaeology, Biology, Botany, Chemistry, Commerce, Computer Science, Economics, Education, English and Fine Arts.

Figure 2: CEC LOR Interface



The National Programme on Technology Enhanced Learning (NPTEL) aims to enhance the quality of engineering education in India by developing curriculum based video and web courses. This is being carried out by seven premier institutions as a collaborative project. Currently samples from approximately 70 courses offered by faculty in various departments and to students at all levels (B.Tech, M.Tech, M.S., M.Sc., Ph.D.) are available. Approximately 140 courses are in various stages of preparation and distribution.

Figure 3: NPTEL Interface



In addition to courses, the number of available non-course OER such as articles, Open Access Journals and books are also growing at a fast rate. For example Textbook Revolution, a student-run site, contains links to a number of freely available (mostly undergraduate) textbooks. Users are able to search for textbooks by licensing (and can therefore access OER textbooks).

iTunes U is another important content-sharing initiative which has gained immense popularity. Launched in 2007, Apple's iTunes University allows Higher Education institutions to make audio and visual content freely available for download (as well as making provision for subscriptions for those wishing to sell content). There is no single licence governing use of all content on iTunes U, and content is freely accessible for students to access and use. However, each institution that sets up an iTunes U account can specify certain parameters and conditions for further use (with many opting to use a Creative Commons licence).

A year after its introduction, iTunes U logged over 4 million downloads and two years since its introduction, iTunes U reached a new milestone with more than 100 million downloads. According to Apple, one of the most popular areas of iTunes U has been that of the United Kingdom-based Open University (iTunes link), whose learning categories include Arts and Humanities, Business and Management, Childhood and Youth, Health and Social Care, Law, Psychology, and Science. The academic institution says it caters to at least 150,000 undergraduate and 30,000 postgraduate students, more than 25,000 of whom live outside the U.K.

More than 175 higher-education organizations currently provide content to iTunes U, including Princeton University, University of California at Los Angeles, Harvard University, the Massachusetts Institute of Technology, Oxford University, Norwegian University of Science and Technology, and Yale University.

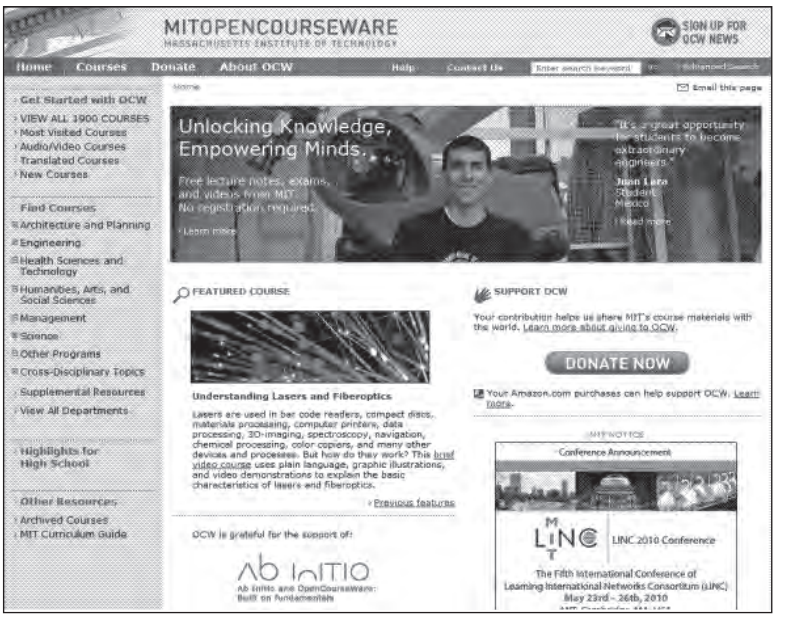
Figure 4: iTunesU

University OCW Initiatives

Massachusetts Institute of Technology (MIT) has perhaps the most well-known institutional OCW project, and is responsible for pulling many colleges from all over the world into the OER movement. In 1999, Provost Robert A. Brown asked a committee of MIT faculty, students, and administrators to provide strategic guidance on how MIT could advance knowledge and education to students in science, technology, and other scholarship areas. This mission was to literally fulfil MIT's mission statement about how to best serve 'the nation and the world in the 21st century.' Based on that premise, MIT's OCW began to provide users with open access to class syllabi, lecture notes, course calendars, problem sets and solutions, examinations, reading lists, and even a selection of video lectures in 2003.

MIT Open Courseware (http://ocw.mit.edu) currently makes available 1,900 courses on the Internet at no cost for non-commercial purposes. Importantly, MIT reports that it is finding clear evidence that this process of sharing materials has led to significant increases in shared use of content within its own institution, with departments increasingly sourcing materials from each other rather than developing their own from scratch.

Figure 5: MIT OpenCourseWare Initiative

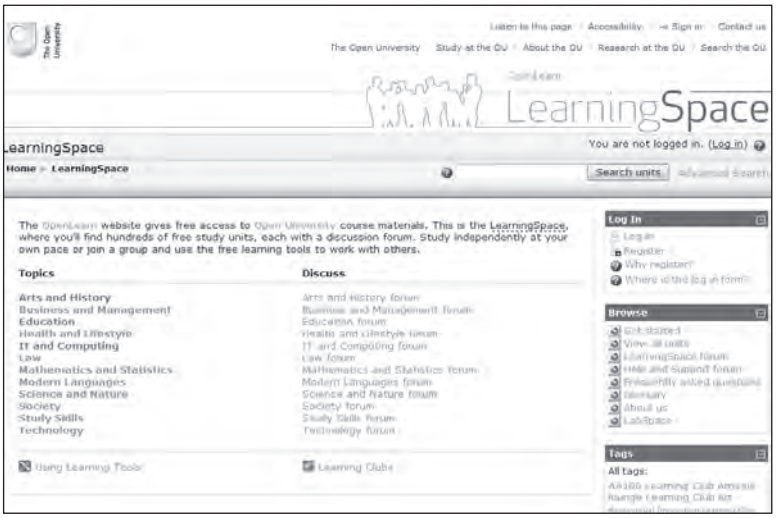


Another well-known institutional source of HE OER is OpenLearn (http://openlearn.open.ac.uk). The Open University is one of the world's most successful distance education universities. Through academic research, pedagogic innovation and collaborative partnership it seeks to be a world leader in the design, content and delivery of supported open and distance learning. The OpenLearn website gives free access to Open University course materials. Users can find hundreds of

free study units across twelve topic areas, each with a discussion forum. Director of OpenLearn, Prof. Andy Lane, stated the following as motivations for OpenLearn:

> OpenLearn gives us an exciting opportunity to see what happens when we release many of the restrictions that we are used to; copyright, fees, and geography. We see Open Educational Resources as having revolutionary potential that we must study but also as a basis for further innovation. Freely accessible and changeable high quality content can underpin experiments in widening participation, use of mobile devices, development of tools for accessibility, geographically distributed experiments and community building. As a catalyst for further research Open Educational Resources have a significant part to play, as a possible indication of how people will learn in the future they are a vital move away from rigid structures that are causing their own pressures. We want to understand this future.[23]

Figure 6: OpenLearn LearningSpace



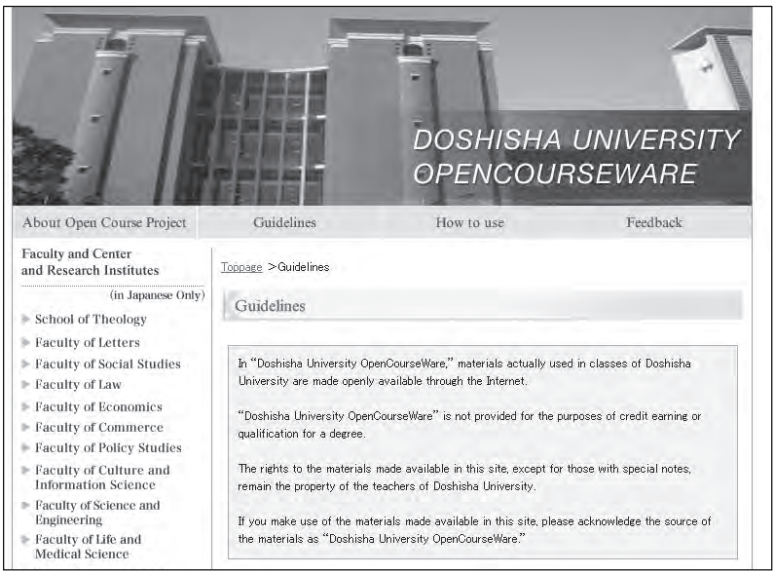
Other university initiatives worldwide include that of a National Digital Repository of learning resources established by the Indira Gandhi National Open University (IGNOU) in India. The repository, eGyankosh, envisages to store, index, preserve, distribute and share the digital learning resources of open and distance learning (ODL) institutions in the country. The repository supports seamless aggregation and integration of learning resources in different formats such as self-instructional study materials, audio-video programmes, and archives of radio and television-based live interactive sessions.

[23]Patrick McAndrew: Motivations for OpenLearn: the Open University's Open Content Initiative- http://kn.open.ac.uk/public/getfile.cfm?documentfileid=10026

Figure 7: eGyankosh Interface

In Japan, The Doshisha University (http://opencourse.doshisha.ac.jp/english/study.html) makes actual course materials freely available through the Internet. Courses range by schools, such as the School of Theology or the Institute for Language and Culture. Courses are presented in Japanese.

Figure 8: Doshisha University Interface



The Open University of Hong Kong (http://freecourseware.ouhk.edu.hk) , being the major local provider of distance education, offers free opportunities for

interested students to have a genuine experience of distance education. Some of the courses are presented in Chinese.

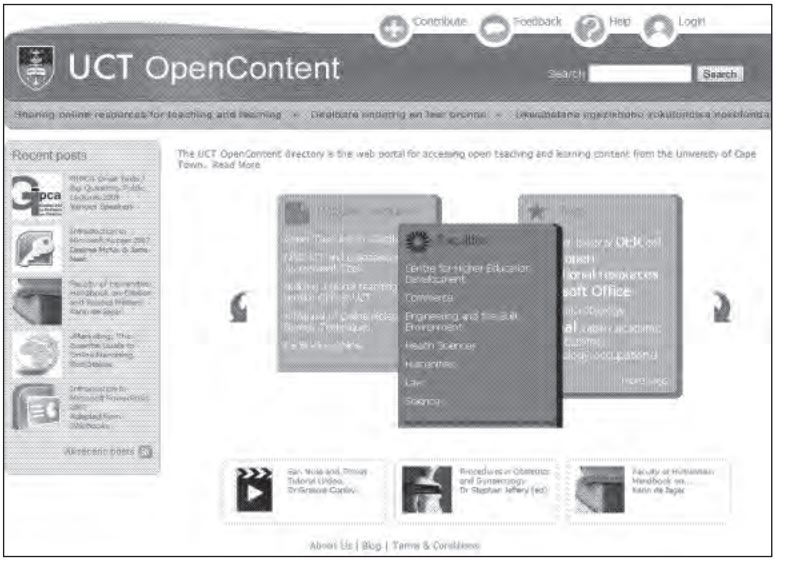
Figure 9: Open University of Hong Kong Interface

The National University of Columbia (www.virtual.unal.edu.co) offers a wide array of free courses available for Spanish speaking students. Subjects that can be studied include administration, science, nursing, art, agronomy, engineering, architecture, medicine and dentistry.

