

Open Educational Resources: Motivations, Logistics and Sustainability

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Introduction

On a cool summer's day in Paris in 2002 (UNESCO, 2002) a group of thirty-four people from around the World gathered together to discuss a phenomenon which had been growing rapidly in importance: the availability over the Internet of free educational content. UNESCO and the William and Flora Hewlett Foundation had brought this eclectic mix of nationalities and professions together to look at how best to promote and develop the open content movement. Attention was centred on Anne Margulies as she introduced the Massachusetts Institute of Technology's (MIT) new OpenCourseWare (OCW) project, where much of the university's material was about to be given away freely to any learner or educator who wished to use it.

Alain Senteni from the University of Mauritius was quick to spot the potential of the OCW initiative and proposed that his university involve itself in repurposing the content for developing nations and translating it into French. The availability of such content could help to address the problem of the growing and largely unmet demand for higher education in places such as Cameroon, suggested Mr Emmanuel Tonye. It could also help to show educators pedagogical models, unfamiliar in Mohammed Dahbi's home country of Morocco. However Abdoulaye Diakité from Guinea noted that in order to make effective use of the content, efforts would also have to be put into building the technical and support infrastructure. V.S. Prasad from India also mentioned the importance of translations and taking into account cultural sensitivities.

The opening comments of the meeting encapsulated many of the hopes and fears surrounding open content. In the following days the international group expanded on many of these issues and produced a definition for what they termed "open educational resources" (OERs) which would require at a minimum the provision of a course description, syllabus and calendar. The content itself could include lecture notes, demonstrations, simulations, illustrations, learning objects, reading materials, assessments and projects. The materials would need to be adaptable and the technology to access them freely available. OERs were defined as: "The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes."

At a subsequent UNESCO meeting in Paris (UNESCO, 2004) the definition was broadened to include:

- Learning resources
- Courseware, content modules, learning objects, learner support and assessment tools, on-line learning communities
- Resources to support teachers
- Tools for teachers and support materials to enable them to create, adapt and use OERs; as well as training materials for teachers; and other teaching tools
- Resources to assure the quality of education and educational practices

Other commentators have since expanded the definition further to such an extent that Stephen Downes discusses whether other resources such as visiting lecturers or paper-based resources ought

to be considered as OERs. (Downes, 2007) It seems clear though that a defining feature of an OER should be an ability to transport it over the Internet if it is to retain many of its supposed benefits. Downes reports that the Public Library of Science considers the concept of “open” to include free, immediate access online and unrestricted distribution and re-use, with the author retaining attribution rights and the materials deposited in a public archive.

The growing number of institutions providing OERs take different approaches to what they mean by the term. In the case of OCW each course publication includes a syllabus and calendar, content such as a reading list or lecture notes and a learning activity such as an exam or project. While some resources such as PowerPoint presentations are of questionable value when disembodied from the lecture itself OCW does not intend its materials to provide a full online educational experience. (Stacey, 2007) Complicating the picture many repositories of OERs do not abide fully by their most commonly accepted attributes such as free access, licenses for easy re-use, and the ability to use open source software for accessing the content. (Gser, 2007) Given such diversity in the types of OERs being produced and the ways in which they are being used, perhaps the main benefit of the term is that it provides a rallying point for discussions and activities around the provision of educational content freely on the Internet.

Motivations and benefits

The primary motivation for the OER movement is the “powerful idea that the World’s knowledge is a public good.” The Web provides unprecedented opportunities to share that knowledge (Smith & Casserly, 2006) and reduces the costs of reproducing and distributing content to almost zero. (Caswell, Henson, Jensen, & Wiley, 2008) This altruistic driver is continually in the minds of those involved in the growing numbers of OER projects; educators already generally believe that learning is beneficial for their students and can easily get caught up with the idea that these benefits should be extended as widely as possible. While there are potential commercial motivations too, as will be discussed later, the desire to give something back to society is arguably the strongest driver for the organisations and individuals in the OER movement. An analysis of the open content phenomenon is therefore heavily influenced by the wider socio-political agenda, as defined by representatives of developing nations as well as the charitable foundations who have driven and provided much of the funding for OER projects.

