Open Source Resources in Education: Opportunities and Challenges, Norm Friesen

"For my generation the great innovation was the course team. For the next I suspect that it will be Open Educational Resources."

Sir John Daniel

The education community has been at the forefront in envisioning and conceptualizing infrastructures intended for utilizing and sharing digital content or resources. However, this community has faced challenges in making these visions a reality. We begin by describing a relatively early attempt at creating an economy for sharing educational resources, referred to as learning objects. We then discuss two approaches to opening up educational contents to the world under the auspices of the more recent Open Educational Resources (OER) movement. One of these approaches has focused on creating open resources from scratch, utilizing Wiki content development and management technologies in the wake of the phenomenal success of Wikipedia. A second approach is represented by developments in Open Courseware. Following the example of MIT's Open Courseware (OCW), this approach has more recently been adopted by many other educational institutions under the OCW Consortium. We conclude by making the case that this second approach may represent the most promising of recent developments in the adaptation of open source and open content to educational practices and technologies.

Learning Objects

The term "learning object" has been defined in a number of different but broadly congruent ways. It is significant that each definition highlights 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. Learning objects were not typically associated with whole courses, but were seen as optimally being comprised of smaller modules, units or course sub-components. The use of terms like "modular," "digital" and "object oriented" testify to a broader emphasis on the technological solutions and standards evident in many learning object projects and publications. Technically-based interchangeability and interconnectability implied by the term "object oriented" has been an important issue in learning objects discussions over the years.

The term learning object was first popularized by Wayne Hodgins in 1994. The relatively early date of this coinage is significant: it is roughly simultaneous with the popular emergence of the Web itself. This means that the development of practical and technical conventions, technological solutions and standards for the interchangeability of these objects were the first of their kind for any type of distributed content on the Web. These path-breaking standards include the IEEE Learning Object Metadata Specification and the IMS Content Packaging Specification. The emergence of these standards specifically for education provides an important example of educational technologists being at the leading edge of developments in technology. The early development of these bleeding edge educational specifications in some ways outpaced more general legal, practical and technological developments. They consequently may have ended up creating rather than resolving problems for educators.

Some of the most ambitious visions for learning objects saw complex, interactive educational resources, whether informational or interactive and software-based, as being combined together in the context of a powerful but flexible "component architecture". "We argue that stand-alone applications are incompatible with typical production, distribution, and usage patterns for educational software. We aim to convince the reader that emerging industry-standard component software architectures "[will allow] a comprehensive learning works [to] emerge [on the basis of] contributions from many distributed innovators".

Some saw such emerging industry-standard component architectures as enabling not only new levels of technical interoperation and ease-of-use, but also facilitating the development of new communities, practices and even economies. In an industry white paper entitled [Elusive Vision: Challenges Impeding the Learning Object Economy](#), Lawrence Johnson describes the basis for such an economy: "Commercial exchanges are the heart and soul of any market economy, and in the commercial market for learning objects, end users and aggregators purchase content under specific licenses that allow them to use the objects in clearly defined ways. This arena includes large traditional publishers who want to repurpose their content as learning objects and training companies eager to move into e-learning. Also appearing are a crop of smaller new entrants who publish learning objects as their core business. This market has some special challenges, and many issues related to licensing remain to be sorted out."

Such an economy was not visualized as being open in the sense of open source or OER. Johnson's final observation that "many issues related to licensing remain to be sorted out" provides a clear indication as to why such an economy did not develop, and also why openness has since become much more important in discussing resources for learning and education. The issues related to licensing have ultimately proven virtually impossible to "sort out." At the time of Johnson's statement, many saw digital rights management (DRM) as a technical answer to questions of licensing, particularly in the contexts where modular resources would be recombined and repurposed in complex ways. It would allow uses of digital bits of content to be prescribed and controlled in great detail. DRM technologies would grant or prohibit forms of access and use of a learning object according to a legal license. These technologies have been successfully challenged and undermined in the world of popular music and video, and they have met with even less success in the world of education. This is one among many reasons why the widespread adoption of learning objects, either on a commercial or a more open basis, has not yet occurred. The innovative approach taken by the OER movement to this challenge constitutes one of its most important characteristics.

Open Educational Resources

OER is a term first adopted at a 2002 UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries. The phrase was [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". This definition and its emphasis on open availability and non-commercial use remains central in the way OER are understood today. UNESCO's far-reaching humanitarian goals are still very much relevant to the use of the term OER today.

Creating OER: The Wiki Model

The first OER model we discuss is the creation of open educational content from scratch in online Wiki environments specially designed for the organization and collaborative development of such resources. The Wiki-based approach is primarily associated with the [Wikiversity](#) and [WikiEducator](#) initiatives. Both initiatives were founded in 2006 and share many points of commonality in terms of process, form and content.

