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## **Are open educational resources systematic or systemic change agents for teaching practice?**

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### **Abstract**

Open Educational Resources (OER) raise many similar issues for education to those that have surrounded Learning Objects (LO). However the greater use and availability of digital technologies and open licensing seems to be enabling OER to have wider acceptance into individual and institutional teaching practice. While the need for appropriate design in teaching and learning on the part of educators, which was the primary driver of developments in learning objects, remains, the very openness of OER is changing the relationships between educators, learners and content (resources) and is becoming a primary agent of change. Experience in OpenLearn, a major initiative to provide OER from The Open University, indicates that some of these changes can be planned for while others will emerge as releasing content openly imposes evolutionary pressures that accelerate change and work around barriers. Development can then be driven by learner expectations of the technology and needs for informal life long learning that in turn impact on how content is being designed and openly presented. It is argued that this represents a shift from a teacher centric, systematic model of change in teaching practices as embodied in earlier ideas about learning objects to a learner centric, systemic model of change as embodied in OER.

### **Introduction**

Education is a process that involves learners, teachers and sets of educational resources that can be mediating artefacts in the educational process, all arranged in some structured way (see Lane, 2008a). It is a purposeful human activity where learning is the main purpose. Some of the primary roles of teachers in this purposeful human activity are to structure and support learning experiences for learners, and develop, or identify, the content or tools (the mediating artefacts) that need to be sourced and ordered to make the process an educative one. Many ideas and associated technological innovations have influenced the teaching practices that underpin the first role – structuring learning experiences – of which a notable one in recent years has been learning objects (LO). Learning can also occur in non-educational settings as a purposive activity which it is useful to describe as educational even though that may not be the primary purpose of that activity (and could be considered as vicarious or opportunistic lifelong learning). In this case there are learners but no obvious teachers or educational resources as the learners draw upon many different people and mediating artefacts in their social or working environments for their learning experience. The structuring role provided by teachers, or more broadly educators to include those with other role in supporting the education process, may still be necessary or at least beneficial. The approach of open educational resources (OER) addresses this by providing structured content that is available beyond formal educational contexts.

The origins of the concepts of learning objects and open educational resources are fairly recent and interrelated. It can be argued that it was the growing use of digital technologies and digital content in universities in the pre-Internet 1980s that led to re-conceptions about how educational material could be more easily replicated and shared between teaching practitioners. At the same time the emerging success of object oriented programming provided a model of how it might be possible to create a plethora of learning objects that could be effectively and efficiently used and reused individually or in new collections by educators in different settings (e.g. Boyle et al., 2005). Wiley (2000) collated work on the concept of learning objects, which led to significant amounts of activity by educational technologists and software engineers to devise the systems, processes and models to enable educators to design, share and (re)use learning objects (McGreal, 2006; Weller et al., 2006)).

With the expansion of the Internet and the emergence of the World Wide Web (WWW) it was also Wiley (1999) who took another major feature of software engineering – the open licences applied to open source software that enabled community driven improvement of the software code – and applied it to educational content. Wiley’s notion of open content, his first attempts at an open licence, and the separate but related developments of the Creative Commons movement and the MIT Open CourseWare initiative then led on to the adoption of the term open educational resources at a UNESCO meeting, all of these actions stimulated and supported by significant programmatic funding from the William and Flora Hewlett Foundation (Iiyoshi and Kumar, 2008). Further developments in the WWW and Web2.0 technologies have since then spawned new forms of individual, institutional and community content development, sharing and (re)use, only some of which has a planned educational purpose.

Amidst these technological and social changes there have been a number of developments in teaching practices in higher education. Most of these can be characterised as either individual-led adoption of technologies that support classroom based teaching and replace previous technologies e.g. the use of digital presentations and electronic whiteboards replacing overhead projectors and blackboards rather than or as the institutional-led adoption of technologies such as Learning Management Systems or Virtual Learning Environments that replicate previous practices e.g. online rather than physical bulletin boards, and digital rather than paper handouts. It is only more recently that the more widespread ownership and use of both laptops and Web 2.0 technologies by students has stimulated lecturers to consider and devise more innovative use of new technologies in teaching (Johnson et al., 2010).

