

## Issues in OER

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Open Educational Resources (OER) are becoming increasingly popular in educational institutions. OER include all educational resources, normally digital in nature such as learning objects, open courseware, etc. that can be freely accessed (with no cost to users) via the Internet with minimal or no restrictions.

UNESCO (2002, Paragraph 3) has defined OER as the  
*“... technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes.”*

OER are normally accessed freely using the World Wide Web either on institutional sites or in organizational repositories. Course developers, teachers and instructors are principal users of OER, but there is a growing number of students who are accessing them directly to augment their learning. OER include learning objects such as modularized lessons, video and audio lectures (podcasts), references, workbooks and textbooks, multimedia simulations, experiments and demonstrations, as well as syllabi, curricula and lesson plans.

This chapter begins with Terry Anderson’s views on how OER fit within the wider context of open scholarship and the new economics. Don Olcott follows up with a theoretical framework on OER categorization and standardization. Carina Bossu then surveys the OER scene in Australia and posits the need for policy development in relation to OER. This is followed by two papers on OER design, the first by Grainne Conole argues that a lack of design skills is a key barrier to the lack of uptake in the use of OER. Rory McGreal finishes by making several practical recommendations for OER designers.

### **OER within the wider context of Open Scholarship**

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OER are perhaps the most visible manifestation of a wider social movement towards open scholarship in the 21<sup>st</sup> century. Scholarship has traditionally been associated with openness in the sense that scholars have always built upon the ideas and work of those who have gone before them, or as Isaac Newton famously noted in 1676 that “If I have seen further it is only by standing on the shoulders of giants”.

However, post-modern times have witnessed the development of a counter force associated with the increasing value and potential for economic gain from intellectual capital and the capacity to turn ideas, discoveries, patents and formula into personal and corporate gain. This has resulted from two primary drivers. The first, being the



effective harnessing of machines that translates ideas into physical objects and tools to create actions in the real world. In past eras, good ideas could be implemented only with massive amounts of human labour, - now machines are harnessed to manifest these ideas. Secondly, consumerism and the accumulation of personal and collective products have replaced religion in most post-industrial societies as the driving force in individual and collective lives. Thus Stenger (2009), argues that "in general the more wealthy a nation the less likely it is to be religious" (Stenger, p.16). Consumerism requires that ideas be turned into products and these products must be promoted and adopted by millions- both tasks requiring extensive use of knowledge generation and dissemination techniques.

Despite the lofty championing of openness by traditional scholars, the move towards commercialization, with associated secret and proprietary use of new discoveries, has been a defining feature of scholarship and the institutions that employ scholars (Bok, 2003). Now openness has been politicized and a battle between those arguing to continue and indeed expand openness has been joined by those intent on deriving personal and institutional wealth creation from scholarship.

Open scholarship's oldest practice has been in the dissemination of results in peer-reviewed publications. Scholars have for generations freely disseminated the results of their work in monographs and articles, for which they have benefitted from reputation enhancement and promotion within their educational institutions, but rarely for personal financial gain. In older times, printed text was the only means for this dissemination and results were distributed largely for the cost of production and distribution of the text through the annals of scientific and professional journals. In more recent times, publishing of such journals has become a profitable business with the emergence of many commercial publishing houses undertaking this task for commercial gain. Even as the cost of printing and distribution has decreased through electronic dissemination, commercial publishers retain a stranglehold on many journals, and as a result, fees for access to these online works as individual articles, issues or data bases of aggregated publications has continued to increase. The cost of journals has now rendered this work inaccessible to scholars in developing nations and to those not associated with universities and their library's acquisition budgets.

In response to these restrictions, open scholars are increasingly moving their work to either open access journals or "freeing" their work through payments to commercial publishers. Currently (Oct 2010) the Directory of Open Access Journals (doaj.org) lists 5,514 journals from all disciplines that have managed to find the means to disseminate scholarly works without imposing charges on readers. The development of business models based on society fees, advertising, patron or individual sponsorship coupled with voluntary work is evolving to meet the very real, though greatly reduced costs associated with online production and dissemination of open content. Although there are differences across disciplines, studies are beginning to show that open access results in faster, more extensive citations for open publications as compared to works published in closed or proprietary journals (Anderson & McConkey, 2009; Craig, Plume, McVeigh, Pringle & Amin, 2007; Eysenbach, 2006; Norris, Oppenheim & Rowland, 2008; Zawacki-Richter, Anderson & Tuncay, 2010).



Beyond journal articles we are also seeing the emergence of open access monographs. Athabasca University Press, bills itself as Canada's first open access press and has, in its first three years, published 44 books (five of which focus on distance education) and all of which are made available for electronic download at no cost to consumers. Thus, we see increasing access to open publications as a promising development.

#### *Open scholarship and produsage*

Alex Bruns (2008) coined the term produsage to define a new type of production of content and products where the consumers are also the producers of the product. The open source software industry is the most developed manifestation of produsage, but we also see produsage at work in the production and maintenance of wiki resources such as Wikipedia and of course open educational resources. Consortia such as the California Open Source Textbook Project ([www.opensourcetext.org](http://www.opensourcetext.org)) and open textbook publishers such as Flat World Knowledge ([www.flatworldknowledge.com](http://www.flatworldknowledge.com)) are making student textbooks freely available in print form, but creating markets, at cost, for enhanced work such as print or audio copies of the work. As importantly, Flat World encourages educators to select sub sections and modify works of other authors – practices usually prohibited by restrictive copyright regulation.

Produsage and open access publishing could not have happened without the very significant contribution of the Creative Commons organization. Creative Commons licensing allows scholars to retain copyright and usually important attribution rights, while licensing free use and re use. Restrictive and excessive copyright legislation has developed in the last century as a major impediment to open scholarship but the development of legally enforceable Creative Commons licensing provides a means to mitigate the unscholarly and closed ramifications of this commercialization.

#### *Open scholarship and open education*

Open education provision or the capacity to take courses and earn credits without tuition is the most recent development in open scholarship. The world's first tuition free university, the University of the People <<http://www.uopeople.org/>> now offers three degree programs (Business, Computer Science and General Studies) based upon a business model that includes volunteer work, peer learning, altruism and charges for taking examinations.