Figure 10: National University of Columbia Interface

Examples of African OCW initiatives include the University of Western Cape – http://freecourseware.uwc.ac.za) and the recently established UCT Open Content (http://opencontent.uct.ac.za) which allows users to accessing open teaching and learning content from the University of Cape Town (UCT).

Figure 11: UCT's OpenContent Interface



Subject-Specific OCW OER

There are also various subject-specific OER initiatives in Higher Education. One such example is the Health Education Assets Library (HEAL), www.healcentral.org, which is a digital library that provides freely accessible digital teaching resources.

Figure 12: HEAL Digital Repository

Another example is that of Tufts University (http://ocw.tufts.edu). Tufts OpenCourseWare (OCW) seeks to capitalize on the potential of the internet to eliminate borders and geographic distance as obstacles to the instantaneous exchange of knowledge and new ideas and offers the world's students free access to its many academic health sciences resources.

Figure 13: TUFTS OpenCourseware Repository

In Vietnam, the Fulbright Economics Teaching Program (FETP) (http://ocw.fetp.edu.vn/home.cfm) allows an opportunity for people working or studying in policy-related fields to increase their knowledge and explore new approaches to learning and curriculum development. Instructors are encouraged to adopt FETP's curricular materials for use in their own courses. Students may use FETP's materials to guide independent study. Course syllabi, lecture notes, reading lists and problem sets used in many one-year mid-career program and executive education courses are available online.

Figure 14: Fulbright Economics Teaching Program Interface

The Stanford University School of Engineering(http://see.stanford.edu) provides access to lecture videos, reading lists and other course hand outs, quizzes and tests. Stanford encourages fellow educators to use Stanford Engineering course materials in their own classrooms. A Creative Commons licence allows for free and open use, reuse, adaptation and redistribution of Stanford Engineering Everywhere material.

Figure 15: Stanford University School of Engineering Interface

AgEcon (http://ageconsearch.umn.edu) is a free, open access repository of full-text scholarly literature in agricultural and applied economics, including working papers, conference papers and journal articles. There are 68 subject headings, which run the full gamut of agricultural economics and agribusiness.

Figure 16: AgEcon Interface

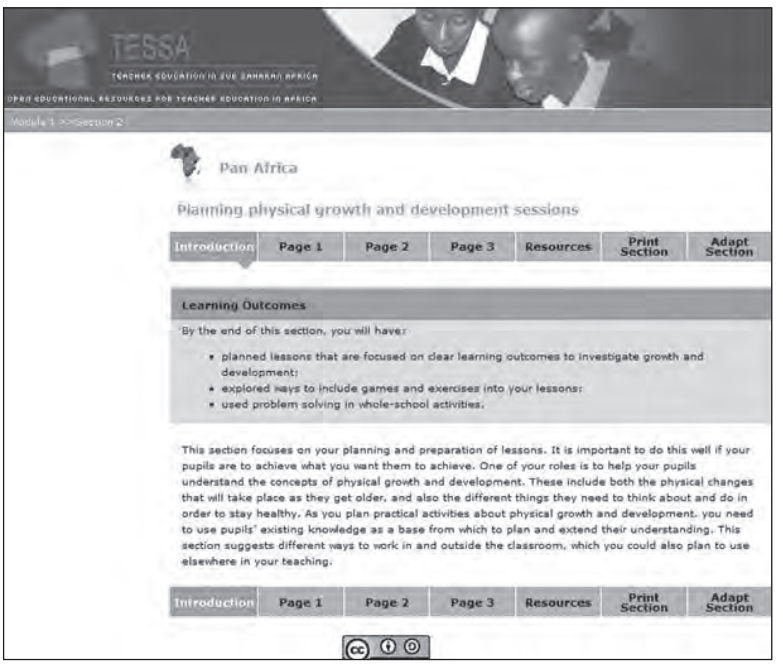
An African subject-specific initiative is the Teacher Education in Sub-Saharan Africa (TESSA) initiative, (www.tessafrica.net) which brings together teachers and teacher educators from across Africa. It offers course design guidance for teachers and teacher educators working in Sub-Saharan African countries, and has produced a range of OER in four languages to support school-based teacher education and training. These materials focus on classroom practice in the key areas of literacy, numeracy, science, social studies and the arts and life skills. In addition, members of the TESSA community are encouraged to explore, share, adapt and add their own resources for teacher education.

The TESSA initiative aims to achieve the MDGs and EFA goals and ensure that by the year 2015, every African child should have access to Primary education. In order to achieve these stated goals, Sub-Saharan African countries need four million trained teachers which cannot be achieved with the present conventional ways of teacher training. The TESSA initiative therefore stands on three pillars:

- Affordability and accessibility of ICT;
- OER philosophy which allows materials to be put on the net and accessible to all for free;
- Research studies in cognitive science which gives current information on how learning takes place.

The screenshot below provides an example of a Life Skills module, focusing on 'Planning physical growth and development sessions'.

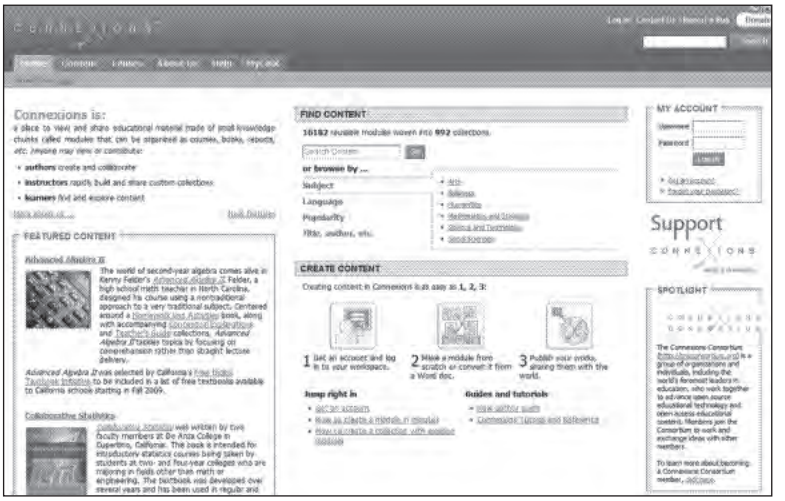
Figure 17: Sample TESSA Life Skills Module



Content Creation Initiatives

Besides OCW initiatives, there are other initiatives focused on creating learning resources that can be used to form courses or stimulate discussion and share advice around using OER. Connexions (http://cnx.org), founded by Rice University, currently hosts over 16,000 open learning objects available for mixing and matching into study units or full courses. The site allows users to view and share educational material made of small knowledge chunks called modules that can be organized as courses, books, reports, and so on. Anyone may view or contribute.

Figure 18: Connexions Content Interface



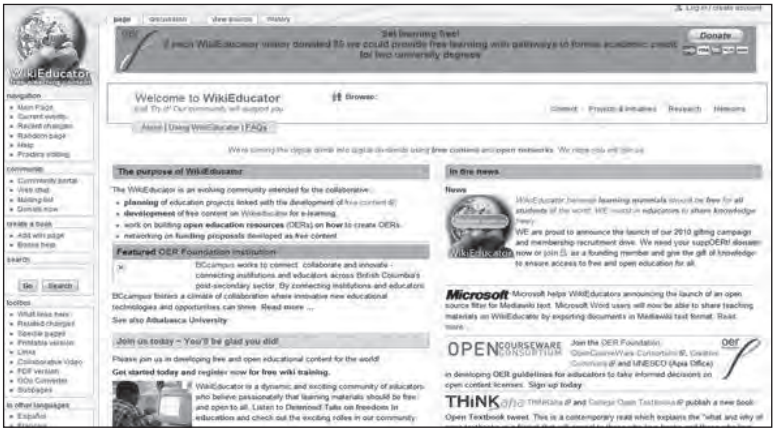
Similarly, WikiEducator and Curriki have made huge impact in the OER Movement.

Launched in 2003 by the Commonwealth of Learning (COL), WikiEducator (http://wikieducator.org) is an evolving community focussed on collaboration in[24]:

- planning of education projects linked with the development of free content
- development of free content on WikiEducator for eLearning
- building of open education resources (OERs) on how to create OERs
- networking on funding proposals developed as free content

[24] www.col.org/SiteCollectionDocuments/WikiEducator%20brochure_PrintCropped.pdf

Figure 19: WikiEducator Interface



Curriki (www.curriki.org) is a website where the community shares and collaborates on free and open source curricula. Curriki is a community of educators, students and committed education experts who are working together to create quality materials that will benefit teachers and students around the world. It is an online environment created to support the development and free distribution of world-class educational materials to anyone who needs them.

Figure 20: Curriki Interface

In Africa, OER Africa (www.oerafrica.org), an initiative of the South African Institute for Distance Education (Saide), is involved in promoting the use of OER in Africa and supporting individuals and organizations in creating OER:

> *OER Africa's mission is to establish dynamic networks of African OER practitioners by connecting like-minded educators – teachers, academics, and trainers –to develop, share, and adapt OER to meet the education needs of African societies. By creating and sustaining human networks of collaboration – face-to-face and online – OER Africa will enable African educators and students to harness the power of OER, develop their capacity, and become integrated into the emerging global OER networks as active participants rather than passive consumers.*[25]

OER Africa is also involved in numerous projects supporting the adoption of OER in a number of HEI across Africa. The site not only allows access to African-developed resources, but also allows users to follow a documented process of how the materials were created. The website provides a space for various OER projects in Africa, for example, the Saide ACEMaths project, which piloted a collaborative process for the selection, adaptation and use of OER materials on the teaching and learning of mathematics for teacher education.

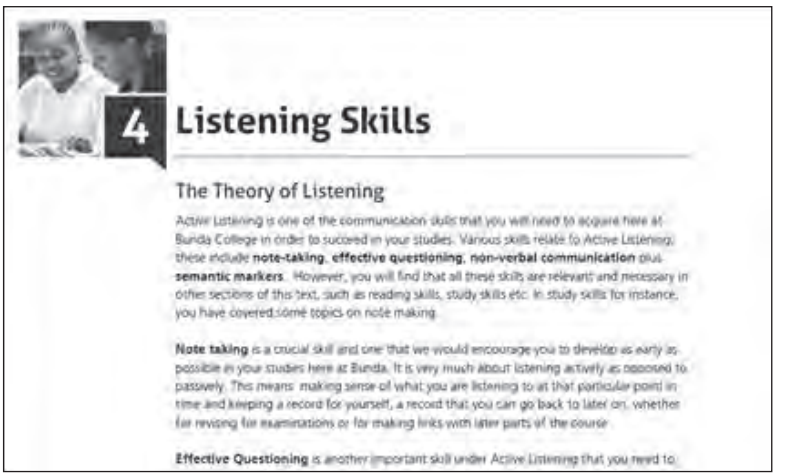
Figure 21: Sample Unit Interface for the ACEMaths Project

These initiatives are having practical effects on the quality of education in programmes on the ground. The University of Malawi also embarked on an OER project at the Bunda College of Agriculture, which led to compilation of

[25]www.oerafrica.org

a first year communication skills textbook[26]. The project was conceived in a context of insufficient numbers of relevant textbooks at the college, and involved the creation of a paper-based textbook from freely available OER. The team members have written new materials but have also used and adapted material from all around the English speaking world to suit the specific needs of this course. The following is an example of a chapter on listening skills from the textbook, Communication Skills, developed by the Language Communication for Development Department at the Bunda College of Agriculture, University of Malawi.

