

MOC OER



Environmental Scan and Assessment of OERs, MOOCs and Libraries:

What Effectiveness and Sustainability Means for Libraries' Impact on Open Education

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Where possible, . . . libraries should engage in conversations around MOOCs and promote their core values. By doing so, they promote the continuing vitality of libraries as partners in the educational system. (Butler, 2012, p. 10)

OER[s] . . . provide great opportunities for an increase in knowledge dissemination in accordance with the educational purpose of universities. It is vitally significant and essential for libraries, the main supporter of educational activities at universities with their informational resources, to participate directly in OER initiatives and revise their services and collections in the scope of OER. (Cakmak, Ozel, & Yilmaz, 2012, p. 1006)

In 2009, librarians started waking up to an emerging open education movement. It began in earnest with a 2009 ACRL/SPARC forum at an ALA Midwinter Meeting, where advocates for Open Educational Resources (OERs) spoke about OERs and the roles libraries could play in supporting them (SPARC & ACRL, 2009). It was further advanced as an important professional issue with the emergence into popular consciousness of massive open online courses (MOOCs) in 2011. Thus, in the last few years, open education has become an important topic in the professional literature, with discussions around library support largely focused on the phenomenon of MOOCs.

Libraries can and should support open education. It fits with librarians' professional support for access to information as a public good, the institutional mandate of academic libraries to support teaching and research, and the professional obligations of librarians in public libraries to support continuing education. But before libraries do so, it is useful to understand the open education movement as a whole, including some of the key challenges facing both OERs and MOOCs and how libraries are well positioned to help address these challenges. By taking a holistic approach, libraries can aid the movement to facilitate universal, affordable, quality education for the peoples of the world and ensure that institutions, faculty, funding agencies, and governments avoid pathways to open education that might prove detrimental to scholarship as well as to society as a whole.

OERs and MOOCs

OERs

OERs are “teaching, learning and research materials . . . that reside in the public domain or have been released under an open license that permits no-cost access, use and adaptation and re-distribution by others” (2012 Paris OER Declaration, 2012). This definition, a refinement of the one adopted by UNESCO in 2002, (UNESCO, 2002, p 6) reflects a commitment to making educational materials freely available to learners worldwide through the creation of educational content that is useful because of its quality. In addition, because of the 4R rights granted to users via open licenses, such content can be freely used (Reused), shared (Redistributed), adapted (Revised), and mashed (Remixed) for cultural, linguistic, technological, or other needs (such as making it accessible to people with handicaps). The definition also includes a wide range of materials—audio, video, texts, video games, and so on useful for educational purposes.

In many ways, OERs are a natural outcome of several social trends. One trend consists of several open-content movements, which strive to liberate research, technology, government information, science, and data from commercial interests that constrain usage via licensing and cost structures. These restrictions have been shown to be detrimental to scholars, information technology personnel, and the general public that finances much of the research occurring in higher education and government (UNESCO & Commonwealth of Learning, 2011, p. 2). Another trend is the evolution of a society where individuals actively share information and where many people collaboratively develop and improve knowledge (e.g., open source) that is then made available for others to freely use or revise. Third, OERs are a natural outcome of Web 2.0 technology combined with the “established [academic] tradition of sharing good ideas with fellow educators” (Cape Town Open Education Declaration, 2007). Finally, OERs are part of a vision of enabling global access to education via the Internet, thereby facilitating free education for the disadvantaged, addressing the need of developing countries for more seats in institutions of higher education (de Langen, 2013, p. 54), and providing people with affordable 24/7 continuing education.

OERs have also benefited from projects initiated by higher education institutions because it is they that have developed the tools, implementation resources, and content required to support open education (Nikolov, 2009, 2). In particular, one can point to

- the creation of an open license used by most OERs: the Creative Commons license created by Harvard University in 2001 (Wiley & Gurell, 2009, p. 13),
- the creation of an open online learning environment, known as OpenCourseWare, by MIT in 2001 in conjunction with the decision to put all MIT courses online for free—a decision that initiated the first discussions of OERs at a forum on OpenCourseWare hosted by UNESCO in 2002 (d’Antoni, 2009, p. 3; Stacy, 2007, Introduction section, para. 1),

- the provision of homes for faculty OERs and open-access research materials via the institutional repositories hosted in numerous academic libraries,
- the provision of homes specifically for learning objects by some higher education institutions (e.g., Rice University's Connexions) as well as by some organizations (MERLOT or OER Commons), and
- the creation of more accessible higher education opportunities via several open universities around the globe.