A second open model known as Massive Open Online Courses (MOOCs) is being developed by individual faculty members (Fini, 2009) usually based on connectivist pedagogies (Siemens, 2005) and operating in networked as opposed to group models of learning (Dron & Anderson, 2007). MOOC network models (students develop, share and consume educational resources within a context of large networks as opposed to closed cohort groups) not only provide scalable and low cost learning, but they also produce an useful legacy as the persistence of an archive of contributions from previous classes serves as resource for future iterations of the class.

#### *Open Science*

The mission of Open Science “is to make clear accounts of the methodology, along with data and results freely available via the Internet” (Wikipedia, Oct 2010). Too often data sets, detailed methodologies followed and the results of work- especially when results do not confirm expected hypothesis, are hidden from the public eye-



resulting in much unnecessary duplication of scientific effort. Thus, the support for a variety of open data projects. (see for example the Open Science project [www.openscience.org](http://www.openscience.org) and the Open Students network <http://www.openstudents.org/>). There is increasing evidence of the value of students participating in, instead of watching and summarizing the work of others (Pascarella & Terenzini, 2005). Open science projects aim to make this process easier and more accessible by not only disseminating the results of student work, but also by making the process by which science is conducted more visible to learners.

### Conclusion

Popular writers such as Chris Anderson (2009) *Free: The History of a Radical Price* and Thomas Friedman (2005) *The World is Flat* argue that the reduction of costs associated with electronic distribution and very low cost of collaboration is rapidly changing the economics of all forms of production. OER are one manifestation of these new economics in educational contexts.

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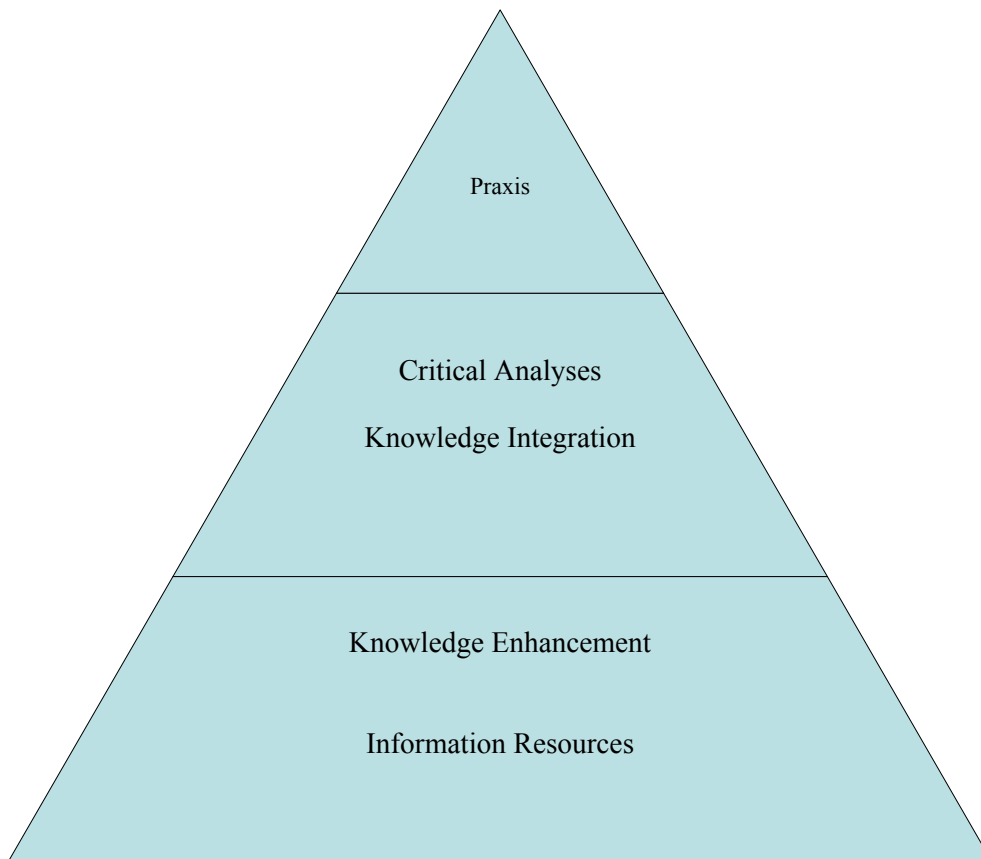
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### **A Theoretical framework for the categorization and standardization of OER**

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During the last decade the emergence of Open Learning Resources (OER) has become a rapidly growing source of content and resource materials for informal and formal learning applications. Moreover, the potential of these resources to ‘open doors’ to educational access in developing nations has also driven the growing potential of OER. Conversely, educators face many challenges primarily because OER are in their infancy in public schools and colleges and universities and issues relative to definition, quality, application towards credentials, content currency, and assessment will require some level of consensus and standardization. More specifically, developing a typology that aligns OER with basic levels of learning will become increasingly important. The following diagram (Figure 1) provides a very basic hierarchical arrangement of how OER might be categorized to address specific types and levels of information and knowledge integration.





**Figure 1. Learning task application of OER**

There have been diverse constructs developed for defining and identifying quality issues associated with OER (MERLOT, Open Learn, etc.). These initiatives are critical aspects of developing a major typology for OER. Figure 1, however, is predicated on aligning OER with specific levels of learning tasks. The left axis of Figure 1 progresses upward hierarchically and represents the level or difficulty of learning tasks that OER would address. The right axis of Figure 1 reflects informal to formal learning tasks to be addressed by specific OER.

*'Information is not synonymous with Knowledge'*

The categorization schema in Figure 1 thus would progress from lower level learning and informal uses of OER to more complex learning tasks that are more formal as the hierarchical relationship progresses.