Figure 22: Sample Page from Bunda's 'Communication' Skills Textbook – an OER



4 Listening Skills

The Theory of Listening

Active Listening is one of the communication skills that you will need to acquire here at Bunda College in order to succeed in your studies. Various skills relate to Active Listening, these include **note-taking**, **effective questioning**, **non-verbal communication** plus **semantic markers**. However, you will find that all these skills are relevant and necessary in other sections of this text, such as reading skills, study skills etc. In study skills for instance, you have covered some topics on note making.

Note taking is a crucial skill and one that we would encourage you to develop as early as possible in your studies here at Bunda. It is very much about listening actively as opposed to passively. This means making sense of what you are listening to at that particular point in time and keeping a record for yourself, a record that you can go back to later on, whether for revising for examinations or for making links with later parts of the course.

Effective Questioning is another important skill under Active Listening that you need to

Open Schooling Initiatives

Open Schooling is increasingly recognised as a feasible solution to the lack of qualified teachers and conventional schools in the developing world. With primary school enrolments growing successfully to meet the United Nations Millennium Development Goal of Universal Primary Education, many nations simply cannot accommodate the corresponding increase in potential secondary school students. The Commonwealth of Learning (COL) defines Open Schooling by two elements[27]:

- The physical separation of the school-level student from the teacher; and
- The use of unconventional teaching methodologies and information and communications technologies (ICT) to bridge the separation and provide the education and training.

[26]The textbook can be retrieved at: www.oerafrica.org/foundation/FoundationOERHome/BundaCollegeofAgriculture/tabid/878/Default.aspx

[27]www.col.org/openSchooling

OER's 4 Open Schools, an initiative of COL in collaboration with the William and Flora Hewlett Foundation and Ministries of Education and Open Schools in Botswana, Lesotho, Namibia, Seychelles, Trinidad & Tobago and Zambia is undertaking a range of activities to strengthen the capacity and sustainability of open schools in developing countries. This includes creating practical handbooks, hosting capacity building workshops, commissioning research and providing access to digital resources.

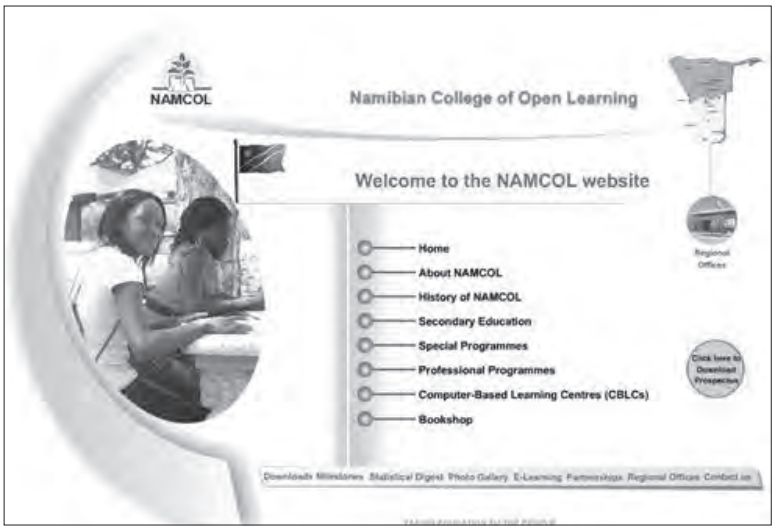
In India, the National Institute of Open Schooling (NIOS) (www.nios.ac.in) provides opportunities to interested students by making available a variety of courses/programmes of study through open and distance learning (ODL) modes. These include:

- Open Basic Education (OBE) Programmes for 14+ years age group, adolescents and adults at A, B and C levels that are equivalent to classes III, V, and VIII of the formal school system;
- Secondary Education Courses;
- Senior Secondary Education Courses;
- Vocational Education Courses/Programmes;
- Life Enrichment Programmes.

Figure 23: NIOS Interface

The Namibian College of Open Learning (NAMCOL- www.namcol.com.na) offers two secondary education programmes, namely the Junior Secondary Education Certificate and the Namibia Senior Secondary Certificate. In addition to this, The Pete Programme is offered to students who intend to pursue further studies in Sciences at institutes of Higher Learning.

Figure 24: NAMCOL Interface



The Botswana College of Distance and Open Learning (BOCODOL) was established out of the Distance Education section of the Non-Formal Education Department. BOCODOL helps out-of-school youth and adults to return to learning. It offers them the environment and the opportunities to break barriers to personal development through flexible learning, and offers distance education courses for preparation for the Junior Certificate (JC) and the General Certificate in Secondary Education (GCSE) examinations as well as vocational training and tertiary programmes.

In Mexico, communities are scattered across vast distances, with some of these far flung communities having fewer than 100 inhabitants. This has made it an almost impossible task to provide secondary education along conventional lines to these communities. The Telesecundaria (http://telesecundaria.dgme.sep.gob.mx) project (lower secondary school learning with television support) has been instrumental in changing this situation and Mexico's communications infrastructure is now opening up to different forms of education and learning. Telesecundaria's mission is[28]:

> *Providing the country's most vulnerable groups secondary education, with a solid foundation in each discipline and ethical principles of social solidarity, allowing them to develop their skills and abilities so that their graduates are able to perform successfully in middle school, as well as responsibly exploit local resources to improve their quality of life through educational activities, materials, computer equipment, use of new technologies of information and communication technologies (ICT) and teaching methods tailored to their*

[28]http://telesecundaria.dgme.sep.gob.mx/

specific needs. At the same time providing training and resources for teachers to ensure optimum performance.

Figure 25: Telesecundaria Interface

OCW OER Search

Finally, there are various search facilities, allowing users to search for relevant HE OER. For example, the Commonwealth of Learning (COL), www.col.org/OER, provides a Google Custom search, which will initially return all OCW and OER results from the higher-education institutions and OER repositories that have been selected. Once on the results page, users can refine their search further by selecting only OCWs or only OER or only OCWs from certain regions.

Another example of a search facility is Folksemantic: www.folksemantic.com. This facility allows users to browse and search over 110,000 OER (although this is not specific to HE resources). The system provides access to, among others, Johns Hopkins, MERLOT and MIT-OCW resources. The developers have also made the code available for others to use.

Figure 26: Folksemantic Search Facility

Likewise, DiscoverEd (http://discovered.creativecommons.org/search) is an experimental project from Creative Commons, particularly interested in improving search and discovery capabilities for OER. It is a prototype that aims to explore how structured data may be used to enhance the search experience, and provides a scalable search and discovery for educational resources on the web. It works like a search engine where users type keywords to find information. The result set reveals metadata for a resource, including subject information and the licence. The results come from other repositories such as OER Commons, Connexions and the Open Courseware Consortium (OCWC). Interested parties are allowed to incorporate DiscoverEd on their own sites.

Conclusion

The above is just a small sample of emerging OER initiatives in the higher education space. They illustrate that there is a burgeoning interest in OER, as well as a fast-emerging web infrastructure to support further growth, sharing and discovery of OER online. Institutional participants include mainstream, highly respected higher education institutions from around the world.

While several of the initiatives outlined above were initiated with donor funding, there is growing evidence that their activities are being integrated into mainstream institutional budgets and that diversification of income streams is taking place rapidly. Most importantly, the above snapshot of examples demonstrates clearly that OER can no longer be considered a peripheral 'movement' – it is something with which all higher education planners and policy makers need to engage.

Appendix Six: A Catalogue of OER-Related Websites[29]

[29]This catalogue is taken from, and kept up to date at: www.oerafrica.org/FindingOER.

OCW OER Repositories

Name	URL	Description
Australian Flexible Learning Framework–Learning Object Repository Network (LORN)	http://lorn.flexiblelearning.net.au/repositories	LORN currently has seven member repositories contributing more than 2500 learning objects for download in a wide range of industries and subject areas, including business, community services, electro technology, horticulture, tourism, and hospitality. The focus is on TVET.
Connexions	http://cnx.org	A place to view and share educational material made of small knowledge chunks called modules that can be organized as courses, books, reports, etc. Anyone may view or contribute
Development Gateway	http://topics.developmentgateway.org/openeducation/index.do	dgCommunities is both a place to find knowledge resources focused on development issues and an interactive space where users can share their own work, participate in discussions, and find people with similar interests.
Internet Archive, Education	www.archive.org/details/education	This library contains hundreds of free courses, video lectures, and supplemental materials from universities in the United States and China. Many of these lectures are available for download.
JORUM (JISC)	www.jorum.ac.uk	JORUM is a free online repository service for teaching and support staff in UK Further and Higher Education Institutions, helping to build a community for the sharing, reuse and repurposing of learning and teaching materials.

Name	URL	Description
LectureFox	www.lecturefox.com	Lecturefox is a free service, where users can find high-quality classes from universities all over the world. The site focuses on lectures from the faculties of physics, chemistry, computer science and mathematics. In the category “faculty mix” you can find miscellaneous lectures from other departments like electrical engineering, biology, psychology, economics, history and philosophy.
MERLOT (Multimedia Educational Resources for Learning and Online Teaching)	www.merlot.org/merlot/index.htm	In this site, users can find peer reviewed online teaching and learning materials, and share advice and expertise about education with expert colleagues.
OER Commons	www.oercommons.org	This site allows users to browse and search OER Commons to find curriculum, and tag, rate, and review it for others.
OpenCourseWare Consortium	www.ocwconsortium.org/use/use-dynamic.html	The OpenCourseWare Consortium is a collaboration of more than 200 higher education institutions and associated organizations from around the world creating a broad and deep body of open educational content using a shared model. Users can find course materials by browsing individual OpenCourseWare sites or by searching across all courses.
OWL Institute – Open Educational Resources	www.owli.org/oer	OWL’s mission is to research, develop, and distribute educational resources and opportunities across economic, geographic and cultural barriers.