### **Comparing learning objects and open educational resources**

One way of establishing the value of a new technology is to understand both the claimed benefits by its developers and the perceived motivations for using it by the target groups.

The concept of learning objects has been bedevilled by different interpretations of them as was acknowledged by Wiley (2000), Littlejohn (2003) and by the many authors in McGreal (2006). Friesen (2009) usefully notes that:

‘Each definition highlights (either directly or indirectly) *modularity* as a technological and design attribute for the object and its content, emphasizing the

“self-contained”, “building block” or “object-oriented” nature of the technology.’  
(Friesen, 2009, p2)

With learning objects the claimed benefits are the ability to create learning experiences more effectively and efficiently by configuring and reconfiguring different elements (such as content, tools, assessments, activities), all managed within an embracing content management system or virtual learning environment. In particular the creation of common and/or shared tools and content that could be used and reused in many different contexts by many different lecturers is seen as a way of improving both the effectiveness and efficiency of teaching practices and hence the related learning experiences for students.

As a technology seemingly targeted at teachers but mainly supported through their institution’s technological infrastructure, learning objects have not apparently influenced much teaching practice or discourse about practice beyond educational technologists. The perceived motivations for teachers to use learning objects do not seem very different to the claimed benefits. And yet there appear to be a number of de-motivating factors. First there is an opportunity cost in learning to use the particular form of such new technologies especially as the technology keeps changing (affected by both technical standards and ease of interoperability); second the language and culture of a more theory driven systematised process of learning design does not match up well with the more craft based, intuitive approach to teaching in most Universities; third early adopters can intimidate later adopters who may then lack confidence in the technology; fourth is the strong academic values around concepts of plagiarism and the ‘ripping-off’ of other peoples work; and fifth and probably most significant, there are often not the policies and practices in place within higher education institutes to support and reward innovative teaching practices (Hatakka, 2009; Gannon-Cook et al, 2009).

Many authors have acknowledged there is a need to distinguish between the technical and pedagogical aspects of LO emphasising that their pedagogic value is most important. Nevertheless few authors provide satisfactory answers as to how online education using learning objects will become a widespread phenomenon. That is due, in part, to a disconnection between the principles and everyday practice, with many of the technologies and systems reported on seemingly being pushed out to unsuspecting users rather than there being a demand pull from teachers and students alike to have these technologies and systems. It is also in part due to the parochial nature of some seemingly very successful developments designed for and implemented in one institution but where there is little likelihood of the technologies and processes being adopted by other institutions which have already got other technologies and processes in place.

The concept of open educational resources is equally subject to different interpretations and variant names such as open educational content, open courseware and open learning resources (Friesen, 2009). However behind all the names it is largely agreed that:

OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software,

and any other tools, materials, or techniques used to support access to knowledge (Atkins, Brown and Hammond, 2007, p4).

As Friesen points out, the definitions of OER do not explicitly include notions of standards and modular design; while LO do not include notions of openness. Both have notions of sharing and an economy of use although LO appear to acknowledge the intellectual property rights of the developers within the content and be more commercially minded whereas many OER are explicitly released under a non-commercial use licence (and even with those that do not preclude commercial use, there is little evidence to date of successfully monetising free content).

The claimed benefits of OER are more extensive than LO. As Hylén (2007) notes '*The reasons for individuals and institutions to use, produce and share OER can be divided into basic technological, economic, social and legal drivers*'. He went on to explore six incentives for institutions to become involved as a provider of OER that can be summarised as: 1. sharing knowledge is a good thing in itself; 2. it increases the value of existing investment of public money; 3. it can cut costs and improve quality; 4. it can be good for public relations; 5. it provides a chance to explore new global business models; and 6. open sharing will stimulate innovation. Hylén also examined four motivations for teachers as: 1. sharing knowledge being a basic academic value; 2. the increase in personal reputation in an open community; 3. being a leader in their field; and 4. there is little value in keeping the resource closed.