Category I Information Supplements and Knowledge Enhancements – Informal learning tasks

*Samples: Wiki references, google searches, and elementary learning objects*

Category 2 Knowledge Synthesis and Critical Analyses- Quasi Formal learning Tasks



*Samples: Formal lessons, modules, case studies, theoretical constructs requiring critical analyses from theoretical and practical applications, context*

Category 3 Praxis – Cognitive Adaptation

*Samples: Formal courses inclusive of theoretical constructs, synthesis of major knowledge constructs, critical analyses and assessment, practical applications, adapting learning and knowledge to different cultural and social contexts, and relating new learning to existing knowledge and constructs (Cognitive Adaptation – Piaget) through continual re-assessment and analyses (Praxis) – Brookfield, Knowles).*

Henry L. Mencken once wrote ‘For every complex question there is a simple answer . . . and it’s wrong.’ The analogy from this is that OER are complex from a definition, application, and qualitative perspective. Figure 1 is a first step in defining OER based upon their use to achieve higher levels of formal learning.

Within each of the categories outlined in Figure 1, each category becomes increasingly complex given that the progressions of higher learning tasks must address qualitative indicators such as rigor, types of OER, cultural context of OER learning goals, number of learners using a specific OER, and the assessment parameters of the composite OER (content, peer review, level of learning, user input, content updates, and independent assessments)[.

In summary, a theoretical framework for categorizing OER would be based upon:

- 1) Level of learning task based upon complexity and informal-formal learning level;
- 2) Type of OER aligned with learning task;
- 3) Quality indicators for each OER learning category; and
- 4) Assessment parameters

Why is a theoretical framework important at this stage of OER development and adoption? There are several reasons. First, without a framework to categorize OER there will be a tendency for these to defined locally making benchmarking or standardization of quality OER across institutions and the field inherently more difficult.

Secondly, a framework begins the process of creating a composite index of OER that will be critical for defining formal OER that will be applied towards various credentials (e. g., modules, lessons, courses, etc.). In other words, higher level OER based upon quality, learning level, and peer acceptance and review can be assessed for academic credit which in turn are applicable towards credentialed certificates and degrees.

Thirdly, the global application and adoption of OER will have to address the cultural, linguistic, and social context of the learning environment and its learners. OER that may be effective in English speaking educational systems may be compromised and



less effective with learners in developing countries whose first language is not English.

Fourthly, the potential use of OER in public education (K-12) at the elementary and secondary levels will require university Colleges of Education to educate existing and new teachers on the available OER resources. Without a framework for OER, systematic approaches to training tomorrow's teachers (and librarians) will be virtually impossible. Equally important will be training resource specialists, assessment experts, instructional designers, and librarians at the postsecondary level to facilitate the effective use of OER by faculty and students.

### **The need for institutional and national policy development for OER in Australia**

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#### *Setting the scene*

In Australia, there have already been some developments in OER. One example is Macquarie University, with the Macquarie E-Learning Centre of Excellence (MELCOE) in Sydney, which was singled out for special mention in the 2007 OECD report surveying worldwide OER initiatives. The authors of the report noted that MELCOE specialises in developing open source software tools and open standards for e-learning (OECD, 2007). Although MELCOE has had some limited success in this area, Macquarie remains on the margins of the OER movement (Suzor, 2006). USQ, one of the DEHub university partners, also has a clear OER strategy in place. USQ remains the only Australian member of the OpenCourseWare (OCW) Consortium, which it joined in 2007. At present, the USQ OCW site offers sample courses from each of the institution's five faculties and also courses from its Tertiary Preparation Program. USQ is currently exploring the means by which it can expand the number of courses available on its OCW site and structure these in such a way that students will be able to formally undertake assessment for these courses and then claim exemptions if they later choose to enrol in a full undergraduate award program.

The Queensland University of Technology (QUT) has developed the Australian jurisdiction-specific licenses from the generic Creative Commons licenses (Fitzgerald, 2009). Creative Commons is a non-profit corporation dedicated to making it easier for people to share and build upon the work of others, consistent with the rules of copyright (OECD, 2007). There have been also some signs of changing attitudes amongst other universities. Seven Australian universities (ANU, Griffith, Swinburne, Melbourne, RMIT, UNSW, UWA and Victoria) have released teaching materials through iTunes U. Most of this material consists of podcasts available only to students and staff of the institution. However, individual universities (such as Victoria University) have opted to release their iTunes U podcasts into the public domain. Interest in OER is also growing in the Vocational Education and Training (VET) and school sectors (Browne, 2009). In fact, there have been several innovative activities in Australia in order to make learning resources shareable in education such as the AShareNet licensing, and LORN from the Australian Flexible Learning Framework, the Australian National Data Service (ANDS), amongst others. However, most of the





institutional policy issues related to licencing, copyright, intellectual property and so forth remain unsolved.

### *Current Challenges*

Even though, there have been some important initiatives regarding OER in Australia, it appears that the use and adoption of OER to their full potential is a long way off. One of the reasons for this might be due to the lack of a national framework to guide and assist educational institutions in the adoption, use and management of OER. In fact some believe that the lack of such a framework might limit and slow down the process of adoption or even prevent universities from pursuing future ventures to better support current students, attract new ones and compete against other Australian and international institutions (Fitzgerald, 2009). In addition, there has been no known funded project seeking to investigate and develop guiding principles to inform the sector's decision-making in this area. Elsewhere, OER represent an emergent movement and are already re-shaping learning and teaching in higher education. This has also been predicted in the last Horizon Report (2010), which highlighted that *OER are likely to reach the shores of institutions worldwide in less than a year*. The growth of the open educational trend "is a response to the rising costs of education, the desire for accessing learning in areas where such access is difficult, and an expression of student choice about when and how to learn" (Johnson, Levine, Smith, & Stone, 2010, p. 6). Thus, the OER trend has the potential to assist Australian educational institutions to overcome other issues such as meet current students' needs for non-formal, informal and formal education, encourage the enhancement of learning communities and to promote social inclusion by reaching those who cannot access formal tertiary education. Lack of understanding and awareness about OER can represent additional challenges for the sector.