Finally, the movement gained support from governments and many foundations, including Hewlett (de Langen, 2013, p. 58), which financed many OER initiatives from their inception in 2003. With this support, the technological, licensing, financial, and philosophical foundations for OERs were in place. Projects supportive of open education emerged, with several universities utilizing OpenCourseWare to provide open courses, several repositories supporting a wide range of learning objects, and several commercial publishers, such as Flat World Knowledge, coming into business to house electronic open textbooks and provide low-cost print-on-demand open textbooks (Goldberg & LaMagna, 2012, pp. 337). Each of these projects was defined by the provision of free, quality educational content that ranged from something as small and granular as a graph or image to a full course or textbook. Open Courses and Open Textbooks benefitted from the granularity of smaller learning objects, such as copyright-expected images, music, videos, readings, assignments, tests, course notes, and so forth.

Supporters of OERs point out that governments, institutions, and educators not only contribute and facilitate, they also benefit from and have a real stake in OER creation (d'Antoni, 2009, pp. 5–6; Stacy, 2007, Business Models section; UNESCO & Commonwealth of Learning, 2011, pp. 5–9). Whether one is talking about learning objects, textbooks, digitized library and archival collections (Plotkin, 2010, p. 9), open-access publications, or entire courses, it is not hard for a faculty member or institution to envision opportunities for using them online or face-to-face;

- OERs can be used without the need for copyright clearance or the payment of fees, saving time and resources.
- The ability to revise and remix this content and make it available in a mashed or alternative format
 - opens up all kinds of configuration opportunities for creating classes or courses.
 - facilitates with the creation of open textbooks that cover all aspects of a course—not just 50 percent of it—and have moderate costs that do not present a roadblock to higher education (Belliston, 2009, p. 284; Carr, 2013a, para. 8; Goldberg & LaMagna, 2012, p. 337).

- enables instructors to adjust content to a wide range of linguistic, cultural, accessibility, or bandwidth purposes, thereby making it more widely useful for promoting inclusion or higher enrollments.
- Creating OERs, particularly entire courses, provides institutions with visibility that attracts students, enhances institutional reputation, advances a university’s public service role, disseminates knowledge, and potentially attracts research or endowment funding (UNESCO & Commonwealth of Learning, 2011, p. 7).
- The ability to review content or courses created by other instructors provides educators with opportunities to learn about new and innovative approaches to teaching a discipline, thereby facilitating improvements in curriculum, pedagogy, and teaching.

For these educational and financial reasons, advocates argue that stakeholders should recognize the value that OERs bring to the table and work at eliminating the last remaining barriers to OERs by

- fostering awareness and use of OERs by encouraging educators and learners to participate in the open education movement by creating, adapting, and remixing content,
- calling on educators, authors, publishers, and institutions to release resources openly, using open licensing and open technologies, and
- encouraging governments, school boards, colleges, and universities to make open education a high priority via support for capacity building and policies (e.g., relating to copyright, tenure, and promotions) that facilitate creation and sharing of OERs (*2012 Paris OER Declaration*, 2012; Bissell, 2009, p. 97; *Cape Town Open Education Declaration*, 2007; UNESCO & Commonwealth of Learning, 2011, pp. 5–11).