While these lists provide a good starting point, they do not fully reflect who are the target audiences for OER and the different motivations that they offer for institutions and individuals as noted for the UK Open University (McAndrew, 2006; Gourley and Lane, 2009; McAndrew et al, 2009). For the UK Open University there have been the following benefits of OER:

- Enhancing the reputation of The Open University.
- Extending the reach to new users and communities.
- Recruitment of students from those who come to see OpenLearn.
- Supporting widening participation.
- Providing an experimental base of material for use within the university.
- Accelerating uptake and use of new technologies.
- Acting as a catalyst for less formal collaborations and partnerships.

Similarly, the perceived benefits to lecturers or other educators given by Hylén are for the primary authors of OER, not the secondary users of the OER as noted by the OU, and are equally diverse but have been found to include (McAndrew et al, 2009):

- Investigating the OU approach to teaching a particular topic;
- Downloading OpenLearn OER study units for incorporation into courses, whether online, blended or face to face;
- Using study units as recommended or supplementary reading for an existing course;
- Reworking and localising study units for their own purposes and their own contexts;
- Sharing materials and ideas with other educators worldwide;
- Collaborating with others in developing new OER;

- Experimenting with the available technologies on the OpenLearn platform;
- Contributing to research into the effectiveness and uses made of OER.

So, while there are also the same, system wide de-motivating factors around OER as there are for LO, there is less disconnection between the technologies and practices being used for OER because they are more commonly available and used by many more people, but more significantly teachers have the opportunity to play and experiment without needing significant support or having to seek prior permission.

Even so, through close examination of the issues affecting the teaching practices of individual lecturers and the common reasons that are reported in the literature for the non-use of LO or OER we note that there are some recurring and similar issues mentioned for both technologies: accessibility, discoverability, granularity and reusability. The next section examines these issues and others by considering the role of design in teaching and learning.

### **The role of design in teaching and learning**

Most design of teaching activities, experiences or modules is principally done by individual teachers. In higher education there is increasing attention being given to staff training and development in the theory and practice of teaching and learning, addressing a previous lack of professional development linked to teaching (Ramsden, 2008) and raising a need to share practice. In broader courses or programmes of study there is greater scope for co-operative teaching effort in that sets of individual teachers divide up the teaching tasks within an agreed structure, but each still largely does their own thing without further input or discussion from their teaching colleagues. It is much rarer to have fully collaborative development of teaching resources where the team, each with different skills and knowledge contribute to their design.

There are many different aspects to learning design (Koper, 2003; Littlejohn, 2003) where consideration has to be given to all the elements (content, activities, assessments) and their configuration to meet clearly set learning objectives or learning outcomes. Equally there are three dimensions to teaching practice of subject content, pedagogy and technology that teachers increasingly need to embrace and cope with either individually or in teams (Tait, 2009). Configuring the learning design requires the use of technology both for the structuring done by the teachers, the appropriate interaction with the content and communications by and with learners.

Stereotypically most teachers work alone in constructing and delivering their teaching experiences. They may draw upon others' similar work in this process and they may involve their students in co-creation or delivery of the experiences, but fundamentally they alone decide on a chosen path or lay out a new route map of resources and activities that constitute the educational experience. They work with the content that they know best from their own experiences or feel able to easily construct themselves from their own knowledge or known sources and use the tools and technologies that they are most familiar with, all for the particular group of students that they know have been self and institutionally selected to study with them. Accessibility and discoverability of educational resources has therefore been very much tied up with a relatively small community of peers teaching similar courses; granularity with existing teaching activities (the lecture, the practical etc) while reusability was based on a minimal level of sharing or using of graphical materials from published sources under fair use rules and

legislation. However, the arrival of OER has meant that both teachers and students are able to more easily find and view in greater depth the teaching and learning experiences of others to inform their own praxis. Open access also lowers some practical barriers so that they are also able to 'teach' more easily around someone else's resources and/or activities (re-use 'as is'). But even more than that, it is becoming possible to rework other people's material and to even co-create (or remix) greater volumes of such material with colleagues around the world.