Name	URL	Description
OE Portal Resource Centre	www.owli.org/portal	Organizing OER within a powerful and efficient learning management system, the OWL Institute's Open Education Portal offers ready-made courses for public use. Using open source software and the OER, the OE Portal puts the power of open education into everyone's reach. Along with resources, the OE Portal brings important news, initiatives, events, expert reviews, guidance and insights for using OER effectively and meaningfully.
ParisTech OpenCourseWare	www.paristech.org/en/etudier_libres.html	The main goal of this site is to promote, gather and give free access to the largest number of courses materials. the site offers access to OCW, PHD Theses and displays all the Credits, Training programs and Books written by educators.
Repository.ac.nz	http://oer.repository.ac.nz/course/index.php	An OER initiative in New Zealand, this site allows users to access a number of courses.
SOFIA (Sharing of Free Intellectual Assets) OpenCourseWare	http://sofia.fhda.edu/gallery	The goal of Sofia is to publish community college-level course content and make it freely accessible on the web to support teaching and learning. The focus is on exploring ways of supporting instruction and student learning using web-based resources.
Universia OCW	http://ocw.universia.net/en	This site contains Spanish and Portuguese OCW from over 30 participating institutions.
Vietnam OpenCourseWare	www.vocw.edu.vn/$	The content in Vietnam OpenCourseWare comes in two formats: modules, which are like small "knowledge chunks," and courses, which are collections of modules. Their open licence allows for free use and reuse of all their content. Most of the course content is in Vietnamese.
Taiwan OpenCourseWare Consortium	http://tocwc.nctu.edu.tw	This website contains OCW from a number of universities in Taiwan. The website as well as the resources are in Chinese.

Name	URL	Description
Utah OpenCourseWare Alliance	http://uocwa.org/courses	This site collates all the OCW courses from participating institutions in Utah, US.
NetEase OpenCourseWare Consortium	http://v.163.com/open	OpenCourseWare Consortium NetEase is the 3rd largest portal site in China and has joined the OCW Consortium as a Sustaining Affiliate Member. They have translated hundreds of videos into Chinese, and are preparing to launch a platform for study groups.
CEC Learning Object Repository (India)	www.cec-ugc.org	Consortium for Educational Communication (CEC) is an inter-university centre on electronic media, established by the University Grants Commission (UGC). CEC's Learning Object Repository (LOR) houses educational resources in different subjects such as Archaeology, Biology, Botany, Chemistry, Commerce, Computer Science, Economics, Education, English, Fine Arts etc.
National Programme on Technology Enhanced Learning (NPTEL)	http://nptel.iitg.ernet.in	The main objective of NPTEL program is to enhance the quality of engineering education in India by developing curriculum based video and web courses. This is being carried out by seven premier institutions as a collaborative project.

Open Schooling Initiatives

Name	URL	Description
OER 4 Open Schools	www.col.org/ OpenSchooling	COL is undertaking a range of activities to strengthen the capacity and sustainability of open schools in developing countries. This includes creating practical handbooks, hosting capacity building workshops, commissioning research and providing access to digital resources.
National Institute of Open Schooling	www.nios.ac.in	NIOS provides a number of Vocational, Life Enrichment and community oriented courses besides General and Academic Courses at Secondary and Senior Secondary level. It also offers Elementary level Courses through its Open Basic Education Programmes (OBE).
Namibian College of Open Learning (NAMCOL)	www.namcol.com. na	NAMCOL was created by an Act of Parliament (Act 1 0f 1997). It provides learning opportunities for adults and out of school youth.
Botswana College of Open and Distance Learning (BOCODOL)	www.bocodol.ac.bw	BOCODOL offers distance education courses for preparation for the Junior Certificate and BGCSE examinations. The college was established out of the Distance Education section of the Non-Formal Education Department. Part of its mission is to extend distance education course provision beyond schooling to offer vocational and other courses. The BOCODOL courses are primarily print-based with some audio support broadcast on Radio Botswana.
Telesecundaria	http://telesecundaria. dgme.sep.gob.mx	The Telesecundaria project (lower secondary school learning with television support) has been instrumental in changing this situation and Mexico's communications infrastructure is now opening up to different forms of education and learning.

OCW OER Search

Name	URL	Description
Commonwealth of Learning (CoL)	www.col.org/OER	CoL provides a Google Custom search, which will initially return all OCW and OER results from the higher-education institutions and OER repositories that have been selected. Once on the results page, users can refine their search further by selecting only OCWs or only OERs or only OCWs from certain regions. They also provides the Yahoo Pipes search field, to help users find specific OCWs.
Discover Ed	http://discovered.creativecommons.org/search	This search facility is provided by Creative Commons to help users find OER.
Folksemantic	www.folksemantic.com	Browse and search over 110,000 Open Education Resources (OERs). "This is an open educational resource recommender. There's also a website widget and a Firefox extension. The system basically provides access to NSDL resources, but also Johns Hopkins, MERLOT and MIT-OCW resources. OER Recommender now has real-time analysis of OER resources related to other web pages (eg. Amazon). It's all free and open source, and the code is available".
Freelearning–Search for OER sites	http://freelearning.bccampus.ca/searchOER.php	This Google Custom Search Engine allows users to focus their search to sites which have already been identified by Freelearning as high quality OER, reducing the clutter of a generic Google search.
Google OCW	http://opencontent.org/googleocw	This custom search engine allows users to focus their search on finding OCW.
OER Recommender	www.oerrecommender.org	OER Recommender makes it easy for OER providers to provide links to related resources. It links users to OER related to web pages you are browsing.

Name	URL	Description
OpenCourseWare Finder	http://ocwfinder.com	This search facility developed by Folksemantics which allows you to search for OER using a keyword search or by a search by tagged items.
SOFIA (Sharing of Free Intellectual Assets) OpenCourseWare	http://sofia.fhda.edu/gallery	The goal of Sofia is to publish community college-level course content and make it freely accessible on the web to support teaching and learning. The focus is on exploring ways of supporting instruction and student learning using web-based resources.
Taiwan OpenCourseWare Consortium	www.tocwc.org.tw	This website contains OCW from a number of universities in Taiwan. The website as well as the resources are in Chinese.
Vietnam OpenCourseware	www.vocw.vn	The content in Vietnam OpenCourseWare comes in two formats: modules, which are like.
Universia OCW	http://ocw.universia.net/en	This site contains Spanish and Portuguese OCW from over 30 participating institutions.

University OCW Initiatives

Name	URL	Description
Athabasca University	http://emd.athabascau.ca/opencourseware	The only OCW course found at this university is 'Maths Support for Calculus'. This consists of 5 modules.
Brigham Young University	http://ce.byu.edu/is/site/courses/ocw	BYU Independent Study offers selected courses from the university and high-school portfolio in their Open CourseWare pilot program.
Capilano University, Canada	http://ocw.capilanou.ca	The Capilano University OpenCourseWare site is a free and open educational resource for faculty, students, and self-learners throughout the world.
Carnegie Mellon University, Open Learning Initiative	http://oli.web.cmu.edu/openlearning	Using intelligent tutoring systems, virtual laboratories, simulations, and frequent opportunities for assessment and feedback, the Open Learning Initiative (OLI) builds courses that are intended to enact instruction–or, more precisely, to enact the kind of dynamic, flexible, and responsive instruction that fosters learning. The site contains Open & Free courses over a number of disciplines. These are designed for individual students who are not under the guidance of an instructor and allows access to most or all course content.
Chulalongkorn University, Thailand	http://cu-ocw.eng.chula.ac.th/cu/Courses_listing	This site contains course content in English and Thai.
College of Eastern Utah's OpenCourseWare	http://ocw.ceu.edu	This site is involved in making course materials available through an open content licence.

Name	URL	Description
Dixie State College of Utah	http://ocw.dixie.edu	Dixie State OpenCourseWare is a free and open educational resource for faculty, students, and self-learners throughout the world.
Grenoble Ecole de Management	http://opencim.grenoble-em.com	This site contains OpenCourseWare in Management. The course content is in French.
John Hopkins Bloomberg School of Public Health (JHSPH) OCW	http://ocw.jhsph.edu	The Johns Hopkins Bloomberg School of Public Health's OCW project provides access to content of the School's most popular courses. It provides free, searchable, access to JHSPH's course materials for educators, students, and self-learners around the world.
Kaplan University OpenCourseWare	http://ocw.kaplan.edu	This site provides Open access to materials used in a variety of Kaplan University's courses.
Keio University	http://ocw.dmc.keio.ac.jp	This site contains notes and materials. The course outlines and assessment tasks are in English, but lecture notes are in Japanese.
King Fahd University of Petroleum & Minerals	http://opencourseware.kfupm.edu.sa	The purpose of KFUPM open courseware is to showcase course material used in the courses of the university to demonstrate KFUPM educational culture and to be part of the global interactions in the open sharing of educational material. The courses on this site are categorized in terms of the academic disciplines in which university offers its academic programs. The site currently includes sample courses and more courses will be added to the site with time.
Korea University	http://ocw.korea.edu/ocw	Contains the university's OCW in English.

Name	URL	Description
Kwame Nkrumah University of Science and Technology	http://web.knust.edu.gh/oer	Through the OER project, funded by the Hewlett Foundation, began in KNUST as a collaboration between Kwame Nkrumah University of Science and Technology, Kumasi; University of Ghana, Accra, University of Michigan, USA, University of Cape Town, South Africa, University of Western Cape, South Africa and OER Africa. KNUST's OER initiative is also supported by the Bill and Melinda Gates Foundations. As part of this collaboration, an African Health OER Network which includes other African universities has been established to enhance knowledge sharing and KNUST represented by the College of Health Sciences is a part of this network.
Kyoto-U OpenCourseWare	http://ocw.kyoto-u.ac.jp/?set_language=en	This site provideas access to lectures and courses at the university. Note that many of the lecture notes are in Japanese.
Kyung Hee University	http://ocw.khu.ac.kr:8080/CTL	This site provideas access to lectures and courses at the university. Course and syllabus outlines are in English, while lecture notes are in English and Korean.
La Universidad de Monterrey	http://ocw.udem.edu.mx	Contains the university's OCW (in Spanish).
Michigan State University	www.msuglobal.com/ocw	MSU Open CourseWare (OCW) is an initiative of the university led by MSUglobal Learning Ventures. Their goal is to share the expertise of the University through OER in the form of OCW. MSU OCW provides free and open access to a growing collection of formal course content as well as innovative and educational resources.
Middle East Technical University (METU) OpenCourseWare, Turkey	http://ocw.metu.edu.tr	METU OpenCourseWare is a free and open educational resource for faculty, students, and self-learners throughout the world. They offer courses in Computer Education and Instructional Technology, Computer Engineering, Educational Sciences, Foreign Language Education, Informatics, Mechanical Engineering and Physics.

Name	URL	Description
MIT OpenCourseWare–Massachusetts Institute of Technology	http://ocw.mit.edu	One of the most popular and most extensive open courseware collections online, MIT offers 1,900 courses in nearly every subject. The site contains free lecture notes, exams, and videos, and no registration is required.
Nagoya University OpenCourseware (NU OCW), Japan	http://ocw.nagoya-u.jp/index.php?lang=en	This site contains notes and materials from lectures given at Nagoya University. The course outlines and assessment tasks are in English, but lecture notes are in Japanese.
National Tsing Hua University	http://my.nthu.edu.tw/~ocw	This site contains course materials in English and Chinese.
OCW Universidad de Cantabria	http://ocw.unican.es	Contains the university's OCW (in Spanish).
Open Learn ((The Open University UK)	http://openlearn.open.ac.uk/course	The OpenLearn website gives free access to Open University course materials. In the LearningSpace users can find hundreds of free study units, each with a discussion. forum.
Open Learning Initiative	http://oli.web.cmu.edu/openlearning	Contains open and free courses as well as 'academic versions'"of courses that are led by an instructor (the latter involves a maintenance fee).
Open Content UCT	http://opencontent.uct.ac.za	The UCT OpenContent directory is the web portal for accessing open teaching and learning content from UCT. Produced by the Open Educational Resources project in the Centre for Educational Technology at UCT with the support of the Shuttleworth Foundation, the directory aims to showcase the teaching efforts of UCT academics and encourage the publication of open resources.
Open Universiteit Nederland	www.opener.ou.nl	Contains the university's OCW (in Dutch).