### *Benefits of OER Initiatives*

In Australia, a greater adoption of OER will enable educational institutions to reach socially excluded groups, who have previously had limited access to alternative pathways to higher education, but have increasing access to technologies, particularly the Internet and mobile devices, which can facilitate access to a wider range of content at little or no cost for the learner. Learners will be able to create and form their own learning communities organised around content. Thus, OER are an innovative possibility for enhancing learning and teaching across educational institutions in Australia for diverse student cohorts. Below are some of the reasons why higher education institutions worldwide are interested in making their educational content freely available to learners. Such reasons could also be also transferable to the Australian universities context:

*They are in the line with academic traditions of sharing knowledge and a good thing to do.*

*They have the potential to bridge the gap between non-formal, informal and formal education.*

*They enable institutions to give something back to taxpayers by allowing free sharing and reuse of resources.*

*Quality can be improved and the cost of content development reduced by sharing and re-using.*

*It is good for the institution's public relations to have an OER project as a showcase for attracting new students;*

*There is a need to look for new cost recovery models as institutions experience growing competition; and*



*Open sharing will speed up the development of new learning resources, stimulate internal improvement, innovation and reuse and help the institution to keep good records of materials and their internal and external use (OECD, 2007, p. 11).*

Development and research on OER will provide the Australian higher education sector with resources, examples, alternatives and solutions for overcoming institutional barriers to facilitate the adoption, use and management of OER.

### *OER Research Project*

In an attempt to identify additional gaps and assist Australian higher educational institutions to overcome current challenges in the adoption and use of OER, a research proposal was put forward. Today, with the financial assistance of the Australian Teaching and Learning Council (ALTC) Competitive Grant Program, the project titled “*Adoption, use and management of Open Educational Resources*” will seek to fill these gaps. In addition, this project will also address the ambiguous nature of OER for learning and teaching within educational institutions, policy development and sustainability of OER within the Australian context. Three partner universities have joined the project. They will collectively identify issues, barriers, opportunities and successes to inform how the Australian higher education sector might respond to the OER movement. The partners are the University of New England (UNE), Massey University (MU, NZ) and the University of Southern Queensland (USQ). With UNE’s expertise in delivering quality distance education for decades, MU’s excellence and innovation in teaching, learning and research and USQ’s groundwork in OER (it remains the only Australian member of the OpenCourseWare (OCW) Consortium), this project has the potential to make significant contributions to the higher education sector in Australia.

The project will have two stages. Briefly, Stage One involves a comprehensive analysis of the state of OER internationally and nationally. This will be done in the first instance through an appraisal of the international drivers. A survey of Australian higher education institutions will be undertaken to ascertain the extent of development, use and management of OER. In Stage Two, the findings of Stage One will provide the basis of a National Symposium, for both gathering more information and feedback, but also as a key dissemination point. This symposium will include members of the reference group and representatives from Australian universities will be encouraged to attend. The participants will provide feedback on the findings of the survey along with discussion and sharing of practice. The final outcome will be the development of a protocol for conducting a feasibility study in any Australian higher education institution to consider how the adoption, management and use of OER might bridge the gap between non-formal, informal and formal learning.

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## **Rethinking the design and use of Open Educational Resources**

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As with technological artefacts more generally, OER offer huge potential for learning and teaching, however despite the fact that there are now significant OER repositories available their update and use in education has been sparse. Research on the use of OER from OpenLearn <<http://openlearn.open.ac.uk>> gives a rich picture of the patterns of user behaviour with resources available via OpenLearn. It shows that teachers are reluctant to deconstruct what they see as quality resources. Furthermore, although there is evidence of OER being used, they are not being reused to any significant extent. This gap between the potential of OER and their actual use is mirrored with other technological artefacts and the reasons are complex and multifaceted. We have developed a Learning Design methodology which aims to guide teachers and learners through the process of rethinking the design of learning resources and activities. A full description of the methodology and the tools and resources we have developed is available (Conole, 2010).

Therefore this positional paper argues that a lack of design skills is a key barrier to the lack of uptake in the use of OER. Teachers and learners need guidance to help them rethink the design process. Conole, McAndrew and Demitriadis (2010) argue that making the design associated with OER explicit helps users think about how they can be deconstructed and used in different contexts. In particular we have developed a range of visual representations to highlight different aspects of design that have augmented the use of collaborative pedagogical patterns developed by Demitriadis and his research team at the University of Valladolid (See Hernández 2005; 2010 for an overview of their work).

We have identified six reasons why adopting a learning design approach might be beneficial (Conole, 2010):

1. It can act as a means of eliciting designs from academics in a format that can be tested and reviewed with developers, i.e. a common vocabulary and understanding of learning activities.
2. It provides a means by which designs can be reused, as opposed to just sharing content.
3. It can guide individuals through the process of creating learning interventions.
4. It creates an audit trail of academic design decisions.
5. It can highlight policy implications for staff development, resource allocation, quality, etc.
6. It aids learners in complex activities by guiding them through the activity sequence.



Our Learning Design methodology consists of three main themes. First are the theoretical underpinnings to our approach and how it differs from related areas such as instructional design and learning sciences. Our approach is predicated on a socio-cultural perspective (Daniels, Wetsch and Cole, 2007). We are interested in identifying the different types of mediating artefacts that can be used to support the design process (See Conole, 2008 for a description of our use of this term). We also draw on the notion of affordances of technologies, following Gibson's definition of the word in that we see technologies and users as co-evolving. Each technology has a potential set of affordances (such as use to promote reflectivity or dialogic exchange, or support for collaborative activities), but in addition, users come to the use of technologies with a set of characteristics (personal preferences, digital literacy skills, context, etc.) and use depends on the combination of these factors. Secondly, we have developed a range of visual representation, which cover the full spectrum of curriculum design, from micro-level learning activities or resource through to representation at a whole course level. Thirdly we have developed a set of tools and activities to promote dialogic exchange between users and to foster collaboration and sharing.