The co-creation of educational resources and courses is a major feature of open and distance learning where teams of academics (supported by media professionals) develop and deliver the teaching and learning experiences, including our Associate Lecturers who do 'teach' around the main, carefully crafted, prescribed educational materials. At the Open University there may be as many as a dozen academics writing for and commenting on others' work in the same course team to develop these carefully crafted educational materials and associated activities. In principle this team approach may extend through OER to wider collaborative relationships, although the recursive nature of curriculum design linking the curriculum, programme of study, qualifications to the course content and resources means that a looser relationship is more likely to emerge.

If OER are to have a systemic impact on the teaching and learning process then we need to look for evidence that some of the potential for change is resulting from release of content as OER. In the OpenLearn initiative the Open University provided access to material with both a learning environment and as resources for reuse, in the next section we describe in outline the process undertaken and some of the results that were observed.

### **Changing teaching practices: the case of OpenLearn**

In 2005 The Open University decided that the impact of working with open content and resources can be best judged by joining in and establishing at least one element of its operations in the open. While this experimental approach was not the sole motivation (McAndrew, 2006) it did provide a foundation for its approach to incorporate both a programme of research and an action research methodology within its initiative. The overall research is reported in McAndrew et al. (2009), one area of study was to consider the design of the learning experience at three levels: the site, the content, and the transferability of resources to learners and teachers.

#### *Site design*

Offering content in an open way means that OpenLearn is communicating with a wide range of users. In drawing up the initial design a scenario-based approach (e.g. Carroll, 2000) drew out two key stereotypical groups of users "learners" and "educators"; two further important groups were the "producers" and "researchers", however these had greater impact on overall approach rather than the visible features of the site. The design of the OpenLearn site partly addressed the different expected interests of the learner and educator groups of users by first providing an overall home site that explained the purpose and highlighted current activity, then offering two distinct spaces: a "LearningSpace", to attract learners, and a "LabSpace", for those who wanted to work with the resources. The LearningSpace was conceived as the place for the majority of users who were seeking content as a resource to learn from and provided a wide selection of structured OER, mainly derived from existing Open University materials. The

LabSpace highlighted the opportunity to reuse and remix that same content but also contained additional material from a wider variety of sources or with less reworking to suit the new context. Both of these areas provided access to open source support tools based on the Moodle learning environment. Initially LabSpace offered additional, more experimental, tools and the ability to download content. However over time all tools were migrated to the LearningSpace and extra download features made available in the LearningSpace so reducing the technical differences between the two spaces.

The impact of dividing OpenLearn in this way allowed the LearningSpace to provide a relatively stable platform while LabSpace emphasised experimental aspects with looser branding, early release of tools, and a more contributory environment. In practice LearningSpace attracted the greatest number of visitors (typically 400,000 unique visitors per month), approximately 6 times as many as visited the home page and 12 times as many as visited the LabSpace. Those users will miss the introductory explanations on the home page or the extra features offered in the LabSpace. It was also apparent that the most likely route to the site was from a search using an external search engine, thus for many users the indexed content caused their visit rather than planned activity. To help such users the sites have become closer in nature and site navigation simplified. The next stage is to look for ways to distinguish the spaces on the basis of the origins of the content with the reworked Open University materials only being available in the LearningSpace, while maintaining indications of the status of content for those that need that information as educator, and releasing other Open University material and all other reworked or new material from individual or institutional users in the LabSpace. More emphasis will be given in LabSpace to supporting different groups or communities of educators to use the many functions and facilities built into the platform.

### *Content design*

Offering OER removes barriers to access such as registration and payment but also means assumptions that might have previously applied need to be relaxed. In the case of OpenLearn typically the content will have been designed to meet the needs for a particular group of learners. The approach to distance learning developed at the Open University has been termed Supported Open Learning (SOL). In SOL the components of material-based learning, tutor support and assessment are combined to offer an integrated experience that has been proven to be very effective. The OpenLearn approach divides content from these other elements. However implicit in the design of the SOL material are knowledge about the match to curriculum group size, assessment and additional support. Under a truly open model that assumed control is now lost. This need not mean that the learners are not able to work from material that retains some of the original context, particularly as many undergraduate courses or modules are designed with few assumptions about precise prior study because of the Open University's open access policy. The approach for the majority of OpenLearn material was to retain integrity with the structuring of the source material while carrying out reasonable but minimal adjustment to the content to avoid cross-references and terminology that no longer makes sense in the new open context.