Librarians can play a central role in advancing each of these objectives. They have relationships with key institutional stakeholders—pedagogical, educational technology, media production, and intellectual property services—that aid in content creation (Hassen, Bordac, Dorner, & O’Brien, 4:19–4:50, 25:30–25:54; Butler, Smith, Crews, & Courtney, 2013). They also have expertise in cataloging and metadata, discovery, and IT services that ensures that they can talk to important groups about OERs, educate others in their use, and “provide economies of scale for nascent and mature OER projects” (Kleymeer, Kleinman, & Hanss, 2010, Introduction section, para. 1). Furthermore, the OER movement’s commitment to open knowledge for all citizens, as well as the value of OERs to the academy and society, means that libraries share a core set of values and goals with the OER movement that makes them natural allies (Cakmak et al., 2012, p. 1003; Former Talis staff member, 2010, *Dovetailing Values* section; Kleymeer et al., Conclusion section, para. 1; SPARC, n.d.-a, para. 1). Indeed, librarians have been advocates for Open Educational Resources longer than the OER movement itself:

- In the print world, public libraries, whose content is free to use and share, were the first and most successful OERs (Downes, 2011, “Freely” section, para. 5; Ronkowitz, 2010).
- The digitization efforts of libraries and archives in the early days of the Web made them among the first online OER creators (Former Talis staff member, 2010, Legacy of Early Digitisation section; Kosewski, 2007, Harvard’s Open Collections Program section; Plotkin, 2010, p. 9).
- These resources were soon followed by extremely valuable content in the form of open-access publications and open data.

If not all these resources were pure OERs (i.e., sharing all rights ascribed to an OER as defined by UNESCO in 2002, these efforts at least shared the same values: the provision of quality educational content to everyone in society regardless of their socioeconomic status. So who could better aid with the OER movement’s goals?

MOOCs

Massive open online courses, or MOOCs, is a name given to immense online classes that are generally (although not always) available for anyone in the world to take for free. When they came into popular awareness in late 2011, they were being offered by major universities that were expending resources to experiment with the provision of free, credit-less, online courses. As such, these courses were taught by leading faculty in some of the most prestigious universities of the world. The possibility of taking courses from an elite university for free was seen as a new, revolutionary phenomenon that captivated the imagination of people everywhere. However, those who observe trends in higher education understood this possibility to be an evolutionary outgrowth of two major trends:

- distance education and online learning, with their technological, assessment, and pedagogical experiments, including iTunes U (Calter, 2013, pp. 2–3), flipped classrooms, use of multimedia in education, open universities, artificial intelligence, big data, and so forth, and
- the Open Educational Resources movement, beginning in 2001 with MIT’s Open-CourseWare—software that was
 - designed to make quality educational content openly available on the Internet,
 - open and available to be used or adapted by other institutions,
 - not created to provide host institutions with certification of students,
 - not interactive (so students were not provided with access to faculty or other students), and
 - experimented with by other major universities, which used it to release selected courses for free.

While many institutions undertook work with MIT's OpenCourseWare, the first MOOC—Connectivism and Connectivist Knowledge, offered by the University of Manitoba in 2008—took its inspiration from OERs and connectivism, using many platforms to ensure that devices were not a limitation to participation. This course had an enrollment of approximately 2,200 students (Downes, 2009, Access in Terms of Awareness section), which was substantial and earned the moniker *MOOC*, but it was nowhere near as large as later MOOCs. For its creators, however, size was of less importance than the use of a more creative pedagogy built around the principles of connectivism: autonomy, diversity, openness, and interactivity. This course had a structure similar to that used by many later cMOOCs (MOOCs built on the principles of connectivism). The course is initiated by a professor, who provides some open course materials that are not linear in nature, but instead clustered around a subject area (Downes, 2009, Access in Terms of Relevance? section). Students selectively review these materials and then provide feedback about them to the learning communities. Students can provide this feedback using any medium they are comfortable with (blogs, multimedia, Second Life, podcasts, concept maps, etc.), and in so doing, they begin the process of sharing their knowledge, creating learning communities, commenting on others' observations or creations, and using the wisdom of crowds to build knowledge. As all the content has open licenses, this leads to the creation by students of open online course materials that fellow students can access, review, analyze, comment on, improve upon, or adapt to any medium. In other words, it leads to the creation of educational resources in a highly scalable fashion. Any changes to content are then fed back to the group for use, adaptation, or remixing. The structure of the course encourages the same types of activities (e.g., use and adaptation) associated with the creation of OERs (Downes, 2009, Solution, Access in Terms of Relevance, Access in Terms of Licensing, & Access in Terms of File Formats sections; Rodriguez, 2012, Connectivist MOOCs section, para. 3–4). It also enables instructors to develop innovative communities where learning takes place (i.e., is effective) with minimal involvement from an instructor (Yuan & Powell, 2013, p. 7). The instructors instead facilitate the educational process for large numbers of students in a sustainable fashion.