OERs could make it possible for far more people to study in countries where there are not enough places currently in universities and reach disadvantaged sectors such as rural communities and women who have not had adequate access to higher education. They could also demonstrate new forms of course structure and pedagogy. OERs are claimed to be able potentially to bridge the divide between universities and the public and to free learners from formalities such as admission criteria, prerequisites, tuition fees and examinations. (Stacey, 2007). Courses built around OERs certainly save students money by not having to buy books, and dramatically increase the variety of resources available to them, assuming they have access to the appropriate technology. They may also develop habits of independent self-regulated learning, autonomy and self-reliance. (Stacey, 2007)

OERs could also affect the developing syllabuses of institutions elsewhere in the World. For example it has been suggested that the John Hopkins School of Public Health OERs could influence the development of public health initiatives in developing countries. (Smith & Casserly, 2006) They can also provide a useful conceptual framework for organisations to work together on the development of content, sharing costs and making better use of taxpayers’ money. (Gser, 2007)

The growing OER movement itself has been a motivation for some institutions, including the Open University, which felt that it was naturally placed to be at the forefront of the open content revolution. It also felt that it could learn how to draw on other resources from around the World and try out new technologies and new ways of working which could benefit mainstream provision. A

“feel-good factor” has been identified by those institutions involving themselves in OER initiatives which can extend right across the institution. (McAndrew, 2006) The profile of the institution is raised across the World and its teaching materials given much higher exposure. (Johnstone, 2005) The sharing of knowledge through OERs can be used to enhance the institution’s branding.

In 2006 the UK Open University launched an OER initiative called OpenLearn with funding from the Hewlett Foundation. The University had always had a mission to extend educational provision as widely as possible by allowing students to sign up for courses without prior qualifications, by broadcasting lectures and television programmes to massive audiences on BBC TV, and by helping to set up other open universities throughout the World. It was therefore felt that an OER project fitted very well the aims of the University to spread the benefits of learning and higher education as widely as possible. In addition to pledging to provide considerable amounts of its distance learning materials as OERs, the Open University would provide tools to help learners manage their learning and would encourage the formation of learning communities around the content.

By viewing materials that colleagues have created there is potential for noticing overlaps in topics which they teach and for generating new collaborations between departments. (Johnstone, 2005) 40% of faculty at MIT for example found OCW to be helpful for updating their courses, many also using the site for advising students. (Caswell, Henson, Jensen, & Wiley, 2008) At Tufts faculty use the OER website to plan their curricula, prepare for teaching or to learn themselves. (Lee, Albright, O’Leary, Terkla, & Wilson, 2008) In addition OERs provide multiple perspectives on the same subject (Stacey, 2007) for both educators and students, taking the learning beyond institutional or national boundaries. These are widely quoted as benefits of OER initiatives however such internal uses would also be possible with a learning management system, open to all staff but closed to external users.

Another supposed benefit of OERs is that individuals or institutions who make them available may receive them back enhanced. The OpenLearn initiative has seen many downloads of OERs from its LearningSpace site but relatively little reworked content uploaded back to its LabSpace by others. The reasons for this may be that educators are using the content without changing it significantly due to lack of time, lack of technical skills or a feeling that they do not wish to interfere with the integrity of the materials. They may also be changing the content but do not feel confident or have the time to deposit them back in the LabSpace. Even if there are significant uploads of reverted materials to OER repositories there would be an expensive process in quality assuring the content and possibly a reluctance to do so by original authors who feel that their carefully crafted materials have been interfered with.