Retaining integrity with the original content seeks to keep the value in well structured, quality assured material produced by teams at the risk that the learner may meet challenges that would be more easily met in the original, supported context. For learners the experience of OpenLearn is that this is not the case; learners are able to translate from the previous context and find content that is useful to them. For example, activity



levels on the LearningSpace show large scale use of the content with, in a typical month: 400,000 unique visitors to the site viewing an average of 15 pages per visit, 80,000 visitors viewing whole units of learning for download or printing, and 15,000 forum entries read each week. Users also identify material as interactive whether or not it is text-based and praise the participatory style of the content. While data from such large-scale use is hard to interpret, the lack of evidence for problems with using material from a combination of analytics data, questionnaires, interviews and case studies (McAndrew et al., 2009) indicates that additional investment in converting material to suit an open context that is itself inevitably ill-defined should not be a priority over ensuring that access is provided as early and as broadly as possible.

The educational content openly published as Study Units on OpenLearn, are of varying size and media complexity, ranging from 1 to 50 hours of presumed learner study time. This varying granularity has not greatly influenced learner behaviour although many of the most popular are of 5 to 10 hours study time. While learners are not generally interested in reworking the material some are willing to make forum posts, learning journal entries, give reviews or other online actions (over 1,000 per month) that represent fairly permanent user augmented content sitting alongside the original educational content. This does indicate that it is important to give learners many different ways to interact with the content in addition to early access.

### *Learning design*

For educators there is evidence from elsewhere (Littlejohn, 2003) of reluctance to use content without understanding it and so content that is presented without explanation may not be attractive to that group. Work on Learning Design (Koper, 2003) offers a potential way to extend content with descriptive information about the design encoded with the content or as separate pedagogic structures. Learning design as a concept is attractive in that it considers that the approach to teaching can be communicated and then the potential for transfer is increased. One of the most developed representations is IMS Learning Design (IMS, 2003), however producing practical implementations has proved problematic (Klebl, 2006) and the formal approach has tended to emphasise the divisions between proponents of learning object approaches and practitioners leading to pressure for more pragmatic approaches (Neumann et al., 2010). Conole and Weller (2008) describe an approach that uses the Compendium knowledge mapping software released for free use through OpenLearn (Buckingham Shum and Okada, 2008) to illustrate and present designs. Positive findings on the use of such simplified designs for communicating within course teams were nevertheless less clear in the context of open content (Dimitriadis et al., 2009). Several visual representations of designs were developed of content on the OpenLearn site, but while this proved the feasibility of extracting designs, they were felt to be subjective in part because they were not developed by the original author. The designs were also felt to develop further description of the original context and so may make reuse under new models less likely. An alternative direction is to work with overall patterns of learning behaviour (Hernández, et al., 2009) in order to inspire educators to look at new ways to use open content. An example of such a pattern is the Jigsaw approach (Hernández, et al., 2009) to build collaborative work distributed across individuals. In the workshop environment this generated enthusiasm and enabled educators to plan reuse based on disaggregation of units of learning rather than the more usual use “as is”.

Within OpenLearn, as has also been observed in other environments for reuse (Wiley, 2007; Duncan, 2009), the idealised cycle of adoption, reworking and recontribution has

only had limited success, often with greater success coming from organised groups than from individuals. This could be seen as a requirement for additional work on modularising material, describing designs and improving metadata, which would bring OER closer to the approaches advocated in developing Learning Objects. While these factors would be of some benefit the risk is high that the additional investment in producing OER that met higher requirements would provide only limited advantages to educator users and at the same time would delay release of further content and demotivate some from engaging with OER. Rather it is valuable to recognise that openness generates alternative, less apparent forms of reuse and that further adoption may not be shared, that collaboration around content, use in its original form and picking items from within structured units are all valid approaches. These ways to reuse may best be supported by advice (Lane et al., 2010) rather than content design and has been a notable feature of many successful reuse and reworking projects using material from OpenLearn. Examples of direct reuse in OpenLearn are apparent in translated units, contributed materials and adding of extra resources. However alternative forms of reuse included collaboration areas, self generated support forums, reformatting content, referencing content from within VLEs, transferring content into other online environments, and selective use of assets within the content. In each of these cases any observed activity will be partial as there is no need in the open environment to ask for permission or notify in anyway the precise use of content, nor to undertake the work on the site itself.