Name	URL	Description
Open University of Catalonia, Spain	http://ocw.universia.net/en/instituciones/8/open-university-of-catalonia	Contains the university's OCW (in Spanish).
Open Yale Courses	http://oyc.yale.edu/courselist?	Each course includes a full set of class lectures produced in high-quality video accompanied by such other course materials as syllabi, suggested readings, and problem sets. The lectures are available as downloadable videos, and an audio-only version is also offered. In addition, searchable transcripts of each lecture are provided.
Open.Michigan	https://open.umich.edu/education/courses-resources	The University of Michigan's initiative to create and share knowledge, resources, and research with the global learning community–Open.Michigan includes information, updates, discussion, blogs, videos, and podcasts detailing their efforts.
Osaka University, Japan	http://ocw.osaka-u.ac.jp	Osaka University Open Course Ware Pilot Site is a collections of Osaka University's educational materials which is actually used in the courses taught at Osaka University. Course outlines are in English, and course notes are in Japanese.
Peoples-uni.org	www.peoples-uni.org	Offers courses in public health through Internet based e-learning. The course content is accessible when you register/login.
Pusan National University	http://ocw.pusan.ac.kr	Course outlines and the syllabus is in English, but lectures are in Korean.
Rai OpenCourseware, India	www.rocw.raifoundation.org	Rai OpenCourseware is Rai Foundation Colleges's inititave of bringing world-class higher education within the reach of one and all. Educational institutions who wish to use Rai OpenCourseWare for their students can also do so by only providing an acknowledgement to Rai Foundation Colleges as 'Source'.

Name	URL	Description
The UMass Boston OpenCourseWare (University of Massachusetts, Boston)	http://ocw.umb.edu/courselist	This site contains OCW over a number of different subjects.
Tokyo Institute of Technology	www.ocw.titech.ac.jp/index.php?lang=EN	Lecture outlines are in English.
TU Delft OpenCourseware, The Netherlands	http://ocw.tudelft.nl	TU Delft OpenCourseWare is a free and open digital publication of high quality educational materials, organized as courses.
United Nations University, UNU OpenCourseWare (Japan)	http://ocw.unu.edu/Courses_listing	The UN University is committed to the development of this OCW website that showcases the training and educational programmes implemented by the University in a wide range of areas relevant to the work of the United Nations.
Universidad Cadiz	http://ocw.uca.es	Contains course materials in Spanish
University of California College Prep (UCCP) Open Access	www.ucopenaccess.org	Provides prep courses freely available for students and educators to use as supplemental or complementary material. Users can easily move through an entire UCCP course from start to finish, or a lecturer can send studens to an open course to provide them with additional learning opportunities.
University of California, Berkley	http://webcast.berkeley.edu	Contains podcasts and Webcasts of UC Berkeley current and archived courses.
University of California, Irvine	http:B31//ocw.uci.edu/B39	Contains courses in English, Spanish and Portuguese.

Name	URL	Description
University of Notre Dame	http://ocw.nd.edu	Notre Dame OCW is a free and open educational resource for faculty, students, and self-learners throughout the world. Users can access courses from 20 departments.
University of Puerto Rico	www.ocwupr.org:8080/ocw	Contains a number of courses (in Portuguese).
University of the Western Cape–Free Courseware Project	http://freecourseware.uwc.ac.za/freecourseware/courselist	UWC has a long history of supporting the use, development and diffusion of free/open source software and educational resources. In 2005 UWC's Senate passed an ambitious Free Content, Free/Open Courseware Policy, which removed institutional obstacles to publication of open educational resources. The Free Courseware project is part of a broader move towards implementation of this strategy.
University of Tokyo OpenCourseWare (Japan)	http://ocw.u-tokyo.ac.jp/english	This site contains OCW over a number of different subjects. The course content is available in English and Japanese.
University of Utah OpenCourseWare Project	http://my.courses.utah.edu/course/category.php?id=3	The University of Utah's OpenCourseWare (OCW) project is a free and open educational resource for faculty, students, and self-learners throughout the world. Also known as U Moodle, the University of Utah has courses in Art, English, Economics, Education, History and the Sciences.
UNow: University of Nottingham OpenCourseWare	http://unow.nottingham.ac.uk	U-Now is the University of Nottingham's formal open courseware initiative, and a member of OCW OpenCourseWare Consortium.
USQ OpenCourseWare (University of Southern Queensland)–Australia	http://ocw.usq.edu.au	USQ is initially offering sample courses from each of the five faculties and also courses from its Tertiary Preparation Program.

Name	URL	Description
Utah State University OpenCourseWare	http://ocw.usu.edu	Utah State OpenCourseWare is a collection of educational material used in our formal campus courses, and seeks to provide people around the world with an opportunity to access high quality learning opportunities.
Utah Valley State College	http://open.uvsc.edu	Containing a number of OCW across subjects, this site requires users to create an account to view and use their OCW materials.
Utah Valley University	http://open.uvu.edu	Contains two OER/OCW.
Waseda University	www.waseda.jp/ocw	Contains a number of courses in English.
Weber State OpenCourseWare (Weber State University)	http://ocw.weber.edu	Part of the OCW consortium, the university offers limited OCW in Automotive Technology, Criminal Justice, English Health Promotion & Human Performance, and Information Systems & Technology.
Western Governors University	http://ocw.wgu.edu	Western Governors University is a non-profit online university, and is the only accredited university in the U.S. offering competency-based, online degrees. It currently provides access to OCW in Liberal Arts.
China Open Resources for Education (CORE)	www.core.org.cn/cn/jpkc/index_en.html	China Open Resources for Education (CORE) is a consortium of universities. It is is a non-profit organization whose mission is to promote closer interaction and open sharing of educational resources between Chinese and international universities.
Japan Opencourseware Consortium	www.jocw.jp	JOCW is the consortium of Japanese Universities which have been providing OCW in Japan.

Name	URL	Description
Indira Ghandi National Open University	www.egyankosh.ac.in	Indira Gandhi National Open University (IGNOU) is a national open university that offers distance and open education in India and other countries. IGNOU has initiated the establishment of a National Digital Repository of learning resources eGyankosh. This repository envisages to store, index, preserve, distribute and share the digital learning resources of open and distance learning (ODL) institutions of the country. The repository supports seamless aggregation and integration of learning resources in different formats such as self-instructional study materials, audio-video programmes, and archives of radio and television-based live interactive sessions.
Doshisha University Open Courseware	http://opencourse.doshisha.ac.jp/english/study.html	The materials actually used in classes of Doshisha University in Japan are made openly available through the Internet. Courses range by schools, such as the School of Theology or the Institute for Language and Culture. Courses are presented in Japanese.
Universidad Nacional de Columbia	www.virtual.unal.edu.co/unvPortal/courses/CoursesViewer.do?reqCode=viewOfFacultys	National University, Columbia offers a wide array of free courses available for Spanish speaking students. Subjects that can be studied include administration, science, nursing, art, agronomy, engineering, architecture, medicine and dentistry.
Open University of Hong Kong	http://freecourseware.ouhk.edu.hk/fc/php/index_e.php?id=2d615705f04bcf974c4b3766411250cf&sid=0&lang=e	The Open University of Hong Kong, being the major local provider of distance education, offers free opportunities for interested students to have a genuine experience of distance education. Some of the courses are presented in Chinese.

Name	URL	Description
University of Hong Kong	www.arch.hku.hk/~cmhui/teach/#Courses	The University of Hong Kong offers several free online courses in sustainable architecture and energy-efficient design. The course materials are all in English.

Subject-Specific OCW-OER

Name	URL	Description
ACEMaths Project	www.oerafrica.org/acemaths	The aim of the Saide ACEMaths Project was to pilot a collaborative process for the selection, adaptation and use of OER materials for teacher education programmes in South Africa. The ACEMaths module, Teaching and Learning Mathematics in Diverse Classrooms, is available for downloading for free in two formats–for printing (PDF), and for adaptation (Word).
Tufts Open Courseware	http://ocw.tufts.edu	Tufts OpenCourseWare provides free access to course content for everyone online. Tufts' course offerings demonstrate the University's strength in the life sciences in addition to its multidisciplinary approach, international perspective and underlying ethic of service to its local, national and international communities. Tufts OCW: • Publishes Tufts course materials. • Does not require any registration. • Does not grant credit, degrees, or certificates. • Does not provide access to Tufts faculty; however feedback is shared.
Health Education Assets Library (HEAL)	www.healcentral.org	The Health Education Assets Library (HEAL) is a digital library that provides freely accessible digital teaching resources of the highest quality that meet the needs of today's health sciences educators and students.

Name	URL	Description
BerkleeShares	www.berkleeshares.com	Here you will find free music lessons that you can download, share and trade with your friends and fellow musicians. Berklee Shares is: Individual self-contained music lessons developed by Berklee faculty and alumni. Free and open to the music community around the world. A library of MP3 audio, QuickTime movie, and PDF files. A glimpse into the educational opportunities provided by Berklee.
Google Computer Science Curriculum Specific Search	http://code.google.com/edu/curriculumsearch	The CS Curriculum Search will help you find teaching materials that have been published to the web by faculty from CS departments around the world. You can refine your search to display just lectures, assignments or reference materials for a set of courses.
Fulbright Economics Teaching Program (FETP) OCW (Vietnam)	http://ocw.fetp.edu.vn/home.cfm	FETP OpenCourseWare is a resource for people working or studying in policy-related fields to increase their knowledge and explore new approaches to learning and curriculum development. Instructors are encouraged to adopt FETP's curricular materials for use in their own courses. Students may use FETP's materials to guide independent study. Course syllabi, lecture notes, reading lists and problem sets used in many one-year mid-career program and executive education courses are available online.
Leadership Initiative for Public Health in East Africa (LIPHEA)	www.liphea.org	Initiative for Public Health in East Africa (LIPHEA) initiative aims to strengthen the capacity of Makerere University School of Public Health (MUSPH) and Muhimbili University College of Health Sciences (MUCHS) to not only provide effective public health leadership for Uganda and Tanzania, but also to catalyze the training of public health leaders in the whole region.
Teacher Education in Sub-Saharan Africa (TESSA)	www.tessafrica.net	This site offers a range of OER in four languages to support school based teacher education and training.