Knowing that your colleagues and indeed a worldwide audience is going to be viewing your content may lead to higher quality products (Smith & Casserly, 2006) and greater recognition. In MIT the OCW initiative has created peer pressure and competitive pride which has led to significantly enhanced content. (Gser, 2007) All of the Creative Commons licences require the creator of the materials to be attributed in any use or redistribution. However in research-led institutions professors are likely to prefer to put their efforts into research publications rather than develop their reputations for the production of OERs. This may be short-sighted. Surveys show that academic publications made freely available on the Internet receive considerably more citations than those in proprietary publications. (Gser, 2007)

The motivations for consumers of OERs are also strong. Knowledge gained in schools and in higher education becomes out of date after a few years and it is becoming essential to develop new skills and acquire new knowledge continuously. (Brown & Adler, 2008) In many countries there is a lack of educational resources and an escalating cost of books and journals. (Stacey, 2007) Some students use OERs to supplement materials on the courses they are enrolled in, to enhance their personal knowledge or for professional updating. (Lee, Albright, O’Leary, Terkla, & Wilson, 2008) 71% of

students at MIT used OCW during their studies, the vast majority of those reporting a positive impact on their student experience. (Smith & Casserly, 2006) There is also a wider range of materials available to learners and the possibility to connect with other learners in networks based around the resources.

Whether OER initiatives can have a positive impact on student recruitment is a key question for institutions running them. MIT reports that 35% of newly enrolled students who were aware of OCW prior to attending MIT considered the initiative to be a significant or very significant influencing factor in choosing where to study. The Open University has noted that more than 7,000 people registered for a course in the same online session as being on the OpenLearn site. Those who had used both the LearningSpace and LabSpace sites were five times as likely to register. (McAndrew & Santos, 2008)

Risks and Objections

There are many obstacles for institutions engaging in large-scale OER initiatives; one of the major ones is resistance from faculty. Some suggest that OERs are not appropriate for their disciplines, particularly where practical skills are involved in areas such as medicine which require experiential learning and human interaction. (Lee, Albright, O'Leary, Terkla, & Wilson, 2008) Authors are concerned that their content may be altered in ways which reduce its accuracy or quality but is still attributed partially to them. They also fear that their ideas and content will be used by others without acknowledgement or remuneration to themselves or their institutions. There is a strong argument however that some developing countries are so far behind that charging for the materials is never going to be feasible and that rich nations have nothing to lose and much to gain by providing OERs freely. (Stacey, 2007)

There are worries too about the workload and costs involved in maintaining OERs (Smith & Casserly, 2006) and that users might violate authors' privacy by attempting to contact them. (Lee, Albright, O'Leary, Terkla, & Wilson, 2008). Fortunately most of these concerns have proved to be unfounded and it has proved possible to involve large numbers of staff in OER projects. OCW reports that 70% of MIT faculty are participating in the initiative, however some cynicism is reported as to what "participation" actually means with many faculty simply agreeing to having their lecture notes placed online by the central OCW team. (Stacey, 2007)

Publishers are also concerned about the threat to their business models posed by OERs and may have a significant influence on governments in their arguments that a fair, competitive and self-sustaining market must be maintained. However countering this is a growing movement to make better use of public funding by promoting OER initiatives. There are also ongoing complaints from institutions of rising journal subscriptions and an unfair system where universities fund their staff to write, peer review and edit journals and then have to pay subscriptions to publish to receive those journals for their libraries. (Gser, 2007)

Many materials which may be suitable for conversion to OERs contain elements where the copyright is held by third parties. Copyright clearance is a particularly time consuming and expensive process which often results in negative reactions from publishers. At Tufts University some faculty were concerned that having to exclude copyrighted materials impoverished their courses, made them seem basic and could affect their reputations. They felt that this could impact negatively on their academic credentials and affect their promotion prospects. (Lee, Albright, O'Leary, Terkla, & Wilson, 2008)

One major concern for educational institutions is that content which is delivered in an environment isolated from some of the key attributes of formal learning including a cohort of fellow learners, assessment and accreditation is likely to be less engaging and effective. Motivation is a key factor here; individuals with a strong interest in a subject or requirement to learn about a topic, together

with well-developed study skills, may find OERs delivered in isolation are perfectly adequate for their immediate requirements. However that is if they can access them in the first place. The digital divide remains a major obstacle to the adoption of OERs. In many parts of the World, particularly in Sub-Saharan Africa and South Asia, the infrastructure for electricity supplies and internet connectivity is unavailable, intermittent or simply too expensive for individuals or institutions to afford. Ironically these are precisely the areas which could benefit the most from free and open educational resources and therefore fulfil the humanitarian aims at the heart of the OER movement.

