

Open Educational Resources as Learning Materials: Prospects and Strategies for University Libraries

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The Importance of Open Access to Information, Demonstrated by the World Wide Web

Consider the World Wide Web as an existence proof for the innovative power of openness. Many readers of *Research Library Issues (RLI)* will recall the days when the web first began. Many people used the University of Minnesota's "Gopher" system to share and access resources on the early Internet, and then, suddenly, Tim Berners-Lee and his colleagues announced HTTP and HTML back around 1994. Over the next five years, the web grew remarkably, exponentially—and globally. What was the underlying phenomenon behind that remarkable growth?

Publisher Tim O'Reilly has argued,¹ and this article's authors agree, that the underlying reason for this growth was web users' **ability to read the page source code**, provided by the first web browsers—Mosaic, Netscape, and Internet Explorer. The "view source" function was a standard option in these browsers' menus, enabling any end user to see how a particularly appealing webpage was written in HTML. Even though these pages were not formally licensed as open source, they were. Extrapolating from O'Reilly's insight, that extraordinary time of innovation—the amazing expansion of websites globally from 1994 to about 2000—was driven by open access and individuals learning by reading other people's HTML code. The web growth over those six years is probably the **most significant distance-learning program the world has ever seen**. One could say it was perhaps the first "massive open online" learning phenomenon, occurring nearly two decades before anyone ever heard of the idea of a MOOC (massive open online course).

The exceptional growth of websites over this period at the end of the 20th century provides an extraordinary example of the power of open information. People wanting to gain website programming skills learned through the reading of openly available HTML code, and then often innovated or created new derivatives that were grounded upon that code. This foundational logic underlies the idea of providing open access to information in higher education.

Open Educational Resources: What Are They?

Issues around the production, distribution, and access to information and knowledge in higher education involve questions about how people treat these resources as "goods." Political scientists and economists

find the “theory of goods” a useful foundation for establishing policies on access and use of natural resources or, in this case, access to information and knowledge. The theory of goods classifies goods or resources by two attributes: excludability and subtractability. For example, “private goods” are resources that are subtractable (if I have the physical book, then you don’t) and easy to exclude others from using (if I keep this book in my home library, I can keep it for myself). Secondly, “toll or club goods” are those that are, theoretically, not subtractable, but are relatively easy to establish for exclusive use. Many resources provided by university research libraries (such as online journals and databases) fall in this category. Students and faculty affiliated with the university enjoy access while people without university affiliation frequently are unable to gain access, or are able to only obtain limited guest access. “Public goods” are a third category, where the good is not subtractable, and it is difficult to exclude people from access to it, or the producers of the good decide that they do not want to exclude people from this resource; “pure” open educational resources fall under this category.²

At its core, the movement for open access to information is a philosophical position on how to treat digital information, and it involves issues around the cost of production and distribution of information. To be absolutely clear, the production of high-quality information, whether paper-based or digital, requires significant human capital and the authors who develop and present new ideas and the organizations that help to make these ideas available **deserve** to be paid for these contributions. Traditionally, in the context of educational material, this reimbursement for author and publisher time and effort has come through the treatment of information as private or toll goods—the sale of textbooks, for example, or the library subscription to a journal or an online database. But the open access movement, and the search for alternative ways to finance and publish information as a public good, is an issue with which society continues to grapple, and research libraries are central in this debate.

Open educational materials come in two forms. The first form is **pure open access**, and these materials are treated as public goods, are often made available online, and are readable or available for download at no monetary cost to the reader. Educational material available through Connexions at Rice University is an example of pure open access educational content. This article refers to these simply as **open educational resources** (OERs). The second form of open educational materials is called **hybrid open educational resources** (hybrid OERs). These materials are, in effect, examples of toll or club goods referred to above. A key issue for open education efforts is the parameters established by the publisher and the library around the number of concurrent users who can access that material simultaneously. The issue of concurrent usage will be addressed later in this article.