Wikiversity was launched with the aim of "...empower[ing] people to achieve their educational goals using resources produced by the free culture movement. The goal...is to create a community of people who support each other in their educational endeavors." WikiEducator has set itself a slightly more ambitious and specific task: To work "collaboratively with the Free Culture Movement towards a free version of the education curriculum by 2015." It is significant that both make clear reference to the free culture movement associated primarily with [Creative Commons](#) and other alternatives to common copyright restrictions. WikiEducator departs from Wikiversity in emphasizing the development of contents for formal education.

WikiEducator and Wikiversity are not limited to addressing post-secondary learning needs, but are designed to serve many educational levels. Both provide separate portals for primary, secondary, tertiary, and other categories of education. Wikiversity's portals offer a number of resources such as courses, discussions, essays, handouts, lesson plans, presentations, reading groups, study guides and syllabi. WikiEducator's portals contain a variety of resources with varying forms of organization and content types.

The ambitious range of resources, services and educational forms and levels encompassed by Wikiversity and WikiEducator is evident in their recent articulations of their surprisingly congruent primary priorities and goals:

- build capacity in the use of Mediawiki and related free software technologies for mass-collaboration in the authoring of free content (WikiEducator, 2009)

- create and host a range of free–content, multilingual learning materials and resources, for all age groups in all languages (Wikiversity, 2006)

WikiEducator is sponsored, in part, by the Commonwealth of Learning, "an intergovernmental organisation created by Commonwealth Heads of Government to encourage the development and sharing of open and distance education knowledge, resources and technologies." WikiEducator places significant emphasis on international development. Wikiversity is a brainchild of the Wikimedia Foundation, which is also responsible for Wikipedia. Wikiversity and Wikipedia currently share eight sister projects ranging from Wikimedia Commons to Wikispecies. Wikiversity aims for an impact that could not be more general and widespread, covering both formal and informal types of education, for learners in wealthy as well as developing countries.

Wikiversity and especially WikiEducator sponsor workshops to build capacity and enable volunteers to create content using the Mediawiki content development and management software. At the time of writing, WikiEducator has delivered over 100 workshops to over 2,000 participants. Wikiversity boasts that it has over "10,537 learning resources and growing".

The Open Courseware Model and MIT

The second approach we discuss is the conversion of existing classroom course content to make it freely available on the Web. MIT's OCW initiative focuses on the conversion of conventional classroom resources. Announced in 2001, the project's goals were originally described in the press as follows: "[MIT] announced plans to post on the Internet materials for nearly all of its courses. Access to the materials, which will include lecture notes, course outlines, reading lists, and assignments, will be open to the public and free of charge. The information posted could be used as reference material, as a source for curriculum development, or as a foundation for independent study".

This approach to OER has met with considerable success. MIT met its own ambitious goal of posting "virtually all" of its courses online by 2007. The MIT project is also noteworthy for its emphasis on MIT's own institutional products and for being one of the few early, high-profile online initiatives announced by a campus-based institution to survive to the present day. The project effectively pioneered the notion of free access to course materials, and popularized the term "open courseware." The OCW Consortium, founded in 2005, takes MIT's OCW approach to a consortial level, bringing together MIT's courses with those of many other universities internationally. At the time of writing, this consortium includes over 200 members and affiliates and has brought together about 10,000 courses. The consortium defines its principle goals as follows:

- extend the reach and impact of open courseware by encouraging the adoption and adaptation of open educational materials around the world

- foster the development of additional open courseware projects

- ensure the long-term sustainability of open courseware projects by identifying ways to improve effectiveness and reduce costs

This last goal is of no small importance to open approaches to educational content, courses and other resources. It forms the focus of the concluding section of this paper.

An Open Question: Sustainability

Sustainability, the capacity of an initiative to outlive its initial startup phase and the associated short-term project funding, is a major concern for OER projects. Both wiki-based resource sets and collections of courseware must find long-term support or revenue. They must develop their particular work from the status of a project to become a program, organization or consortium. It is disquieting to read in a recent report on OER that "the majority of OER development" are generally still being "undertaken on a project basis".

OER activities, specifically when they follow the OCW model, present a relatively clear alternative to project funding: the financial support of the educational institutions with which the courses are associated. Reasons for providing ongoing funding can be compelling for an institution. A number of motivating factors are outlined in the findings of a 2005 Program Evaluation Findings Report produced as a part of MIT's OCW project:

1. The majority of the use of MIT courses is for self-directed, informal learning: namely, to "improve" or "enhance personal knowledge" or to "explore areas outside [one's] professional field". In other words, the majority of materials use occurs outside of institutional settings. This helps to explain a contradiction apparent in the MIT initiative: it is educationally valuable but does not detract from the educational value of the face-to-face activities on which the collected content is based. The informal users of this material, generally located outside of North America, would not be potential on-campus students or "customers" of the institution generating the material.

2. A second finding is connected to the relationship of the project to MIT itself as an institution. It provides clear evidence of multiple areas of significant benefit accruing to MIT from the OCW project, and provides the strongest motivating factor for long-term local support. The report states that "OCW use is centered on subjects for which MIT is a recognized leader," with areas in technology and science accounting for 62% of traffic. Majorities of students and faculty at MIT use the site to support their study and teaching, and 32% of faculty say that putting materials online has improved their teaching. Finally, the role of the project in student recruitment is significant: 16% of student users employ the MIT courses to "plan a course of study," and "35 percent of freshmen who were aware of OCW prior to deciding to attend MIT indicate the site was a significant or very significant influence on their choice of school". Significantly, this percentage of students more than quadrupled from the year before.