Running institutional OER initiatives

Initiating a successful OER initiative at an institution involves high levels of commitment from senior management and is likely to require significant start-up funding. A vision will be required for why the institution should be making its educational resources freely available. Funding from an external organisation can give added impetus to the venture and pilot projects to develop OERs can then be used to demonstrate the production processes required and the potential uses.

Systems such as eduCommons, funded by the Hewlett Foundation, assist with the processes of placing materials into a repository, tagging them with appropriate metadata, copyright clearance, quality assurance and publication. Technical staff who can convert materials into appropriate OER formats will be required to assist faculty whom, as was noted earlier, will inevitably be concerned about time commitments. (Caswell, Henson, Jensen, & Wiley, 2008) Addressing such concerns should be a priority for institutional OER ventures. It has been found necessary to emphasise the altruistic nature of the venture, reinforcing this and the project's links with the worldwide OER movement continually through a variety of communications. Showing statistics which demonstrate global uptake and providing examples of positive user feedback can be particularly effective. (Lee, Albright, O'Leary, Terkla, & Wilson, 2008)

There is a large number of issues which institutions need to address if OERs are to be produced on a large scale on a sustainable basis with maximum benefit to users. Andy Lane (Lane, 2006) reports that OpenLearn had a particular challenge in taking material designed to be part of larger distance courses which assumed tuition, support and assessment, and repurposing it for learners who would not experience the wider context of formal learning. Another issue was the tension between making large amounts of existing, primarily text-based, materials available on the web while knowing that this was not the optimum medium for such content; it would be better to have less text, more images and more interactivity for on-screen delivery. The aim was to minimise scrolling by having no more than two screens' worth of text per web page, though it proved impossible to maintain the integrity of some of the original materials by dividing them up in this way and in the end there were some long pages requiring considerable scrolling.

Lane identifies five different characteristics of the content which may need to be tackled in the transfer from standard distance learning to OERs: type, medium, structure, language and pedagogy. The type of content will include activities, text and video. The medium is how it is rendered; video content might for example move from CD-ROM to streaming video. Structural changes such as breaking the content up into smaller chunks will be necessary. There is also the language of instruction, which is not changed by the OpenLearn team, though translations have been made by users abroad. Finally there is the pedagogical model. Attempts to keep this as close to the original as possible were made but the other changes frequently impact on the pedagogical approach.

One of OpenLearn's biggest challenges has been attempting to retain the essential nature of the learning content while transforming it into OERs appropriate for online delivery with smaller chunks of text, more interactivity and greater use of multimedia. The approach of placing mainly text-based materials on OpenLearn as the starting point drew criticism from some commentators but meant that large amounts of content could be uploaded quickly, maintaining consistency with the original content, but able to be transformed into more engaging OERs later.

OERs will achieve much greater penetration, particularly in less affluent regions where they may have the most benefits, if they depend only on free or open source software for their usage. Providing materials in simple web pages will guarantee the greatest visibility. The incorporation of flash animations or video may enhance the content and be visible using a freely-downloadable plug-in for the web browser. However OER authors may not realise that such content is bandwidth-heavy and therefore difficult or costly for some users to download. (Smith & Casserly, 2006) It is also of course likely to be more expensive to produce and much more difficult to edit by other teachers than text. Moreover it may be less accessible for users with some disabilities; there can be a trade-off between the engagement achieved with the use of multimedia in educational software and the accessibility of the materials.