Name	URL	Description
Stanford University (School of Engineering)	http://see.stanford.edu	View lecture videos, access reading lists and other course handouts, take quizzes and tests, and communicate with other SEE students. Stanford encourages fellow educators to use Stanford Engineering course materials in their own classrooms. A Creative Commons licence allows for free and open use, reuse, adaptation and redistribution of Stanford Engineering Everywhere material.
African Health OER Network	www.oerafrica.org	This is a collaboration of institutions seeking to develop a sustainable and scalable model for the systematic rollout of OER to support health education on the continent. The OER materials produced in this initiative will be made freely available to students, faculty, and self-learners around the world through a Creative Commons licence.
CTisUs (vodacsts)	www.ctisus.com/vodcasts/index.html	CT is us is created and maintained by The Advanced Medical Imaging Laboratory (AMIL). AMIL is a multidisciplinary team dedicated to research, education, and the advancement of patient care using medical imaging with a focus on spiral CT and 3D imaging. The AMIL is part of the Department of Radiology at the Johns Hopkins Medical Institutions in Baltimore, MD.
IMARK (Information Management Resource Kit)	www.imarkgroup.org/modulesintro_en.asp?m=2	The Information Management Resource Kit (IMARK) is a partnership-based e-learning initiative to train individuals and support institutions and networks world-wide in the effective management of agricultural information. IMARK consists of a suite of distance learning resources, tools and communities on information management. IMARK is being developed as a series of modules on CD-ROM and on the Internet, offered free of charge, which will introduce the latest concepts, approaches and tools for information management. Each IMARK module focuses on a specific area of information management, with a curriculum designed, developed and reviewed by subject matter experts. The modules are being developed using the latest methods in e-learning, providing an interactive environment for self-paced learning.

Name	URL	Description
Chinese Quality Open Courseware (CQOCW)	http://ocw.core.org.cn/CORE	To share Chinese Quality Courses worldwide, China Open Resources for Education (CORE) has launched the project of writing "Chinese Quality Open Courseware (CQOCW)" into English in 2006.
Oxford University Mathematics OpenCourseWare	www.maths.ox.ac.uk/opencourseware	Has a number of Mathematics courses which are published under the terms of OpenCourseWare.
GEM4 OpenCourseWare	http://gem4.educommons.net	GEM4 enables the brokering of engineers, life scientists and medical professionals with shared facilities and joint students and post-doctoral fellows to tackle major problems in the context of human health and diseases that call for state-of-the-art experimental and computational tools in cell and molecular mechanics, biology and medicine.
Robotics CourseWare	http://roboticscourseware.org	RoboticsCourseWare.org is a free and open educational resource for faculty, students, and self-learners throughout the world. The site was created for the primary purpose of providing a resource to faculty at colleges and universities to facilitate the implementation of new robotics courses or the improvement of existing courses. The aim is to enable institutions without core expertise in robotics to begin to introduce these concepts into their curricula. In developing and populating the site, they have prioritized the following: Providing original, easily-modifiable curricular content, typically in .ppt and .doc formats. Covering the range of primary areas of robotics pedagogy, including robot mechanics, control, motion planning, vision, and localization, with less emphasis on secondary areas and courses in which robotics is used as platform to teach concepts in other academic areas.

Name	URL	Description
nanoHUB	http://nanohub.org	A resource for nanoscience and technology, the nanoHUB was created by the NSF-funded Network for Computational Nanotechnology. It is a rich, web-based resource for research, education and collaboration in nanotechnology. The nanoHUB hosts over 1600 resources which will help you learn about nanotechnology, including Online Presentations, Courses, Learning Modules, Podcasts, Animations, Teaching Materials, and more. Most importantly, the nanoHUB offers simulation tools which you can access from your web browser, so you can not only learn about but also simulate nanotechnology devices.
Science Commons	http://sciencecommons.org	Science Commons has three interlocking initiatives designed to accelerate the research cycle — the continuous production and reuse of knowledge that is at the heart of the scientific method. Together, they form the building blocks of a new collaborative infrastructure to make scientific discovery easier by design. Making scientific research "re-useful". We help people and organizations open and mark their research and data for reuse. Enabling "one-click" access to research materials — We help streamline the materials-transfer process so researchers can easily replicate, verify and extend research. Integrating fragmented information sources — We help researchers find, analyze and use data from disparate sources by marking and integrating the information with a common, computer-readable language.
AgEcon Search	http://ageconsearch.umn.edu	AgEcon Search is a free, open access repository of full-text scholarly literature in agricultural and applied economics, including working papers, conference papers and journal articles. There are 68 subject headings, which run the full gamut of agricultural economics and agribusiness.

OER Tools

Name	URL	Description
Curriki	www.curriki.org	A website where the community shares and collaborates on free and open source curricula. Curriki is a community of educators, students and committed education experts who are working together to create quality materials that will benefit teachers and students around the world. It is an online environment created to support the development and free distribution of world-class educational materials to anyone who needs them.
EduCommons	http://educommons.com	eduCommons is a content management system designed specifically to support OpenCourseWare projects. eduCommons will help you develop and manage an open access collection of course materials. It is built around a workflow process that guides content developers through the process of publishing materials in an openly accessible format.
Eduforge, Innovation for Education	https://eduforge.org	Eduforge is an open access environment designed for the sharing of ideas, research outcomes, open content and open source software for education. Users are welcome to use the community resources or start their own project space. Eduforge is designed to provide tools for collaboration at two levels. The Eduforge Community is for everyone with an interest in education to share their thoughts and experience. Eduforge Projects supports more focused research, discussions, and software development for education. Users can register a project of their own, or request to join one of the many innovative project communities.

Name	URL	Description
Folksemantic	www.folksemantic.com	Browse and search over 110,000 Open Education Resources (OERs). "This is an open educational resource recommender. There's also a website widget and a Firefox extension. The system basically provides access to NSDL resources, but also Johns Hopkins, MERLOT and MIT-OCW resources. OER Recommender now has real-time analysis of OER resources related to other web pages (eg. Amazon). It's all free and open source, and the code is available"–Stephen Downes. It also allows you to meet people with whom you can find, discuss, remix, and develop learning resources.
OER Grapevine	www.oergrapevine.org/OER_projects	OER Grapevine's mission is to promote discussion and cooperation among projects relating to open educational resources (OER). The site was created in 2006 Rob Lucas, and includes an email list and this wiki. This wiki will be used to keep a list and short descriptions of OER projects.
Open Clip Art Library	www.openclipart.org	This project aims to create an archive of user contributed clip art that can be freely used.
Open Everything	http://openeverything.wik.is	Open Everything is a global conversation about the art, science and spirit of 'open'. It gathers people using openness to create and improve software, education, media, philanthropy, architecture, neighbourhoods, workplaces and the society we live in: everything. It's about thinking, doing and being open.
Open Font Library	http://openfontlibrary.org	The goal of the Open Font Library project is to collect free software fonts–those that may be used, changed and shared freely.
Open Source Open Courseware Prototype System (OOPS)	www.myoops.org	Opensource Opencourseware Prototype System (OOPS) supports a volunteer effort in widening access to world-class knowledge for the Chinese-speaking population around the globe. The mission of OOPS is threefold: To break down language barriers through adding translation and captioning; To disseminate OER concept and stimulate use through speech, media coverage, and community building. To encourage original Chinese contributions of OER through partnership and consultation.

Name	URL	Description
OpenCast Community	www.opencastproject.org	The Opencast community is collaboration of individuals, higher education institutions and organizations working together to explore, develop, define and document best practices and technologies for management of audio visual content in academia. Through the mailing list, website and collaboration among its members, the community offers guidance and information to help others choose the best approach for the delivery and usage of rich media online.
Peer 2 Peer University	www.p2pu.org	The Peer 2 Peer University (P2PU) is an online community of open study groups for short university-level courses. Think of it as online book clubs for open educational resources. The P2PU helps you navigate the wealth of open education materials that are out there, creates small groups of motivated students, and supports the design and facilitation of courses. Students and tutors get recognition for their work, and we are building pathways to formal credit as well.
The Bazaar	www.bazaar.org	The Bazaar is a community portal for people who want to use, exchange and share Open Source Software and resources to support learning.
UNESCO OER Community	http://oerwiki.iiep-unesco.org	This site was originally created by the UNESCO International Institute for Educational Planning (IIEP) as a place where members of the UNESCO OER Community can work together on questions, issues and documents. The site contains useful resources needed to understand what OER is about, and how to use/contribute/collaborate.
WikiEducator	http://wikieducator.org	The WikiEducator is an evolving community intended for the collaborative: planning of education projects linked with the development of free content; development of free content on Wikieducator for e-learning; work on building open education resources (OERs) on how to create OERs; networking on funding proposals developed as free content.

Name	URL	Description
WikiTeach	www.wikiteach.org	This lesson plan wiki is for teachers who want to share their lessons with others. Think of it as a Wikipedia of instructional content. Login is not required, but you can log in to take advantage of enhanced features. The free lesson plans available on this site are from a wide age range including preschool lesson plans, elementary lesson plans, middle school lesson plans, high school lesson plans and college lesson plans. Subjects covered in these free lesson plans can be from any subject, including math lesson plans, english lesson plans, language lesson plans, history lesson plans, social studies lesson plans, art lesson plans, science lesson plans and more.
Open Education News	http://openeducationnews.org	The field of open education is gaining momentum and energy. As additional projects, foundations, universities, and other participants join the movement, the need increases for a single source to gather, sort, analyze, synthesize, and disseminate news related to open education. Open Education News provides you with a daily dose of the most relevant open education news from around the world.
Open Education–Free Education For All	www.openeducation.net	OpenEducation.net is a site dedicated to tracking the changes occurring in education today.
OLCOS, (Open eLearning Content Observatory Services)	www.olcos.org	aims at building an (online) information and observation centre for promoting the concept, production and usage of open educational resources, in particular, open digital educational content (ODEC) in Europe. Presently the benefits and characteristics of open source software in education is apparent and widely acknowledged, this is not the case with respect to the concept of digital open content that may particularly benefit flexible and open learning models (e.g. collaborative knowledge and skills building) in schools, higher educational institutions and vocational training. Contains a useful a set of online tutorials that provide information and guidance on how to practically work with ODEC.

Name	URL	Description
OLNet (Open Learning Network project)	http://olnet.org/node/68	The aim of OLnet is to tackle gathering evidence and methods about how we can research and understand ways to learn in a more open world, particularly linked to Open Educational Resources (OER) but also looking at other influences. We want to gather evidence together but also spot the ideas that people see emerging from the opportunities.

Other OER Sources

Name	URL	Description
Commonwealth of Learning (COL) Course Material	www.col.org/courseMaterials	COL has been involved in the creation of course materials with many of their partners over the years. Most of their material is freely available for download and adaption, but some may carry restrictive licences.
Harvey Project	http://opencourse.org/collaboratories/harveyproject	An international collaboration of educators, researchers, physicians, students, programmers, instructional designers and graphic artists working together to build interactive, dynamic human physiology course materials on the Web. Founded in 1998, the Harvey Project has over a hundred participants in nearly twenty countries. It has received funding from the US National Science Foundation. The Harvey Project has developed over forty learning objects, mostly Java simulations and Flash(tm) animations.
Open of Course	http://open-of-course.org/courses	The focus is on educational information where people can benefit of in daily life. Most of the courses offered here at the moment are related to computers, internet and learning languages. In the future we hope to offer more content on things like getting a job, business, hobbies, earning or saving money, self-improvement, etc. Open-Of-Course is based on Moodle, an open source electronic learning environment (ELO). Our portal is free for everyone to use.