## **Conclusion**

In looking at the similarities and contrasts in the development of learning objects and of open educational resources there are three major lessons for teaching practices.

The first lesson is the power of openness as a driving force. The openness in open educational resources derives mainly from the use of an open, some rights reserved 'copyleft' license rather than a closed, all rights reserved 'copyright' license. This means that rather than trying to design and devise a 'controlled' system for using learning objects, the emphasis was on openly publishing educational content that could be treated as learning objects by both teachers and learners. That is not to say that there has been an explosion of taking and reworking or remixing open educational resources but it has and is happening across and within institutional borders as and when people want to. And it is strengthened by the increasing use of open source software to support education. In the end success is more likely to happen through experimentation on the ground by learners and teacher practitioners as by the efforts of educational researchers or technologists. Interestingly, this teacher led approach is now faced with considering the needs of a very diverse set of potential learners for OER rather than the more closely defined set of students on their taught courses. However, this will contrast the needs of learners for tightly integrated and configured resources to aid learning with the needs of teachers wanting to use and reuse individual assets rather than complete works. This raises issues of whether learning design and teaching design are the same activity.

The second lesson is that the open educational resource developments were not in general linked to the learning object approaches and started with the premise of how to make content more open and portable in general rather than one of how to design 'better' courses. Possibly as a result of this, the open educational resource movement has yet to fully take on board what the learning object movement has done before them to help teachers (rather than other users). A good example is the use of standards,

especially for metadata, to enable greater portability and discoverability of resources. Another example is learning design or educational modelling – ways of thinking about constructing courses or educational experiences using a variety of educational resources. The learning object literature is primarily technical books and research articles rather than material for front line teaching practitioners to use as a basis for changing their teaching practices, however the authors and the projects they talk about have made good theoretical inroads into some of the trickier issues. The majority of open educational resource projects in the initial phase led with publishing content with thoughts on how people will use it secondary. As the field matures more attention is, and will be, needed on researching and theorising, identifying principles and practice that bring the fields closer together.

A third lesson is how quickly the changes in available technology create new affordances and possibilities. Many educational technologists have considered the implications of new and emerging web technologies for education but often from a position of controlling the activities through more closed systems whereas many significant changes in the web have been around user contributions, whether that be open source software applications, user generated content or user developed Application Programming Interfaces (APIs) linked to major commercial systems such as Google. Indeed the weight of activity with OER has shifted away from it being a specialist's domain (unlike LO) because many developments on the WWW tackled some of the issues of discoverability, accessibility and granularity for the community without having to figure out solutions themselves. Again it is the openness of many these developments that is leading to widespread use. It is also this very openness and a large diverse user base that makes any changes more systemic in nature than the systematic, incremental evolution of fairly closed practices within higher education institutions (Lane, 2008b). Rather than a step by step process of adding to existing practices as might have happened with the push of LO technologies, OER are helping to force some rethinking about the nature of higher education in general and systems of e-learning in particular.

The evolutionary pressures from working in the open and accepting that others may make changes or spot new opportunities have made OER a rapidly changing area. Examples of change in focus include switching from producer led approaches to participatory ones (Atkins et al., 2007) and national programmes, but also in how sites working with OER have adapted to requirements for new ways to access material and acceptance of different models of use. The modularity of learning objects can also assist this process of change, however experience seems to suggest that it is not a necessary condition as users will bypass careful descriptions or structuring to find their own pathways through resources. The most important step is to make those resources available and accept that open use will take place. The next evolutions are likely to be both at the systematic level as appropriate content structures emerge rather than are imposed, and at the systemic level as institutions and processes adjust to the blending of formal and informal learning. The process of evolution also may mean that less predictable changes result.

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