The issues may be more acute with OERs than with educational software designed for distribution in affluent countries where more aspects of the supporting infrastructure such as bandwidth and the underlying software and hardware can be assured. A further issue with providing content such as video or flash files is that teachers may not have the skills to adapt more complex materials or access to the proprietary software required to do so. Alternative low bandwidth versions of content for areas with limited infrastructure may therefore be required.

The use of mobile phones is however growing massively in developing countries. Handheld devices can be charged from intermittent power supplies or solar power, and the supporting infrastructure is easier to maintain than a network of cables to individual houses. The implication for OERs is that in order to prove of maximum benefit (in the developed world too) they will need to be accessible on devices with small screens and a variety of operating systems. This has major design implications and renders much of the content produced to date inaccessible without considerable re-engineering.

Deciding how big an OER module should be and whether there should be subdivisions is a challenge for all creators of content, and brings out many of the issues about granularity and dependencies which the learning object community has been debating over the past decade. In the case of OpenLearn (Lane, 2006) it was decided that a “unit” should be between three and fifteen hours of effort (including study time, “thinking” time) ie between an evening’s worth of study and a week’s worth of part-time study. Subdivisions into smaller sections of three hours’ length would be possible but the unit would be self-contained with no references to other units and minimal hyperlinks to other websites. There could be several learning outcomes per three hours’ study. The units would be put together into “groups” of between five and ten units in the same discipline area and level. Within these groups, learners would be free to study the units in any order they chose. In the end the expected study time for units was between four and thirty hours.

Determining the level of study is another complex issue. Most courses make assumptions about the capabilities of the learner and assume prior subject knowledge. With OpenLearn no assumptions are made about prior knowledge as the units do not lead from one to the next. However OpenLearn classifies units in four levels: *introductory undergraduate* (the learner’s qualifications would not guarantee entry to higher education), *intermediate undergraduate* (the learner has qualifications appropriate for starting higher education), *advanced undergraduate* (the learner has already studied at university level) and *masters* (the learner already has a degree).

OpenLearn took the decision to include self-assessment tasks covering every learning outcome in a unit – either an interactive quiz or a reflective activity which the learner writes up. Due to the limitations of the virtual learning environment used not all forms of paper-based interaction such as filling in a table could be easily replicated online so sometimes these had to be left out. A forum was provided for each unit too, where learners could discuss the content or provide evaluations of the materials.

Determining the recommended study time for a unit was another issue which exercised the OpenLearn team greatly. It was assumed that English would be the learner's mother tongue and that study time would be likely to be longer if not. Learners studying units at *introductory undergraduate* level would be given more time to read than those at *masters* level, for example. It was also assumed that on-screen reading would take longer than reading from print. Further allowance was made for the fact that the materials might be delivered in isolation, thus taking learners longer to "tune-in" than those who were studying a lot of related modules on a formal course. These factors meant that an additional 35% of time was added to the recommended study hours for most content than when they were in their original form.

Translation and localization

Learners are likely to be more motivated when the medium of instruction is in their mother tongue (Stacey, 2007) but this can add considerably to costs. At the UNESCO meeting in Paris Professor Dahbi reported that in Morocco "Multilingualism . . . functions as a limiting factor [since] institutions feel that it is inappropriate and improper to be present on the web only in French, so they spend a lot of energy and resources trying to have Arabic as well as French and sometimes English, which makes the whole effort much more costly or simply aborts the project." (UNESCO, 2002)

Various organisations are involved in translating OCW, OpenLearn and other content into different languages. Pre-eminent among these is China Open Resources for Education (CORE) which incorporates a number of prestigious Chinese universities, and provides a mirror site for MIT content with much of it already translated into Chinese. (Johnstone, 2005) Translations in Spanish and Portuguese are also provided by Universias, a large consortium of institutions in Spain, Portugal and Latin America.