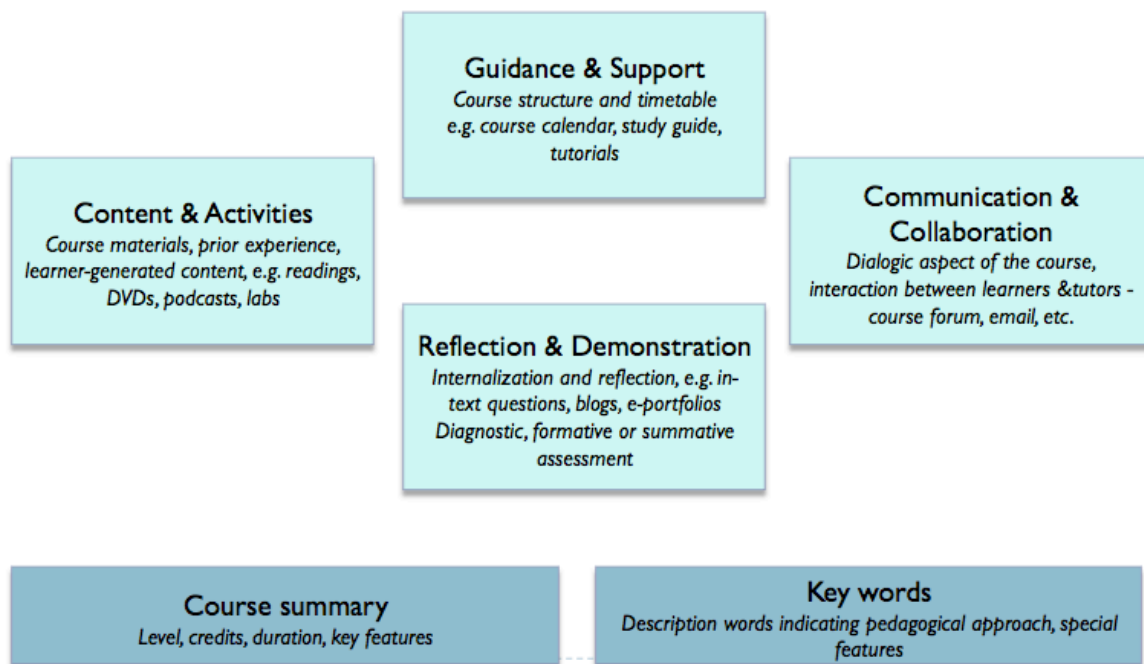
We have developed five visual representations, which can act as both conceptual tools to help guide the design process and as explicit representations of the design, which can then be interrogated, discussed and shared:

- The Course Map View
- The Course Dimensions view
- The Pedagogy Profile
- The Learning Outcomes view
- The Task Swimlane view

In addition two data-driven views have been produced, one giving an indication of the cost effectiveness of the course, derived from finance data about the course and one giving an indication of the course performance, derived from student and tutor survey data and information on course retention and progression.

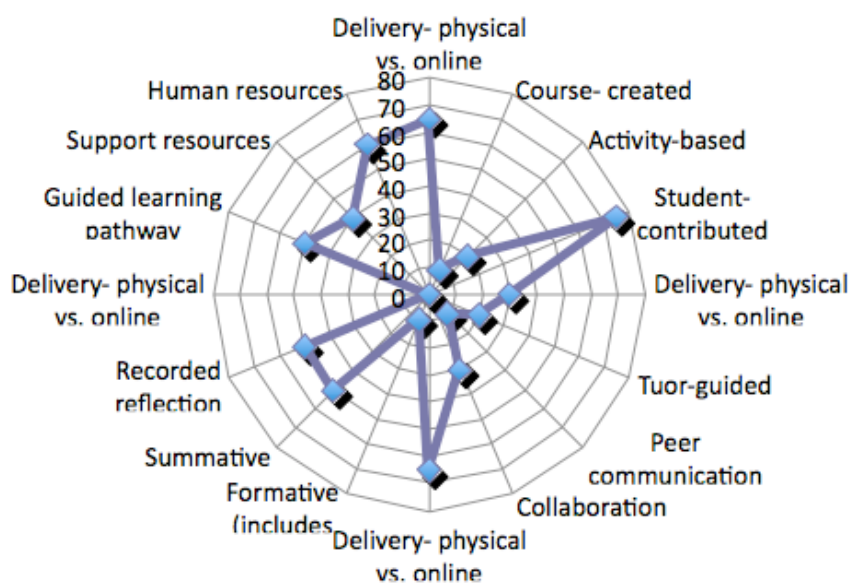
**The Course Map view** provides an overview of a course at a glance and enables teachers to think about the design of the course from four meta aspects; namely 'Guidance and Support', 'Content and Activities', 'Communication and Collaboration' and 'Reflection and Demonstration'.





**Figure 2. The Course Map view**

The second is a refinement of the course map. **The Course Dimensions view** gives a better indication of the nature of the course and how it is supported. For example, it indicates to what extent the course is online, how much it is tutor-guided and the amount of collaborative or activity-based activities are included.



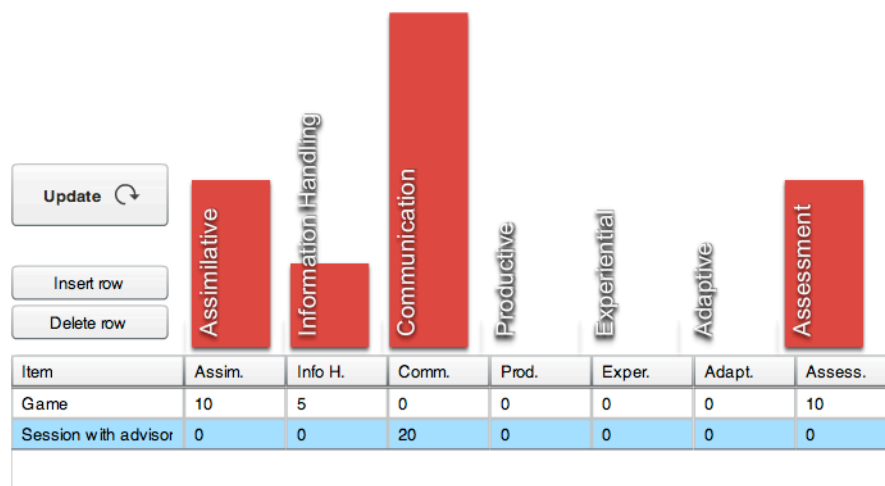
**Figure 3. The Course Dimensions view**