Faculty Use of OERs and Their Motivations

University faculty can be involved with OERs as either producers or consumers of content. Co-author Charles Schweik has had experience in both roles. As a producer, Schweik created a 150+ page course pack of exercises for his geographic information systems class, which he authored with graduate student colleagues and published under a Creative Commons license. This course pack was then distributed through the University of Massachusetts (UMass) Amherst’s institutional repository, ScholarWorks@UMass Amherst (bePress). As a consumer, Schweik generated a list of class readings and exercises for an undergraduate environmental policy class and made these materials available through his course website (Moodle). In the latter case, some materials used were pure open access with Creative Commons licenses,

and others were hybrid open access readings that were available to the students at no cost, due to the subscription paid by the university libraries.

From the standpoint of producing OERs, this is a transition period that will likely take years to reach wide adoption. Much of what university faculty produce and where and how they decide to publish is based on the importance of that publication for their career and future promotion. At a large research institution, peer-reviewed publications, high-caliber journals, and prominent book publishers are the gold standard. But recently, new forms of publishing and readership statistics may be changing that behavior. One example of this new kind of publishing is a video produced by digital ethnographer Michael Wesch of Kansas State University, who produced a YouTube video called “Web 2.0...The Machine is Us/ing Us,” first released in 2007.³ Since that time, the video has gone viral and now has 11,637,661 views. That kind of reach for any written product would be the dream of almost any scholar. This is an era when what constitutes a publication is beginning to change, and the metrics used to evaluate the impact of a publication are also changing. As this continues, publication of openly accessible learning objects might be seen as a more attractive endeavor by faculty than previously realized, and download metrics that are provided by institutional repositories will help faculty gauge the impact of these works.

Turning to the standpoint of consuming OERs, faculty have two obligations to their students when considering open educational resources. First, the resources need to be of high quality and cover the topics that the faculty expect the students to learn. Second, the faculty and the university need to deliver high-quality learning at the lowest possible cost to students. This last point is a significant reason for the development of the Open Educational Initiative at UMass Amherst.

The Open Education Initiative at UMass Amherst

The increasing costs of higher education and the high cost of textbooks has been a concern for students and their parents for many years. As reported by the *Chronicle of Higher Education* in 2011, 78% of undergraduates report not purchasing a required course textbook due to its high price.⁴ Perhaps of more concern is the anecdotal evidence that some students occasionally decide whether or not to take a course based on the expected cost of the required textbooks. This is becoming a bigger issue now that faculty are required to report the textbook titles on the course catalog system so students can see what materials they will be asked to purchase during the registration process.⁵ In short: book cost, not student interest in the subject matter, may be driving some students in their selection of elective courses.

As one response to the rise in student expenses, the University Libraries and Office of the Provost at UMass Amherst developed the Open Education Initiative (OEI). Building upon a program spearheaded by Steven J. Bell, associate university librarian for research and instructional services at Temple University and a member of Temple’s Teaching, Learning & Technology Roundtable Group, UMass Amherst formed a grant-incentive program to change or augment the traditional textbook model with resources that are openly available or available to students at no additional charge.

Begun in March 2011, the UMass Amherst director of libraries and the provost each contributed \$5,000 to award 10 faculty members individual \$1,000 Open Education Initiative grants to seek out an alternative textbook solution in one academic course. Tenure-track faculty were asked to identify the cost of their current teaching materials and to discover or develop replacement materials that would come at little to no cost for the students. To assist faculty, the University Libraries developed an online

guide to open educational resources.⁶ This guide aggregates resources such as Academic Commons, Rice University's Connexions, FlatWorld Knowledge, MERLOT, and the Open Courseware Consortium, among others. Once this guide was created, the libraries reached out to campus partners to develop a support structure for the initiative and then held an internal workshop for subject liaisons to discuss available OERs and useful library databases. The campus partners included the Center for Teaching and Faculty Development, Academic Computing, and the Information Technology Program. Collaboration with these groups provided assistance with technology, teaching, and assessment and provided membership for the grant application peer-review group.

The libraries' Communication and Development Office and the key campus partners rolled out publicity for the Open Educational Initiative over several weeks. Deans and department heads were asked to encourage their faculty to apply. Library subject liaisons were asked to speak to their faculty colleagues about the grant and the available resources. Interested faculty were encouraged to attend a workshop put on by the OEI partners or to schedule an individual consultation to review available resources.