By comparison, the first massive courses that captured the imagination of people outside mainstream education were three courses offered by a few Stanford professors in the fall of 2011. Each had enrollments of over 100,000 students, and in one class on artificial intelligence, enrollments approached 160,000 students (Pappano, 2012, para. 3). Each class used technology to facilitate a "technology enriched teacher centered [aka knowledge-transmission model of] instruction" that came to be known as an xMOOC, rather than the learner-centered knowledge construction model (cMOOC) (Yuan & Powell, 2013, 11). The software underlying these courses also allowed for the inclusion of quizzes, feedback and more interaction than what OpenCourseware allowed, even though they did not use crowd sourced interaction as their primary pedagogical method and instead opted to use short, snappy videos, which were found to be successful in a forerunner to xMOOCs: The Khan Academy (Khan Academy, 2013; Pappano, What Is a MOOC Anyway? section, para. 3–4; Yuan & Powell, 2013, 11).

Their success, measured by the number of enrollments, meant that they were quickly followed by three things:

- Three major players were introduced that offered more interactive—and continuously evolving—xMOOCs:
 - edX (an open-source system developed by MIT and Harvard),
 - Coursera (an educational technology company offering MOOCs founded by Andrew Ng and Daphne Koller from Stanford University), and
 - Udacity (a venture firm founded by Sebastian Thrun, David Stavens, and Mike Sokolsky that was an outgrowth of the courses offered by Stanford in 2011).
- Many elite universities partnered with Coursera at a rapid pace, with the exception of those that participated in edX and Stanford University (which created an offshoot of edX known as Class2Go).
- Discussions began among the OER and MOOC communities about the openness and pedagogical practices of new MOOCs (xMOOCs) versus the initial ones that followed connectivist and OER practices (cMOOCs).

Proponents of cMOOCs do not see xMOOCs as OERs (Campbell, 2013; Downes, 2013, 1:26:30; Kolowich, 2012a; Volmer, 2012; Yuan & Powell, 2013, 6). Many are not open in the sense of the courses being free—the major players such as edX and Coursera are, but others, such as Udemy and Udacity, are not. In addition, many do not make their content openly available for others to use [i.e., reuse], redistribute and adapt—edX is supposed to, but commercially financed startup groups used by institutions to host their courses do not (Carr, 2013b; Educause, 2012, p. 3; Kolowich, 2012a; Lurie, 2013, 17:28–18:00). Consequently, OER and cMOOC advocates see the use of the term *MOOC*, which defines these courses as open, as misleading. They call for another term because the use of *MOOC* leads to confusion about openness and Open Educational Resources, and to questions about whether xMOOCs lower the standards for truly free and open education (Carr, August 20, 2013a; Wiley, 2012; Kolowich, 2012a).

A second, more systemic concern about MOOCs is that they could potentially lead to a world of educational haves and have-nots, a world where many people get their higher education from a computer or at a badly underfunded public institution, and a select few get the benefit of an on-campus education at an elite university (Casey, 2012, p. 9; Fowlkes, 2013, It's All About the Students section, para 2–3; Lennox, 2013). In this scenario, investors, together with major research universities (i.e., universities that can afford the expensive up-front investment of MOOC creation), partner in order to maximize profits in the higher education marketplace by offering inexpensive courses to large numbers of cash-strapped students (Casey, 2012, p. 3; Educause, 2012, p. 3). If this competition results in dramatic reductions in enrollments for non-MOOC institutions, it will