Name	URL	Description
Professional Education Organization International (PEOI)	www.peoi.org	Professional Education Organization International (or PEOI for short) was created, and is run by volunteers who believe that it is time for open post-secondary education be made available to all free of charge, and that the Internet is making this possible. On-line course content to upgrade the skills of aspiring professionals, serving businesses that employ them, universities that award degrees, and faculty that offer instruction.
Uchannel (University Channel)	http://uc.princeton.edu	The UChannel (also known as the University Channel) makes videos of academic lectures and events from all over the world available to the public. It is a place where academics can air their ideas and present research in a full-length, uncut format.
Virtual University for Small States of the Commonwealth (VUSSC) Courses	www.vussc.info	On behalf of Commonwealth Ministers of Education, COL is co-ordinating the development of a Virtual University for Small States of the Commonwealth (VUSSC). Thirty countries are now actively engaged in making the VUSSC a reality. VUSSC countries have chosen to focus on creating skills-related courses in areas such as tourism, entrepreneurship, professional development, disaster management and a range of technical and vocational subjects. In this section, you can get information on various courses, course materials, guidebooks/handbooks, toolkits and other resources open to the Virtual University for Small States of the Commonwealth.
Wikiversity	http://en.wikiversity.org	Wikiversity is a Wikimedia Foundation project devoted to learning resources, learning projects, and research for use in all levels, types, and styles of education from pre-school to university, including professional training and informal learning. They invite teachers, students, and researchers to join them in creating open educational resources and collaborative learning communities.

Appendix Seven: Some OER Policy Issues in Distance Education[30]

Some institutions interested in OER are also interested, or already active, in distance education. There is a natural synergy between the two since distance education requires ongoing investment in the development of learning resources. Using OERs in the development process should help to shorten the time and reduce the costs of development: sharing distance education resources as OERs will help further to open access to quality learning opportunities and will make the differentiating characteristics of distance education institutions the nature and quality of the support services they offer. This should help to improve quality in both the learning resources shared as OERs and also in the distance education provision.

The following framework has been adapted from Lentell[31] (2004: 249-259) and Welch & Reed[32] (Eds) (c.2005) to provide some insight into the possible linkage between distance education and OERs. The table was originally developed to provide feedback to institutions on their existing policy framework.

[30] Sourced, with permission, from OER Africa website: www.oerafrica.org/policy/OERsanddistanceeducationsomepolicyissues/tabid/1091/Default.aspx.

[31] Lentell, H. 2004. Chapter 13: Framing policy for open and distance learning in Perraton, H. & Lentell, H. 2004. *Policy for Open and Distance Learning. World review of distance education and open learning: Volume 4*. London: RoutledgeFalmer/COL. 249-259

[32] Welch, T. & Reed, Y. c2005. *Designing and Delivering Distance Education: Quality Criteria and Case Studies from South Africa. Johannesburg: Nadeosa.*

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Identifying target audience	• Educational purpose of the programme • Demography of student population (e.g. age range, gender, employment) • Motivation for learning (e.g. vocational, academic) • Existing knowledge and/or skills of target students (e.g. can study skills be assumed?) • Curriculum needs (e.g. is it defined by an examination or a professional body, academic knowledge, vocational skills?) • Market research	• The sharing of research and templates could facilitate the process of building and then using student profiles at participating institutions.
Type of DE system	• Campus based, organization based, individual based • Self-paced or programme based • Open access • Single, dual-mode, partnership service provider	• The sharing of research, guidelines, process documents and quality criteria can help an institution make informed decisions about which model(s) of DE will be most appropriate to its needs.
Choosing the appropriate technology for distribution and materials and for interaction with students	• Print, audio/visual, web-based or a mix • Access implications of choice • Training implications of choice • Cost – including maintenance and sustainability	• Open licences for materials will facilitate cost-effective production and distribution of materials. • Access to course materials from other members of the community of practice can be an effective, rapid strategy to secure materials for courses where no materials exist. • This might allow use of media that would not have been affordable if an institution needed to develop everything itself.

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Business planning and costing	• Philosophy and objectives • Capital and recurrent costs • planning • implementation • maintenance and updating • fixed and variable • Self-financing or subsidised? • Courses portfolio (e.g. length of study) • Course development and production process (e.g. team, individual contract) • Course delivery • Enrolment • Tutorial system • Materials dispatch • Assessment • Record keeping • Marketing • Funding	• Clear policy indications are needed that materials development is considered important by the institution and that there is commitment to investing in it. • Policy positions are essential to ensure high quality of materials and effective collaboration and this is indicated by allocation of appropriate resources including staff time. • May be necessary to include specific references to collaborative activities to ensure that funds are set aside to cover the time of academic staff from the institution to participate in such collaborative activities. • Sharing of course materials with members of the community of practice may reduce requirements to pay sub-contracting fees for materials development, as it may open access to already developed course materials in key areas of need. • Participation in materials development/OER collaborations could generate consultancy funds, providing an alternative income stream to the institution and its staff and financial returns on capital investment.

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Human resource strategy	• Staff complement • Staff development • Staff workload • HR systems	• Most academic staff will be discipline experts rather than materials developers – the wider OER community may be able to help with the development of skills related to materials development. • Staff awareness processes should include awareness about changing intellectual property parameters introduced by growth of ICT, and accompanying introduction to open licences like the Creative Commons. • Consideration might be given to the notion that staff participating in collaborative activities and materials development exercises that are over and above their normal workload can receive remuneration for their time spent – however, in the long term if DE provision accelerates – job descriptions will need to be adapted so that time is allocated to programme development, course design and materials production as a core activity.

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Programme development, course design and materials production	• Buy, make or adapt • Media choice and/or mix • Instructional design • Developmental testing • Production • Delivery • Updating • Storage	• Facilitated by use and adaptation of OER. • Facilitated by systematic analysis of current copyright status of existing materials, and efforts to ensure that all materials can be freely updated and revised without securing additional permissions. • Existing OERs available on the Internet and materials available from other members of the community of practice can support review processes and cost-effective updating of courses. • Establishment of licensing frameworks relevant to digitized materials (e.g. Creative Commons) will be essential to protect rights of the institution. • Essential to define terms of use of all materials within a digital library, which will be facilitated by systematic materials audit and establishment of systems to manage the institution's knowledge base. • Shared course materials and OERs can be used to increase the number of available materials in digital library without significant additional cost. • Collaboration with other members of the community of practice will facilitate such access, as will ongoing integration of the institution into emerging global OER networks.

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Tutoring and supporting students	• Tutor role and tasks • Tutor skills • Recruiting tutors • Induction and training tutors • Monitoring tutors • Marking and feedback • Face-to-face, telephone, online tutoring • Student counselling • Student guides and providing information to students	• The sharing of research, guidelines, process documents and quality criteria can help the institution make informed decisions about suitable models for tutoring and supporting its DE/off-campus students.
Recruiting and enrolling students	• Making course information available • Marketing • Diagnostic testing of potential students • Briefing students about ODL • Enrolment • Fee payment systems	• The sharing of research, guidelines, process documents and quality criteria can help the institution make informed decisions about suitable models for recruiting and enrolling DE students.
Assessing students	• Methods to be used (e.g. exams, projects, thesis and portfolio) • Summative or formative • Methods of submission and giving feedback (e.g. online or by paper correspondence) • Recording marks and student progress	• The sharing of research, guidelines, process documents and quality criteria can help the institution make informed decisions about suitable models for assessing DE students.

Policy Area	Policy Issues/Objectives	Relevance to collaboration and/or OER
Managing and administering the DE system	• Operational issues, e.g.: • Finance • Student recruitment • Enquiries processing • Enrolment • Materials development • Materials manufacture • Tuition and support • Assessment • Technology • Governance and management structures	• The sharing of research, guidelines, process documents and quality criteria can help the institution make informed decisions about suitable models for managing and administering its DE system.
Collaborative relationships	• Programme development, course design and materials production • Associations • Sub-contractors • Work integrated learning • Consortia	• The sharing of research, guidelines, process documents and quality criteria can help the institution make informed decisions about suitable models for managing collaborative arrangements.
Monitoring evaluation and quality assurance	• Who is the evaluation for? (e.g. politicians, managers, educational staff) • The level of monitoring (e.g. system level, course/programme level, individual tutor or individual student) • Capability to act on findings of evaluation, monitoring and quality assurance • Quality assurance systems	• Completing a systematic audit of materials and their licences will create a clear legal framework to guide staff and students • Maintaining proper licences that facilitate use and adaptation of materials further supports this • The sharing of research, guidelines, process documents and quality criteria can help institutions make informed decisions about suitable models for managing a quality assurance system in a DE context.

Appendix Eight: OER Policy Review Process[33]

In evaluating the policy framework of an institution, the following steps may be useful.

1. **Explain the purpose of the policy review.**
2. **Collect information about the mission, strategic plans, teaching and learning, human resource and ICT policies and procedures.**
3. **Establish the context and indicate whether the vision, mission and strategic planning are collaboration and OER 'friendly'.**
4. **Identify challenges and opportunities.**

For example:

Challenge	Relevance to Collaboration and/or OER
Curriculum/Course Materials Challenges	
• The panel found that in some departments, the curriculum had not been reviewed for many years. (2b)–Visitation Report, Executive Summary) • Concerning graduate study, the Panel recommends: an urgent review of graduate programmes by departments for relevance and breadth of courses... (2d)–ibid) • ... Library... collection of books... is inadequate... (Council Statement, Infrastructure and Resources, (viii)	• Development of new courses can be accelerated through collaborative processes, sharing of course materials, and harnessing of existing OER – an objective of Health OER; • Systematic auditing and re-licensing of materials can serve as vehicle to monitor relevance of curricula and study materials; • Existing OER libraries can be made available locally and updated regularly without incurring licensing/acquisition costs.

[33]Sourced, with permission, from OER Africa website: www.oerafrica.org/policy

Challenge	Relevance to Collaboration and/or OER
• Blurred inter-faculty & inter-departmental linkages with duplication of activities (CSP, p.13) • Inadequate and uncoordinated information & communication technology characterised by low access and utilization (CSP, p.13) • Inability to admit all qualified applicants (CSP, p.13) • Inadequate funding for research partly attributable to poor marketing of research projects and weak proposal writing skills (CSP, p.14)	• Policy review provides opportunity to be responsive to Mission – promote innovation, relevant and cutting edge technology – by taking cognisance of the changing realities of IP management in a digital age. • The creation of institution-wide policies around OER provides an excellent opportunity to introduce new systems for more effective management of institutional resources (human & material) as well as its IP.
Human Resources & Curriculum/Course Materials Challenges	
• Aging faculty, high faculty turnover and the absence of mentoring combine to indicated a crisis in Human Resource Supply which could lead to lowering of output quality ... (CSP, p.18) • Poor work ethic among some teaching staff coupled with a weak mentoring and supervision system (CSP, p.14)	• Staff succession planning demands effective management of intellectual capital – • Open licensing frameworks provide simple mechanisms to ensure that, in the long term, institutions have effective access to the products of academic staff's intellectual capital. • Imposing a discipline of licensing all materials under an open framework will ensure that knowledge products are stored and tagged on an ongoing basis, thus helping to deal more effectively with staff turnover and induction of new staff.