After faculty attended workshops and/or individual consultations, it became clear that, in addition to OERs, the existing library resources, specifically subscriptions to Books 24x7 and Films on Demand, were substantive enough to replace the need for high-cost textbooks or supplementary textbooks entirely. Faculty who did not find adequate existing OERs to accomplish what the grant required, realized that using library resources in conjunction with OERs would be enough to replace or supplement the textbook at no additional cost to their students. These became the toll or club goods referred to earlier as hybrid OERs.

Through the use of OERs, hybrid OERs, and the development of entirely new materials, the first round of the Open Education Initiative granted 11 awards to 9 faculty members in a variety of academic subjects. By using class enrollment numbers and the costs identified in the grant proposals, the total student savings approximated \$70,000 in a single semester. Faculty and student responses to the new materials were observed to be favorable in all courses. The success of the first round of the OEI prompted a second round of grants in the fall of 2011. During this second round, 12 faculty teaching 15 courses were awarded grants, for a total of \$15,000 dispensed and approximately \$135,000 saved. The total recurring savings from both grant rounds came to just over \$205,000 from a \$27,000 investment. Using course enrollment figures, over 1,600 students stand to be affected by the Open Education Initiative each time these courses are taught—the average savings per student per course will be \$128.

The libraries are currently launching a third round of grants, specifically aimed at high-enrollment general-education courses. These classes, typically with an enrollment of over 300 students, are the required 100-level courses taught every semester. Though intrigued by the success of the program, many faculty responsible for these courses have identified a need for larger grants to compensate for the greater investment of time and effort for these larger classes. Formal assessment of the Open Education Initiative is underway using the standard end-of-semester "Student Response to Instruction" forms, as well as separate focus groups and questionnaires for faculty and students.

Challenges and Next Steps

Following the first two rounds of awarded faculty grants and the implementation of (predominantly) new digital materials in courses, it became clear that this initiative was heightening the current definition of

information access at UMass Amherst. With the third round of grant awards underway, analyzing end-of-semester user data to take a closer look at the impact of open educational resources on student learning is clearly only part of the assessment process. Challenges of concurrent user access, material software and hardware conformity for the reading of digital OER products, and content accessibility became more pronounced as increasing numbers of faculty began requiring OERs as part of the core curriculum.

The first instance of a concurrent usage problem presented itself during early stages of the OEI grant awards, in the aforementioned environmental policy course taught by Charlie Schweik. In this instance, a hybrid-OER model was used, integrating an e-book hosted by both ebrary and EBSCO. Unbeknownst to Schweik at the time, the EBSCO single-user license on this newly required e-textbook prevented any of the 80+ students in the class from using the text concurrently. The assumption of multi-user licensing caused problems for students mid-semester, as they were battling with each other to gain access to the required readings.

This issue provided a valuable lesson for the University Libraries and grant participants to ensure that any licensed products allow multiple concurrent usage through leased ownership, as opposed to single-copy licensing, and that the licensing is clearly explained by the library when faculty are looking for these products as they design a course. In larger lecture courses, consideration must be given to increasing multi-user license allotments provided by publishers, as their arbitrary assigned usages are not sufficient for larger general-education courses.⁷ Working to establish more multi-user materials will become a major role of libraries during the contract-negotiation process with the publishers and/or vendors providing these materials.

Increasing the instances of required digital course materials brings attention to the second challenge, software and hardware conformity issues, which is not limited to courses under revision as a part of the OEI. The ongoing investigation of circulating e-readers and tablets is a topic receiving heavy focus from many academic libraries, as successes have been noted in the circulation of such devices in the public sector.⁸ While the amount of digital content increases, students are interested in more portable delivery mechanisms that are compatible with content format. With the University Libraries working closely with faculty, the Center for Teaching and Faculty Development, and Academic Computing, it would stand to reason that the acquisition of specific materials could be coordinated with the procurement and circulation of compatible hardware to students—this is no simple issue.

While EPUB, the successor to the Open eBook format, is the most commonly utilized e-book format by large vendors such as ebrary, this format is not easily transferable to many mobile devices, particularly most e-readers.⁹ The issue of incompatibility with devices and the ongoing difficulties students experience with varying e-book platforms prompted the University Libraries' Research and Liaison group to establish an online guide.¹⁰ The guide assists students in the navigation of sometimes overly complex reader software and issues of general material access through the proxy server. The concept of electronic books is still a difficult one to grasp for many students and faculty, and the libraries' role of information interpreter continues to grow as issues of access increase.