cause a reduction in tuition revenues and force these institutions to either form consortia and rationalize or close their doors, either of which would reduce the number of faculty positions and drive salaries down. In addition, under this system of higher education, only rich universities could hire the best researchers and consequently get almost all research money, further reducing the revenue to non-MOOC institutions and leading to a situation where have-not institutions no longer do research, but just teach (Fowlkes, 2013, para. 15–20; Lenox, 2013). An alternative scenario might be that distributed learning is already taking place on campuses, and those students who traditionally look for additional courses from open universities might instead turn to MOOCs, which are less expensive. In this model, traditional universities would likely lose less enrollment revenue, but they would still be in danger of reduced research funding because MOOC institutions, reaping the rewards of redirecting money from open universities to themselves, would have more resources and hire the best researchers. In either situation, the overall number of researchers in a country would likely decline, with negative consequences for a society's ability to generate knowledge in a knowledge-based economy.

Initially, this debate around xMOOCs' openness and their potential threats to higher education was being overwhelmed by their grandness and the hope that they could

- fill the need for millions of more seats in institutions of higher education—a need estimated to be as high as 120 million by 2020 (Casey, 2012, p. 6; Yuan & Powell, 2013, 15),
- serve as an effective continuing education mechanism in areas where knowledge changes rapidly (Kanchanaraksa, Gooding, Klaas, & Yager, 2009, p. 40),
- provide institutions with a way to experiment with emerging forms of instruction and brand extension (Calter, 2013, p. 7; Educause, 2012, p. 3),
- provide institutions with a new business model where, in addition to on-campus courses, there is another layer of education where “students undertake largely independent study with free courses and paid-for external examinations for degrees awarded when they feel ready to take them” (Yuan & Powell, 2013, p. 16), and
- use their online certification model to provide classes at a substantially reduced cost as compared to a traditional class, thereby opening up a new market for MOOC universities: people with less money (Rock, 2013, 17:35–19:20).

More recently, criticisms are being given voice and a more balanced discussion is taking place in general and academic newspapers, numerous blogs, and scholarly conferences and training sessions. Many are asking whether MOOCs have the potential to be a disruptive innovation that has an impact on higher education, affecting both its educational and its business models at a time when the high cost of education leaves many people looking for alternatives and rapid advances in educational technology point to alternatives to the traditional methods used in many universities (Bohle, 2013, President's Top Advisors section, para. 3–4; Casey, 2012, pp. 8–9; Hassen et al.,

2013, 4:19–7:16; Lenox, 2013; Yuan & Powell, 2013, 13). However, all advocacy and criticisms are hypothetical. MOOCs are still in their experimental stage, a period where they are receiving funding from backers and institutions that are excited about their potential but are still experimenting with a wide range of course-delivery issues and funding models that many hope will make them effective, sustainable, and profitable (Casey, 2012, pp. 8–9;; Yuan & Powell, 2013, pp 15–6, 18). In addition, recent moves by MOOC providers have many believing that they underestimated the difficulty of providing unfettered credentialing for their courses. Upon failing to gain control of credentialing from university faculties, MOOCs are now altering their business models so that instead of relying on revenue from tuition (in a system where universities compete with other universities for tuition) —MOOCs are now seeking to generate money from technical and support services (Kolowich, 2013b, para. 13, 82 Students Who Mattered section, para. 5–6). Finally, unless MOOCs become mainstream, no one knows just how they will actually affect higher education as governments and institutions are already coming up with other ways to make higher education affordable (i.e., competitive), such as the Pay It Forward proposal in Oregon that is getting notice elsewhere (Nathanson & StudentNation, 2013).

Needless to say, the buzz around MOOCs has already led to a whirl of discussions related to the role of libraries in supporting institutions offering MOOC courses and their students. There are also questions related to whether libraries, which have made a real commitment to open content, share compatible values with MOOCs as they have been affected by the commercial entities in the movement. In particular, libraries, which have long struggled to free faculty publications from private ownership, are already facing similar concerns as relates to ownership of useful educational materials on some MOOCs. They will now need to ensure that course content remains open (Butler, 2012, p. 14; Educause, 2012, p. 3; Schwartz, 2013, Why Would They Need the Library? section, para. 16).