The third view, the **Pedagogy Profile**, looks at the balance of the types of student activities (See Conole, 2008 for the full learning activity taxonomy this is based on). These are:

- **Assimilative** (attending and understanding content);
- **Information handling** (gathering and classifying resources or manipulating data);

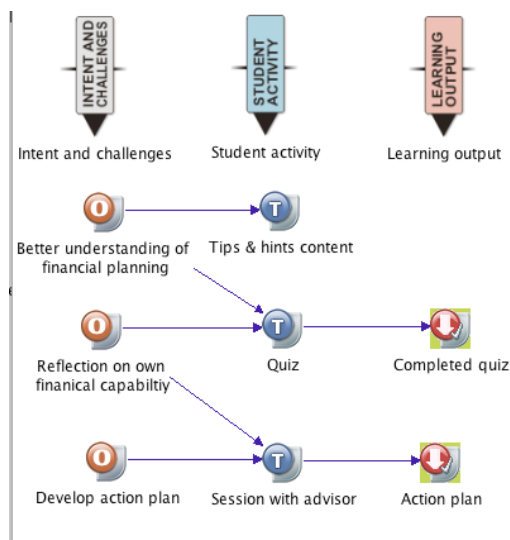


- **Adaptive** (use of modelling or simulation software);
- **Communicative** (dialogic activities, e.g. pair dialogues or group-based discussions);
- **Productive** (construction of an artefact such as a written essay, new chemical compound or a sculpture);
- **Experiential** (practising skills in a particular context or undertaking an investigation); and
- In addition the tool looks at the spread of **assessment** across the course.



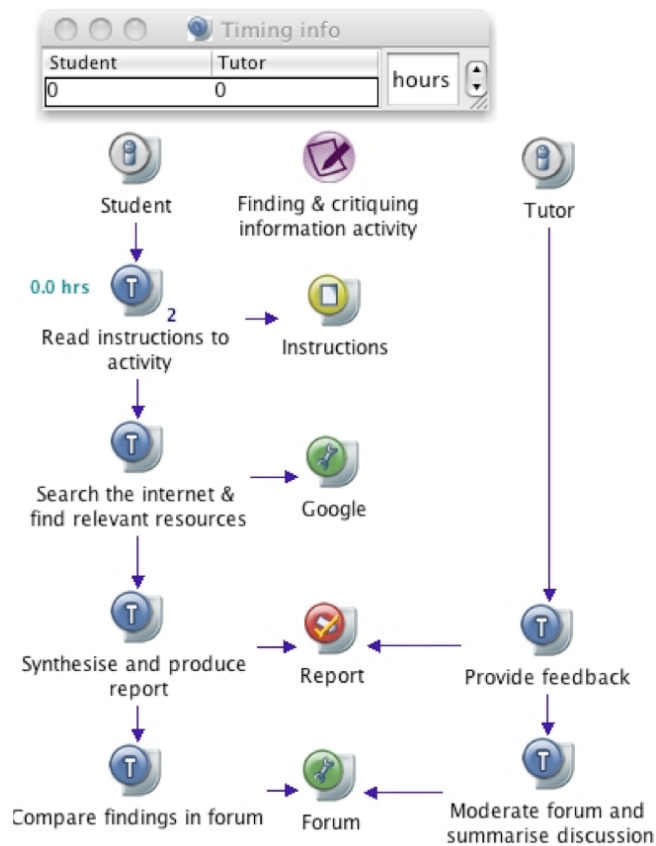
**Figure 4. The Pedagogy Profile**

The **Learning Outcomes view** enables the teacher to judge to what extent there is constructive alignment (Biggs, 1999) with the course, i.e. it looks at how the learning outcomes map to the student activities and to the assessment tasks.



**Figure 5: The Learning Outcomes view**

Finally, the **Task Swimlane view** enables a teacher to map out the details on an individual learning activity; indicating what the student is doing when and what tools and resources they are using.



**Figure 6. The Task Swimlane view**

We have used these in a variety of workshops, both within the OU and externally. In particular we have developed a one-day workshop, ‘Using technologies in teaching’, in which participants use some of these views to rethink their design practices and critically evaluate the use of different technologies and resources for teaching. See for example <http://cloudworks.ac.uk/cloudscape/view/2169>. We have run the workshop four times in the last month or so; with PGCE student teachers in the OU, teacher trainers in Cyprus, schoolteachers in Spain and masters level students in Mexico. Feedback on the format of the workshop and on the conceptual tools has been positive; participants find them helpful in thinking more creatively about their design practices and also find them useful as mediating artefacts to enable them to discuss their design ideas with others.

In a workshop last summer we explored the use of these views, along with collaborative pedagogical patterns specifically looking at how OER, which had been designed for individual learner use could be repurposed to be used in a collaborative learning context. We began by asking them to share a design with another person and then got them to look at one of the OER in OpenLearn to see if they could elicit the inherent design. These activities revealed that articulating and sharing designs is tricky and that it is hard to articulate someone else’s design intentions in an OER. We then looked at how some of the conceptual views and pedagogical patterns could be used to make OER design more explicit and sharable. We concluded by providing an illustration of how a beginners-level Spanish language OER designed for individual use could be repurposed and used in a collaborative learning context by intermediate level students. The design representation is available online



<<http://compendiumld.open.ac.uk/documentation/examples/CSCL-2009/>> and a paper by Dimitriadis et al. (2009) describes the workshop and the design process in more detail.

## Conclusion

OER have enormous potential for learning and teaching, but this paper has argued that teachers and learners need more guidance on how they can be designed and used. The paper has described a new methodology for Learning Design, which provides a set of tools and activities to help teachers and learners interrogate, deconstruct and repurpose OER. Rethinking design is one of the key challenges and potential solutions to more effective development and use of OER.

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## Approaches to OER Development

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OER development is becoming more sophisticated as instructors and course specialists become more familiar with the environment. Most approaches to OER creation have been developed from those that were appropriate in the face-to-face context. However, the online environment opens up new possibilities for learning and particular limitations. This paper presents several approaches, attempting to build on the knowledge base of distance education and traditional learning, adapting to the online environment and the strengths and weaknesses of software applications.