Broader issues of accessibility expanded into the third major challenge for the initiative, ensuring that this content (which is required for completion of coursework) is accessible to **all** users. The accessibility of OERs is an issue drawing increasing attention from online teaching and learning advocates such as Gerard L. Hanley, the executive director of MERLOT and senior director for academic technology services at California State University. The OpenCourseWare Consortium and MERLOT, partnering with

the National Federation of the Blind (NFB), recently presented their concerns of action needed in the higher education community to resolve ongoing issues of access.¹¹ With cases as recent as the *Florida State University v. NFB* settlement in May 2012, the path to making course materials accessible to all students is far from well-travelled.¹²

Aside from addressing issues of content accessibility on a local level within content acquisition and provision, the libraries at UMass Amherst are also participating in a university-wide initiative to address accessibility as new programs and technologies are assessed for implementation. The Technology Access Committee, composed of members from all over the university including (but not limited to) the Provost's Office, Disability Services, IT, and the libraries, was born out of a recognition that issues of accessibility need to be continually addressed. By participating in the action on accessibility at an institutional level, the libraries are much more closely integrated with ongoing campus initiatives, and can provide valuable advice and expertise "from the field," as library staff deal with a large percentage of students currently attempting to access these newly implemented materials.

Conclusion

Just as the high cost of commercial research journals has motivated the academic library community to advocate for open access publishing with faculty, the high cost of commercially published college textbooks is broadening the conversation to include open educational resources. Many of the issues are similar—the concern for quality, the realization that publishing is not "free," the understanding that authors should rightfully expect some level of recognition and/or remuneration for their work, and the fact that faculty can change the paradigm since they are almost totally responsible for the choice of textbooks they require. And, as with open access publishing, many faculty are not aware of the magnitude of the problem or the solutions available to them.

The Open Education Initiative at UMass Amherst has demonstrated there are several ways to address the concerns students and parents have as they face an average of \$1,168 per year for books and supplies.¹³ The University Libraries, in collaboration with the campus academic administration (the Provost's Office), faculty support groups (Center for Teaching and Faculty Development), and academic programs (the Information Technology minor), have led the effort to incentivize faculty to modify the traditional commercial textbook model with resources that are openly available or available to students at no additional charge. Among the alternatives now in place are:

- True open access textbooks available through the libraries' institutional repository, ScholarWorks @ UMass Amherst, or other open textbook solutions
- Hybrid open educational resources that utilize the learning management system to provide access to appropriate resources (articles, e-books, streaming media) already licensed by the libraries
- Reducing the number of "required textbooks" by supplementing one core commercial textbook with either open access resources or resources already licensed by the libraries to reduce the overall cost to students.

OERs are not without issues to address. Faculty need to fully understand copyright and alternatives such as Creative Commons licensing. If faculty are assigning students to use existing licensed resources,

those licenses must provide adequate access for multiple users. And, important for any resources being provided by the campus or the library, the materials must be fully accessible to all students. ARL has recently published two reports, the *Report of the ARL Joint Task Force on Services to Patrons with Print Disabilities*¹⁴ and “Massive Open Online Courses [MOOCs]: Legal and Policy Issues for Research Libraries,” an ARL Issue Brief,¹⁵ that are very helpful in understanding the complexity of these issues.

While assessment of student and faculty satisfaction is still under way, preliminary indications are that both groups are very satisfied with efforts to challenge the existing model of expensive commercial textbooks with a model using OERs. One-time savings to students of over \$205,000 have resulted from an initial investment of \$27,000—and these savings will multiply each time the course is taught. Working with faculty and commercial publishers to promote and facilitate the adoption of open educational resources and other hybrid models places the libraries in an excellent position to uphold their public land-grant mission and to gain support from campus administration, parents, and students.