Challenge	Relevance to Collaboration and/or OER
• Lack of formal training in teaching and poor teaching aids / laboratory equipment (CSP, p.14) • Weak recognition and reward systems ... (CSP, p.14) • In adequate funding for research partly attributable to poor marketing of research projects and weak proposal writing skills (CSP, p.14) • Need to "Do more with less" by rethinking assumptions about delivery systems, curriculum, organizational structures and personnel. (CSP, p.6)	• Process of adapting OER can be used to build capacity in creation / development and the use of educational materials, i.e. Instructional design. • Access to high quality materials packages and supplementary materials of multiple media is essential to alleviate workload pressure on overstretched academics. • Investment into faculty by the university is critical – OER is not a panacea to structural under-funding.

5. Identify key policy positions

For example:

Having analysed some key challenges relevant to OER and collaboration in materials development, it is now possible to explore key policy positions and objectives, in order to assess their relevance. This is presented below:

Policy Position/Objective	Relevance to Collaboration and/or OER
Curriculum/Course Materials Positions/Objectives	
• 8.6. A digital library – accessible over the Internet, operational by June, 2009 [Rolling Strategic Plan, p. 83]	• Essential to define terms of use of all materials within a digital library, which will be facilitated by systematic materials audit and establishment of systems to manage the institution's knowledge base. • Shared course materials and OERs can be used to increase number of available materials in digital library without significant additional cost.

Policy Position/Objective	Relevance to Collaboration and/or OER
• 13.7. Study materials regularly digitized [Rolling Strategic Plan, p. 84] • Digitize all the study materials and make CDs [Rolling Strategic Plan, p. 64]	• Establishment of licensing frameworks relevant to digitized materials (e.g. Creative commons) will be essential to protect rights of the institution.
Financial/Human Resource Policy Positions/Objectives	
• Pay writers and reviewers of study materials adequately and promptly based on guaranteed budget from Government and student fees [Rolling Strategic Plan, p. 60] • Reduce time for developing study materials by contracting full and part-time academic staff [Rolling Strategic Plan, p. 60] • In distance education institutions, the major activities of full time academic staff members are to develop new programmes and review the existing programmes, to develop and review instructional materials, to moderate the work done by part-time academic staff and tutors, as well as researching and consultancy [Formula for Evaluation of Workload, p. 3 – emphasis added] • Definition of teaching for purposes of calculating workload includes: • Supplementing existing study materials (Once annually – 4 hours per lecture allocated). • Writing scripts for radio broadcasting and other ICT media (where applicable – 6 hours per script allocated). [Formula for Evaluation of Workload, p. 4]	• Clear policy indications that materials development is considered important by the institution and that there is commitment to investing in it. • Policy positions are essential to ensure high quality of materials and effective collaboration. • May be necessary to include specific references to collaborative activities to ensure that funds are set aside to cover the time of academic staff from the institution participating in such collaborative activities. • Sharing of course materials with ACDE members may reduce requirements to pay sub-contracting fees for materials development, as it may open access to already developed course materials in key areas of need.

Policy Position/Objective	Relevance to Collaboration and/or OER
• University consultancy is work carried out by members of staff acting as employees of the institution. The work carried out may be additional to normal duties for which additional payment over and above the normal salary may be made/or may be part of normal duties for which no additional payment is made. [Consultancy Services Policy, p. 2] • Enabling staff whose expertise has a commercial value to benefit financially as well as professionally from their external work. This way, the institution will also sustain its operations through increased income generation. [Consultancy Services Policy, p. 3] • University consultancy shall be contracted through the proposed institutional –Consultancy Bureau (CB) and will be given a formal registration number. [Consultancy Services Policy, p. 5] • As a rule, the institution will retain 20% of the net revenue for University Consultancy after deduction of the related declared and approved direct costs. [Consultancy Services Policy, p. 8]	• Participation in materials development/OER collaborations could generate consultancy funds, providing an alternative income stream to the university and its staff and financial returns on capital investment. • Consultancy policy provides clear frameworks to ensure that staff participating in collaborative activities and materials development exercises that are over and above their normal workload can receive remuneration for their time spent.

Policy Position/Objective	Relevance to Collaboration and/or OER
Intellectual Property Issues	
• Development of a structured system that forestalls practices of plagiarism, infringement of copyrights and other forms of cheating among staff and students. [Quality Assurance and Control Policy, p. 22] • Copyright: Students are not allowed to copy and paste text, images or graphics from websites that are protected by copyright, without 'proper acknowledgment' or permission of the owner of the intellectual property [ICT Guidelines for Students]. • Students should comply with legal and University restrictions regarding plagiarism and the citation of information resources [ICT Guidelines for Students].	• Completing a systematic audit of materials and their licences will create a clear legal framework to guide staff and students. • Maintaining proper licences that facilitate use and adaptation of materials further supports this.

6. Identify issues for consideration

For example:

Some key issues for consideration emerge from the above review. These are as follows:

1. A policy is clearly required to govern materials development. It will be useful to ensure that it takes account of the above analysis to create a policy environment supportive of collaboration and sharing and to ensure rigour in the management of the university's intellectual property. Some additional observations are worth noting to feed into development of that policy:
    a. The Human Resource Management policy must include references to copyright or intellectual property.
    b. Workshop feedback suggests that materials development does not explicitly count when considering job re-categorization and promotion, performance-based incentives, and letters of recommendation and this may need attention. It would be useful if performance appraisal could include contributions of OERs.

c. It is unclear whether or not job descriptions/employment contracts take account of the need to transfer copyright to the institution.

2. It will be important to include open licences (such as the Creative Commons framework) when organizing and executing training of staff and course writers on copyright issues and plagiarism. This will serve to deepen knowledge of the options available to manage intellectual property effectively.
3. It will be useful for the institution to begin its commitment to sharing resources with others on a limited basis in order to test the potential and explore the policy implications through action research.

Appendix Nine: Skills Requirements for Work in Open Educational Resources

Below is a list of the core skills that institutions will need to develop in order to make most effective use of Open Educational Resources to improve the quality and cost-effectiveness of OER:

Expertise in advocacy and promotion of OER as a vehicle for improving the quality of learning and teaching in education (having a good grasp of both conceptual and practical issues, policy implications, and so on). This requires:

- Passion about the concept of openness, without which any attempts at advocacy are unlikely to succeed;
- Ability to engage audiences effectively during presentations;
- Understanding of the pros and cons of different open licensing arrangements, combined with insight into how most current policy environments constrain use of OER and open licensing of intellectual capital (with a particular focus on the challenges of persuading educational decision-makers in environments where Intellectual Property policies make no provision for open licensing);
- Clarity on the economic benefits of OER, both in terms of marketing institutions, programmes, and individuals and in cost-effectiveness of materials production;
- Sound knowledge of practical examples of use of OER to illustrate key points;
- Up-to-date knowledge of the arguments for and against use of OER;
- Capacity to engage in argument and respond to the questions that people will inevitably pose given the extent to which OER challenges many entrenched conceptual frameworks.

Legal expertise to be able to:

- Advise people on licensing of materials;
- Review current copyright and intellectual property rights (IPR) regimes;
- Develop and adapt copyright and IPR policies;

- Determine requirements for copyright clearance to release materials under Creative Commons licences;
- Negotiate rights to use materials under Creative Commons licences;
- Reflect copyright statements accurately in materials of different kinds and multiple media.

Expertise in developing and explaining business models that justify, to institutions, individual educators, and other creators of educational content (including publishers), the use of open licensing and that illustrate the benefits.

Programme, course, and materials design and development expertise, with a particular focus on helping educators to harness the full potential of resource-based learning in their programmes and courses. This requires a thorough understanding of education (pedagogy; being able to differentiate between open, distance, electronic and blended learning – and their respective merits, etc), as well as the context of education, tailored to the specific sector in which work is taking place. In addition, it requires skills in:

- Conducting educational needs assessments;
- Managing curriculum development processes;
- Effective identification of target audiences;
- Definition of effective and relevant learning outcomes;
- Identification of relevant content areas for programmes, courses, and modules;
- Selection of appropriate combinations of teaching and learning strategies to achieve identified learning outcomes;
- Financial planning to ensure affordability and long-term sustainability of teaching and learning strategies selected;
- Developing effective and engaging teaching and learning materials;
- Integrating meaningful student support into materials during design;
- Designing appropriate effective assessment strategies;
- Applying the most appropriate media and technologies to support learning outcomes;
- Using media and technologies to support educational delivery, interaction, and student support;
- Sourcing OERs, including a knowledge of the strengths and features of the main repositories, specialized repositories, and OER search engines;
- Adapting and integrating OER coherently into contextualized programme and course curricula;
- Negotiating with external individuals /organizations to issue or re-issue resources under open licences;

- Re-versioning existing resources using optical character recognition where they do not exist in digital form;
- Implementing the necessary processes for producing print-on-demand texts.

Technical expertise. This set of skills is tightly connected to the skills of materials design and development. Increasingly, resource-based learning strategies are harnessing a wide range of media and deployed in e-learning environments, facilitated by the ready availability of digitized, openly licensed educational content. This requires skills in:

- Advising institutions on the pros and cons of establishing their own repositories, as well as advice on other possible ways of sharing their OER;
- Creating stable, operational Virtual Learning Environments (VLEs) and content repositories;
- Supporting educators to develop courses within already operational or newly deployed VLEs;
- Developing computer-based multimedia and video materials.

Expertise in managing networks/consortia of people and institutions to work cooperatively on various teaching and learning improvement projects (including an ability to adapt to challenging environments – for example, power outages, physical discomfort, difficult personalities, institutional politics – and remain focused on the task at hand).

Monitoring and evaluation expertise to design and conduct formative evaluation processes, as well as longer-term summative evaluation and/or impact assessment activities that determine the extent to which use of open licensing has led to improvements in quality of teaching and learning, greater productivity, enhanced cost-effectiveness, and so on.

Expertise in curating and sharing OER effectively. This includes:

- Technical skills to develop and maintain web platforms to host OER online, as well as to share the content and meta-data with other web platforms;
- Ability to generate relevant and meaningful meta-data for OER;
- Knowledge of and the skills to deploy standardized global taxonomies for describing resources in different disciplines and domains;
- Website design and management skills to create online environments in which content can be easily discovered and downloaded.

Communication and research skills to be able to share information about OER, in the form of web updates, newsletters, brochures, case studies, research reports, and so on. This will include the full spectrum of skills required for such communication activities, from researching and documenting best practices, core concepts to graphic design and layout expertise.

This Guide comprises three sections. The first – a summary of the key issues – is presented in the form of a set of 'Frequently Asked Questions'. Its purpose is to provide readers with a quick and user-friendly introduction to Open Educational Resources (OER) and some of the key issues to think about when exploring how to use OER most effectively.

The second section is a more comprehensive analysis of these issues, presented in the form of a traditional research paper. For those who have a deeper interest in OER, this section will assist with making the case for OER more substantively.

The third section is a set of appendices, containing more detailed information about specific areas of relevance to OER. These are aimed at people who are looking for substantive information regarding a specific area of interest.

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