There are serious logistical issues in maintaining translations of OERs. When resources in the original language are updated, those in translation risk being outdated unless there are processes in place to ensure that new translations are made. Finding out which bits of an OER have been updated in order to update the translation could be a time-consuming process. In addition there will always be questions as to the quality of the translation and whether the author's meanings have been interpreted correctly by the translator.

Allegations of cultural imperialism are also levelled at the OER movement and many would like to see a two-way flow of content and interaction between the developed and developing nations. OERs are built around a host culture, using a specific language, pedagogy and institutional philosophy, with literature generally originating from that culture. Such issues have led to discussions regarding the possibilities for local initiatives in developing countries themselves for the production and dissemination of OERs. Interestingly Universias latterly changed its emphasis from translation to assisting their members in the creation of their own OERs. Carnegie Mellon's OLI initiative has partnerships with faculty and institutions in Chile, Columbia and Qatar in order to localize, translate and enhance the courses. Encouragingly, partners include instructional designers and learning scientists as well as subject experts. (Stacey, 2007) However the predominant model is likely to remain the provision of OERs by developed nations with the developing countries lacking the financial and human resources to initiate and maintain significant repositories of OERs.

Sustainability

While many institutions have recognised the benefits of OERs there remain powerful incentives for institutions to protect their investments in educational resources. This may be particularly acute for institutions where distance education is prominent and a large amount of resource is devoted to the production of content. A valued part of the student experience at institutions such as the UK Open University is the receipt through the post of packages of learning materials at the start of a course. These materials are a physical manifestation of the investment a student has made in their studies

and remain of value well after the end of the course. There are concerns that some students might not register for study if all the materials are available freely and this may be one reason why OERs on the UK OU's OpenLearn site generally represent only a proportion of the total content for individual courses.

There remain numerous opportunities for staff and universities to make money through the sale of educational content by deals with publishers or distance learning courses, and the OER movement undoubtedly presents a threat to the status quo. However many institutions and even publishers may see that the benefits of providing OER "loss leaders" are worth forgoing other forms of income generation. The Open University has commissioned popular television programmes with the BBC since the 1970s which cost a significant amount of money but generate positive publicity for the University and increased interest in studying there. One recent television series *Life in Cold Blood* inspired 83,054 potential students to enquire about Open University courses. If similar evidence of registration on OU courses after browsing courses on OpenLearn can be ascertained then there is more justification for sustaining the initiative. McAndrew (McAndrew, 2006) quotes costs of €600 recruitment costs per student and suggests that the €9m costs of the OpenLearn project over two years would be covered if 15,000 new students were recruited as a result of the project. Given that the costs will be significantly lower in future years as the infrastructure has already been developed it begins to look as if maintaining OpenLearn could be almost justified solely on the grounds of student recruitment.

Repositories of OERs will require ongoing substantial investment to retain their usefulness. OERs themselves will become outdated and therefore need to be updated when necessary. New content should be added on a regular basis in order to add dynamism to the site and drive continued visits from users. The sites themselves incur costs in hosting, backing up and installing server upgrades. Stephen Downes examines various financial models for sustaining OER initiatives (Downes, 2007) and these are worth analysing in some detail.

Many US institutions rely heavily for their funding from endowments, and Downes proposes that the *endowment model* might provide a mechanism for the ongoing funding of OER projects. However with interest rates at unprecedented low levels and an uncertain outlook for other investments in the current global economic climate this is unlikely to be a viable option.

This downturn in the World economy may also negatively affect the viability of a *donations model* where a non-profit foundation requests and receives funds to maintain the OER initiative. Wikipedia is funded on this basis however it is able to run its operations with minimal staffing and relies on many thousands of volunteers to create and maintain a website which, though hugely comprehensive, is far less complex than the range of materials considered to be OERs.