Endnotes

- 1 Tim O'Reilly, “The Open Source Paradigm Shift,” June 2004 (article based on presentation, Warburg-Pincus Technology, Media, and Telecommunications annual conference, May 2003), http://www.oreillynet.com/pub/a/oreilly/tim/articles/paradigmshift_0504.html.
- 2 There is a fourth category: “common-pool resources” that are subtractable goods but are also difficult to exclude people from using. Goods that fall under this category are often natural resources like fisheries, water resources, and forests. This category isn't as relevant in the context of OERs.
- 3 Michael Wesch, “Web 2.0...The Machine is Us/ing Us,” YouTube video, updated on Jan. 31, 2007, <http://www.youtube.com/watch?v=6gmP4nk0EOE>.
- 4 Molly Redden, “7 in 10 Students Have Skipped Buying a Textbook Because of Its Cost, Survey Finds,” *Chronicle of Higher Education*, Aug. 23, 2011, <http://chronicle.com/article/7-in-10-Students-Have-Skipped/128785/>.
- 5 In compliance with the Higher Education Opportunity Act (HEOA), amendment to Textbook Provision section 112, section 133 dictates:
 - (a) PURPOSE AND INTENT.—The purpose of this section is to ensure that students have access to affordable course materials by decreasing costs to students and enhancing transparency and disclosure with respect to the selection, purchase, sale, and use of course materials. It is the intent of this section to encourage all of the involved parties, including faculty, students, administrators, institutions of higher education, bookstores, distributors, and publishers, to work together to identify ways to decrease the cost of college textbooks and supplemental materials for students while supporting the academic freedom of faculty members to select high quality course materials for students.

- In 2010, UMass Amherst and textbook provider eFollett worked together to establish provision of anticipated textbook and required materials cost to non-enrolled students through the SPIRE registration system.
- 6 Matt Sheridan, "Open Educational Resources" guide, last updated Feb. 19, 2013, <http://guides.library.umass.edu/oer>.
 - 7 The example of an arbitrary assignment of 26 concurrent users in a license by publisher HarperCollins would not suffice for a 300+ student lecture course. Source: American Library Association, *The 2012 State of America's Libraries: A Report from the American Library Association* (Chicago: American Library Association, 2012), <http://www.ala.org/news/mediapresscenter/americaslibraries/soal2012>.
 - 8 In 2011, nearly 28% of public American libraries reported providing e-readers and other mobile devices for checkout to patrons. Source: *ibid*.
 - 9 Many resources report on the incompatibility of e-readers with EPUB, the most prominent in the market since 2010 being the Kindle. Source: Jason Perlow, "EPUB: The Final Barrier for Kindle Adoption," *Tech Broiler* (blog), Aug. 20, 2010, <http://www.zdnet.com/blog/perlow/epub-the-final-barrier-for-kindle-adoption/13804>.
 - 10 This guide can be embedded in any standard course as a widget; it covers finding e-books in the UMass Amherst Libraries' most prominent e-book vendors: "E-Books at UMass Amherst Library," last updated Jan. 2, 2013, <http://guides.library.umass.edu/content.php?pid=234808>.
 - 11 OpenCourseWare Consortium, MERLOT, and National Federation of the Blind, "Accessibility and OpenEducational Resources: Status and Issues for Higher Education," (presentation, Emerging Technologies for Online Learning conference, Las Vegas, NV, July 26, 2012).
 - 12 Marc Parry, "\$150,000 Settlement Reached in Blind Florida State Students' E-Learning Suit," *Wired Campus* (blog), *Chronicle of Higher Education*, March 6, 2012, <http://chronicle.com/blogs/wiredcampus/150000-settlement-reached-in-blind-florida-state-students-e-learning-suit/35659>.
 - 13 College Board, "Quick Guide: College Costs: Books and Supplies," accessed March 27, 2013, <https://bigfuture.collegeboard.org/pay-for-college/college-costs/quick-guide-college-costs>.
 - 14 Mary Case et al., *Report of the ARL Joint Task Force on Services to Patrons with Print Disabilities* (Washington, DC: ARL, 2012), <http://www.arl.org/bm~doc/print-disabilities-tfreport02nov12.pdf>.
 - 15 Brandon Butler, "Massive Open Online Courses [MOOCs]: Legal and Policy Issues for Research Libraries," ARL Issue Brief, Oct. 22, 2012, <http://www.arl.org/bm~doc/issuebrief-mooc-22oct12.pdf>.

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