But first, I would like to stress the importance of designing course materials for mobile devices. At present one-quarter of the world's population can access the internet (+2 billion out of a global population of + 6.8 billion). There are now 4.5 billion mobile devices and more than 1.3 billion mobile Internet users. Most significantly, more than 90% of the world's population is covered by mobile cellular signals, and one-third of the Internet access is facilitated ONLY by mobile devices and this ratio is growing. The world is going mobile (International Telecommunications Union, 2010). So, designing for use on mobile devices is becoming essential, with the added benefit that such design is also inclusive facilitating access by a wide variety of assistive technologies.

Course developers can bear the following recommendations in mind when initiating and supporting OER development projects.

1. *Beg, borrow, (steal!) courseware. Don't reinvent the wheel.*

Using previously created materials is almost always more efficient than creating your own. There is a growing body of freely accessible OERs, accessible online. Take advantage of them. It almost always easier to adapt existing materials to your needs than to develop them yourselves. If course materials you like are not available as OERs, you can always take the idea and create your own content using the basic idea in neat courseware. You can make an OER. Remember, ideas are not copyrightable, only the specific expression of an idea is protected by copyright.

2. *Take what exists and build the course around it.*

This is one approach to course development that is tried and true. Early universities developed around monasteries or religious study groups, where teachers based their lessons on the Bible or other holy texts, that is - the content determined the learning. Now, most instructional design manuals insist that you not start with the content, but rather start with a needs analysis and build your course materials based on the specific learner needs that are identified in the analysis. Without undermining this approach, one can agree that the more traditional approach also has value and can be effective in promoting learning. Instructors can construct relevant courses, or at least relevant



sections of courses based on materials that are already available. For example, a Geography instructor could design specific relevant tasks around a computer game, a computer simulation on running a city. Computer programming instructors could refer students to specific free courses on Java programming that are available online. How about a history teaching module based on the ancient history game “*0. A.D.*”? Christiansen & Anderson (2004) reported on three courses at Athabasca University that employed this approach, building their courses around available materials. Courses in English and Nursing found this approach useful, finding OERs easy to come by. Mixing and matching modules from different sources can be highly effective using a course assembly approach rather than a creating one or spending too much time on adapting materials to make the “just right”. “Good enough” is often preferable if it saves time and resources.

3. *Avoid the “not invented here” syndrome.*

Curriculum specialists, instructional designers, and individual teachers can find fault with any course materials. Turf protection is alive and kicking in most learning institutions. Nash (n. d.) refers to it also as the “let’s re-invent the wheel” syndrome claiming that quite often “there are no other factors that dictate an internally developed solution would be superior.” Material developed or chosen by someone else is commonly judged to be inferior. Sometimes settling for someone else’s course material that is “good enough” is better than going to the expense and effort of creating your own “perfect” materials. Quebec “protestant” physics is not that different from Ontario “catholic” physics or Arizona public school physics. Quite often the only people who care are the curriculum specialists themselves, who can spend years arguing over the relative merits of different approaches, techniques, and content.

It may very well be appropriate to adapt an entire course produced by other institutions, but more likely, specific modules on relevant course topics will be more suitable. Externally produced learning objects can form the component parts of specific modules or larger courses. Often they can serve as alternate pathways to accommodate differing learning styles among the students or facilitate students using different software/hardware configurations or serve the special needs of learners with disabilities (Leeder, Davies, & Hall, n. d.).

4. *Know the content – garbage in and garbage out*

When you choose or create content, make sure that a real content expert is fully involved. Do not depend on non- specialists for the content. At the same time, the content specialists should be paired with instructional designers, because good subject-specific content does not necessarily translate into good learning content. Adaptation is necessary. This marriage of the content expertise with instructional design know-how forms the primary strength of distance education course development. Add a good web designer to this team and you have the makings of a solid web course.

5. *Establish deadlines. Work to deadlines, but don’t be unrealistic.*



Procrastination is a common human trait. Time limits, whether externally or internally imposed are essential for the completion of course development projects. Deadlines should be established in consultation with the course development/assembly team. The tasks assigned must be seen to be realistic by those who have to complete them. Have people agree on the task deadlines and then see that they adhere to them. Written expectations for all team members are crucial. Beck (2000) in his approach to software projects recommends that short cycles with real deliverables are best. It is too easy to get bogged down in details and never finish unless real achievable short-term goals with realistic deadlines are in place.

6. *Estimate your costs and then double them. Double them again.*

The budget established must be adequate for the tasks to be achieved. If a course has a very limited budget, then course creation and adaptation tasks must be controlled more than if a substantial budget is available. With limited funds, it is always more realistic to take OERs as is and avoid any significant development work (This also can be prudent even when you have significant funding!). The scope of a course development project must be controlled in order to keep costs down. “Must have” features should be incorporated in the course before the “bells and whistle” are added. This helps to keep a project on track and within budget.

7. *Be realistic in scheduling and scoping.*

Remember that nine women cannot produce a baby in one month. Hiring three more people never triples productivity (Brooks, 1995, p. 159). Use the agile, extreme programming approach in building courses: Have short iterations of at most two weeks in which a module is completed. Reduce the scope of the project if necessary, but do not compromise by extending the time or reducing quality. Make clear priorities. And make them REAL priorities. If everything is a priority, then nothing is. Clarify the relative importance of each task into three categories: Necessary, Desirable, Optional or use a scale.

Get a basic usable module up and running online. Remember that the first automobiles broke down every few hundred metres. The first airplanes were not considered air worthy. Getting a basic prototype up-and-running, no matter how faulty should be a top priority. Then test it. With this approach, if the module is not initially successful, you have not lost as much as you would have by waiting until a full multimedia product had been developed before launch.

Once you have the basic modules of a course available, use them as scaffolding to expand, building features into them, and then building around the newer features, like the layers of an onion. This lowers the costs of entry and lowers the risks. The course developers can learn from mistakes made in one layer before a new layer is built. Like in the automobile and airplane examples, the experience gained in building the first prototype is valuable in making subsequent builds better.