A *membership model* is also proposed, where a consortium of institutions funds the OER initiative. There are successful examples of such groupings such as SAKAI, for building educational software, and IMS which coordinates the development of underlying specifications and standards for educational software. MERLOT (MERLOT, 2009) is an example of an OER initiative where member organisations contribute to the costs of maintaining and developing a repository of OERs. However one of the major benefits of OERs as outlined earlier is the branding and reputational potential for the institution which may be lost if efforts are subsumed into a wider membership organisation. On the other hand participation in organisations such as the Open Courseware Consortium is arguably a useful way for the visibility of individual university websites to be increased. (Lee, Albright, O'Leary, Terkla, & Wilson, 2008)

In the *conversion model* consumers of free content are converted to paying customers. Many social software sites utilise this model so that the majority of users can use the system at no cost but those organisations and individuals who find the service vital to their business or lives are prepared to pay

for additional services such as support or advanced features. Flickr is one example and Twitter is another site investigating commercialisation possibilities. Building commercial services around OERs to generate income may indeed be one of the only ways for institutions to justify the continuation of OER initiatives.

The *contributor-pay model* requires producers or commissioners of content to pay for the cost of making it freely available. Downes mentions the Wellcome Trust, which spends £400m producing nearly 3,500 papers each year, (Gser, 2007) requires research funded by them to be made available freely and is prepared to pay considerable amounts of money to ensure that this happens. Meanwhile the German and Austrian government-funded research councils have open publishing requirements, the Spanish Government is investigating a similar policy of open access to the results of all research funded with public monies (Ministerio de Ciencia e Innovation, 2009) and there is a possibility that public bodies will follow suit around the World. This model may be appropriate for publications which require no maintenance however OERs, as has been stated earlier, cannot remain static and it is unlikely that funding OER projects in this way will be sustainable.

A *sponsorship model* where sponsoring institutions raise their profile through logos or advertising does have potential, though intrusive advertisements are likely to be resented by users of OERs. To maximise the usefulness of OERs they will need to be able to be remixed by educators elsewhere who may of course use the opportunity to remove commercial advertising.

The *institutional model* is the dominant current model for sustainability and includes all the major initiatives such as OCW, OpenLearn and Connexions. Here an institution assumes responsibility for the ongoing maintenance of the OERs after initial funding from an outside body is reduced or ceases. With this model the institution retains many of the benefits outlined earlier however it will require considerable ongoing funding and can only be justified if there is an acceptance that the costs are outweighed by the benefits. If OER development practices are viewed as a burdensome additional responsibility for faculty they are unlikely to be sustainable. They may therefore have to become an integral part of teaching responsibilities and the educational mission of institutions (Smith & Casserly, 2006) with their production recognised in promotion and tenure processes. (Stacey, 2007) Embedding such practices in institutions combined with the development of volunteer networks to support and maintain content may a viable way forward.

Also listed is a *governmental model* where governments provide funding for OER developments. In the UK, JISC is funding a programme for the creation of OERs (JISC, 2009) However this and other initiatives are often designed to fund the development of the resources with less thought given to their sustainability. Governments are less likely to commit resource to the ongoing maintenance and development of repositories of OERs. The Worldwide recession may provide the impetus though for this with funding for the development of teaching materials being withdrawn from individual institutions and pooled for the centralised or collaborative development of OERs, maximising the government's investment (though also making the materials freely available to competing nations).

Finally, Downes mentions *partnerships and exchanges* where institutions exchange their expertise in OER production and the OERs themselves. This is a pooling of resources in a similar way to the governmental model but arranged by the institutions themselves rather than being imposed from on high. This has the potential to increase the range and quality of OERs but still requires substantial ongoing financial commitment from the institutions themselves.