Commenting on this rapidly growing awareness of student recruits, David Wiley presents a conclusion that may be of the utmost significance for OER: "The time will come when an OpenCourseWare or similar collection of open access educational materials will be as fully expected from every higher education institution as an informational website is now".

Conclusion

Enlightened institutional self-interest is one of the most powerful drivers for the sustainability of OCW initiatives and for OER more generally. Wiley makes the case in connection with institutional service and recruitment, but MIT has benefited in many other ways from its early investment in OCW. Although MIT is able to leverage an already existing global reputation and first-mover advantage, many benefits would also apply to smaller institutions. These include student recruitment, the potential

for improving teaching and better supporting learning, and viral marketing of the quality of teaching and learning in areas of strategic institutional interest. Those following in MIT's footsteps enjoy the advantage that effective licensing, consortia and growing awareness are all in place. They need not risk financial and cultural capital on creating yet another collection or repository. Instead, they can invest in the quality and accessibility of their course offerings. This is enabled through the OCW Consortium, which combines and centralizes course offerings to create "a broad and deep body of open educational content using a shared model". The OCW Consortium presents a relatively low barrier to entry and only asks of its members a contribution of 10 courses to its growing collection. This low barrier to entry, as well as the expanding number of reputable member institutions, has resulted in the kind of exponential growth shown in Figure 1:

Figure 1: Open Courseware Production in the Open Courseware Consortium
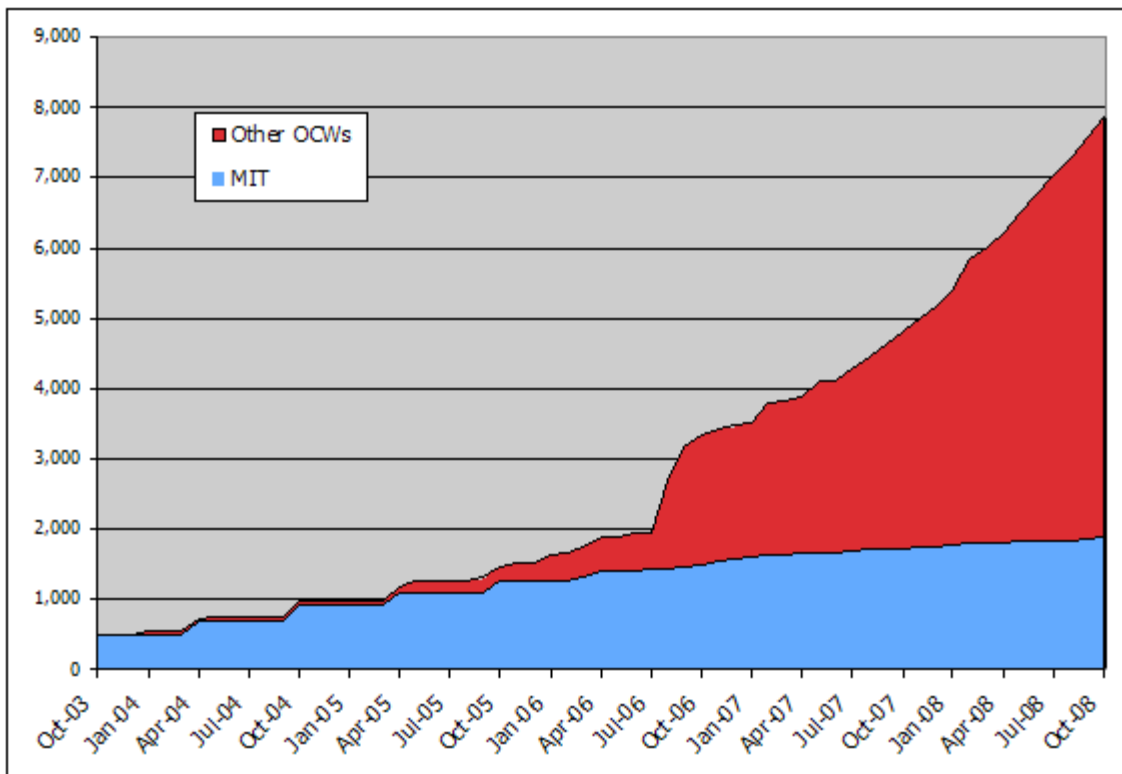
The hope is that the examples, evidence and arguments of the kind provided in the MIT report and the above graph will lead to action and investment whose effects ultimately extend well beyond present institutional interests. The point, as Wiley explains, is that "this strategy of openness" holds out the promise of "catalyzing further innovations". Innovations in practice, community and policy have the potential of fomenting the gradual, cultural sea change that is needed for the success of OCW and OER models of whatever kind.

This paper was written with the support of the BC Centre for Open Learning.