Assemble or build one course module at a time and then deliver them independently, before continuing on other modules. In any event, don't create the idea of a perfect course and then try to implement it -- the “cathedral” approach. Ideas and features should be formulated as part of the experiences gained during delivery – the “bazaar” approach (Raymond, n. d.). As more courses are delivered, and experience is built up,



the development team can afford to take more risks and increase the scope if it is warranted.

8. *A course development project plan must be flexible. Be prepared for major shifts.*

It is trite but true, to note that the world is rapidly changing. Course content that was valid yesterday can be outdated tomorrow. In many fields, new knowledge is being published on a monthly and even weekly basis. Any plan must take this into account. Courses must be constructed flexibly so as to allow for constant changes. Fortunately, the World Wide Web environment and the OER concept allowing for adaptations are ideally suited for altering content on a regular basis. New relevant course materials covering the same content can also be obtained after a particular learning unit has been completed. Any plan must be flexible enough to allow for significant ongoing changes. Course materials must be reusable and adaptable for repurposing. To facilitate this, organize lessons as modules and construct learning objects. Learning objects are reusable digital resource encapsulated in a lesson or assemblage of lessons grouped in units, modules, courses and even programmes (McGreal, 2004).

9. *Build flexibly for reuse and repurposing – generalizability reduces costs*

Learning objects facilitate change in the type and amount of content, features and functionality of your course materials. Learning objects are self-contained and portable to different environments. Costs of overall development are reduced significantly when materials are generic, available for use in multiple content areas and formats. For example, an interactive ASCII conversion scale could be designed for use in various, introduction to information technology, mathematics, and computer programming courses if it is designed from the beginning to be adaptable and editable. This approach also makes ongoing maintenance and error correction much easier. Too many designers do not allow for multilingual capacity in their course structures. Many materials could be easily translated, if the course structure is open. For example, if text is not used inside graphics, translation into other languages is easier.

10. *Elearning should involve the completion of meaningful tasks.*

It is no secret that people learn by doing. ElBushra (1979) suggested that a set of related tasks make up a lesson. These tasks are the lesson. They are not extras. The tasks are not the text and presentation. They are practical activities undertaken by the students. They can include copying, notetaking, and calculating as well as more specialized activities. Their purpose is to reinforce concepts being studied and aid the memory with appropriate practice. The tasks together serve to achieve specific lesson goals. Course designers and teachers are responsible for ensuring that the learning tasks are sufficiently generalizable so that the knowledge acquired and the skills used can be applied in a wide variety of contexts.

11. *Provide different routes to learning.*



We know that different people, learn in different ways in different situations, at different rates, at different times of the day, week, month, year and life, based on different experiences, attitudes, and talents. Contrary to what all too many professionals believe, learning styles research does NOT support the view that individuals have a preferred learning style in ALL situations. The complexity of the concept being learned, the time of day, the comfort level of the learner with the material, the quality of the presentation format, the level of interactivity and many other factors can have a significant impact on the preferred individual learning style of a learner, which can change from time to time and situation to situation. Learners, who show a preference for “visual” learning in a standardized test, may find that in many other situations, they prefer a “kinetic” or “audio” style.

Nevertheless, if a choice of approaches and techniques are available to learners, they will be able to choose for themselves their preferred format and also be able to study the concept in a different format if they do not understand it the first time. When a concept is experienced in a variety of independent ways, learning is improved. Learners develop skills by using or working on the concepts being taught. Different media and techniques match the way people need to think better than others (Bates, 1992).

*12. The diagrams and charts included in the lessons should clarify the text.*

Quite often graphics are superfluous and can actually detract from the learning experience (Mayer, 1989). Real-life images often contain too much information. Simple diagrams are usually superior, eliminating visual “noise” and focusing on the features that are critical to the understanding of the concept being taught. The designer should also consider the goal of the message and the level of the learners. Gilbert (1995, pp. 25-26) lists several approaches for the use of images to promote learning. Images should focus only on features that are critical to the concept being taught and be used for one or more of the following reasons:

1. prepare the learner;
2. attract and direct attention;
3. guide the learner through successive steps of complexity;
4. present the content repeatedly in a variety of contexts;
5. provide a vehicle for practice with immediate feedback; or
6. make connections.

An online Course should at a minimum have these basic features:

A title page;

An introduction to the course;

A course schedule, and a list of objectives and requirements;

The course content arranged into modules;

A Frequently Asked Question (FAQ) file;

A glossary of terms used in the course;

A table of contents, a search engine and/or index with a roadmap to the course;

A resources page with links to useful external course related information; and

A credits page listing the sponsors and the people who have developed the course along with an open access copyright statement (Creative Commons, GNU or public domain).



### 1. Build to standards.

Course materials that are built to commonly accepted standards are easier to assemble, adapt and repurpose. As well as institutional standards for interface design and quality, developers must also ensure that their products conform to the emerging international metadata standards for learning objects (IEEE LOM, SCORM, IMS Common Cartridge). Use CanCore to facilitate the implementation of these standards (See: <http://www.cancore.ca>).

Create a standard procedure and “look” for course development in your institution and follow it intelligently. Be consistent in instructions, icons etc. The finished product should look like one person did it. Cyrs (1990) reminded us that ego gratification is not as important as consistency.

## Conclusion

Most importantly, when assembling or building courses: Keep it Simple. Do not make the interface difficult to navigate. Use simple commands and easily understandable icons. Simple clean interfaces with no glitz are preferable to overly complex designs with bells and whistles. All too often the glitz detracts from the learning. Make it easy for the learner. Use plain, simple language. Explicitly state the course objectives on a separate course objectives page. Make the link between the assignments and the course materials clear. Let students clearly know what is expected of them for each individual assignment or test, and for the entire course and examinations. Clearly describe the resources that will be needed and the learning activities that will be undertaken (Eastmond & Ziegahn, 1995). In that the way, both the instructors and the learners can be confidently aware of the requirements of the course. And lastly, it is important not to procrastinate. Just do it, but make it mobile.!

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