In reality none of the nine funding models described above will be sufficient to maintain the majority of the current OER initiatives which are based in a single institution. Where organisations wish to maintain the momentum of their OER programmes they may need both to draw on a range of external and internal funding sources and to weave the production and maintenance of OERs into their institutional fabric so that it is not seen as an additional burden. The Open University's strategy

for sustaining OpenLearn includes embedding the development and use of OERs within all existing activities, continuing to seek grant funding from a range of sources and investigating new business models for educational services around OERs. Perhaps most importantly though procedures and systems are being put in place for formal course materials and OERs to be created simultaneously so that there is minimal additional overhead for the production of the open materials. (McAndrew & Santos, 2008)

Conclusions

The importance of the social aspect to learning is recognised throughout the OER movement and some of the projects have attempted to build learning communities around the content. When students interact in groups they can clarify their understanding by asking questions or listening to answers to other questions. By explaining difficult concepts to other students they are reinforcing their own understanding. Where learning activities involve web-based forums, wikis, blogging and commenting on blogs, opportunities for reflection and the deepening of understanding are likely to be greater than when OERs are provided in isolation.

In fact some argue that providing OERs in the context of teacher-led education will simply fail to provide learners with the skills they need. OLCOS believes the focus should be more on open educational practices which use constructivist and competency-focussed models of learning to promote collaboration and engagement. With technologies such as blogs students gather and interpret information, take a position and back it up with evidence and refer to the writings of others; wikis go a step further by encouraging the collaborative creation of knowledge. (Gser, 2007) Teachers, they say, should “change their roles from dispensers of knowledge to facilitators of open educational practices that emphasise learners’ own activities in developing competences, knowledge and skills.” The teachers themselves should be involved in communities of practice where they share content and experiences and encourage learner participation through the use of social software. (Geser, Hornung-Prahauser, & Schaffert, 2007) OERs will only make a significant impact if a new mind-set and culture in education can be developed to make the best of them, and repositories continue to see teachers and learners primarily as consumers rather than producers and adaptors of content. (Gser, 2007)

The social constructivist paradigm behind the OLCOS vision may be based on sound educational research but it is difficult to facilitate. Online forums for learners are more likely to be utilised where there is a subject expert involved and where participation is clearly linked to the assessment process. With educators, effective communities of practice are not easy to put in place either and are much more likely to succeed if they form spontaneously between people who have a genuine interest in making them work. Wenger (Wenger, 1998) believes communities of practice comprise three main attributes:

- Joint enterprise as understood and continually renegotiated by its members
- Mutual engagement that binds members together into a social entity
- The shared repertoire of communal resources that members have developed over time

While it may be possible to build communities of practice with teachers, none of these attributes is likely to be fostered among individual learners who are outside formal courses of learning unless a highly engaging and dynamic site can be built which draws them back continuously and provides them with direct benefits from engaging with other learners. The OpenLearn project demonstrates the difficulties of attempting to build communities: despite huge interest in the content there is relatively little discussion between learners in the online forums, and educators have not uploaded their own or reversioned content to the extent that was envisaged.

Learners are more likely to benefit from OERs where an associated learning community has been established. They are also more likely to return to repositories which offer the attractions of

dynamically-updated interactive content, thus providing added incentives for institutions to foster such communities and maximise the returns on their investment. Perhaps formal education in order to drive usage of OERs will ultimately prove to be necessary. One venture, the University of the People, proposed by Israeli entrepreneur, Shai Reshev, aims to build on free educational resources and peer to peer teaching networks. It would incorporate attributes of formal education such as registration, weekly discussions, assignments and exams but at a nominal fee for enrolment (\$15-\$50) and exams (\$10 to \$100) (Lewin, 2009)

There is little doubt that educational resources will continue to be made available freely on an ever greater scale and that the OERs are already being used by large numbers of learners and educators around the World. Unlike the open source movement and the social software phenomenon, however, the OER movement is much more organised, less spontaneous, and funded and nurtured to a large extent by organisations such as UNESCO and Hewlett with socio-political agendas. It is not therefore a grass roots movement and runs the risk of floundering if the funding is pulled from it. A key question for the charitable foundations who have spent many millions of dollars in attempting to develop the movement is: has the tipping point for OERs been reached? In the coming years many people will be watching closely whether universities and other educational providers are truly able to embed the production and maintenance of OERs into their institutional processes without reliance on external funding.

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