Despite the fact that some MOOCs are not free and most are not open in terms of the rights they assign to others to use [i.e., reuse], redistribute, or adapt, most do share libraries' commitment to providing people access to affordable information and continuing education. In particular, they are a very good means of educating those for whom money, time, distance, or traditional education methods are a constraint to learning. In so doing, they are

- supporting the growth of a healthy, informed electorate in a democracy,
- providing public libraries with a means to assist people in upgrading their education or skills in an affordable manner (Schwartz, 2013, MOOCs and the public library section, para 4-7, and
- providing people with quality access to information for free.

For these reasons, many libraries are contemplating their role in supporting MOOC initiatives, assisting MOOC students, and using MOOCs in order to provide continuing education for the public or for their own staff (Calter, 2013, p. 7;; Todd, 2013, 2:36–12:35). As more libraries become

aware of the issues around ownership of educational materials and the disruptive potential of MOOCs, other goals need to be considered. In particular, libraries will need to ensure that faculty retain all rights related to self-archiving content. They will also need to introduce a new issue into the debate around scholarly communication: the long-term societal impact on the amount of knowledge being generated by a society that chooses to accept a possible have-and-have-not higher education system.

What Are the Challenges Facing Each Movement?

Challenges Faced by OERs

Although the Open Educational Resources movement is supported by social trends, developments, and funding agencies, it does face several challenges. Producing OERs comes with a host of quality, instructional design, technological, and licensing requirements as well as the need to address funding and participation issues. All are essential in order to ensure that OERs are both effective and sustainable, not to mention free.

Effectiveness

In relation to OERs, *effectiveness* largely refers to the movement's goals to provide quality educational materials that effectively convey knowledge, are freely available, and are useful across borders, cultures, or regions where access to the Internet may be limited, slow, or available only by using specific devices. Meeting these diverse needs means that frequently there are calls for OERs to

- be constructed by subject experts whose knowledge ensures that the learning object is credible and of topical quality,
- follow instructional design and pedagogical principles to ensure that the learning object includes well-laid-out topics, is interactive (so as to engage and challenge learners), and uses the appropriate technologies to facilitate learning (Misra, 2012, p. 3; Stacy, 2007, Open Educational Resource Types section, para. 74–75, Provider Summary section, para. 1), **and**
- adhere to agreed-upon technological standards, such as
 - standard text or video formats (Belliston, 2009, p. 287),
 - discoverability,
 - modularity and granularity (which make learning objects effective, easy to augment, and useful for people with different access and bandwidth issues; Hylén, 2009a, p. 133; Stacy, 2007, Provider Summary section, para. 1), **and**
 - interoperability, to ensure that content can be shared by means of different systems and devices even if format standards are not in place (Downes, 2007, p. 36).

At times, accommodating these diverse needs can be accomplished by the use of specific instructional design, pedagogical, or technological methods. However, at times these approaches (such as the inclusion of an effective rich media tool, like Carnegie Mellon's OLI Introduction to Chemistry course that includes a virtual lab) can come into conflict with local bandwidth, linguistic, cultural or special user needs (Stacy, 2007, Open Educational Resource Types section, para. 68-69; Open Learning Initiative, n.d., Experimental Chemistry section, para 1). This means that adaptation for the purposes of localization / ensuring that learning materials can be widely used, trumps what some believe to be pedagogically excellent [i.e. effective] means of conveying knowledge (Stacy, 2007, Users section, para. 14-19, 24-26). Moreover, pedagogical methods that are informative or useful in one culture can make re-contextualization not only essential, but also problematic, as "there is an inverse relationship between reusability and the 'amount' of pedagogy embedded in the content resource" (Rivard, 2013, Building on the OpenCourseWare Model section; Stacy, 2007, Users section, para. 23-26). Finally, licensing for adaptation, in and of itself, presents its own problems as there has yet to be an agreement on standard licensing practices (e.g. commercial verses non-commercial; use of attribution verses attribution share-alike licensing) (Atkins, 2007, p 28). This makes remixing content problematic as different licenses contain different permissions and restrictions; permissions and restrictions that can come into conflict when attempting to mix a variety of licensed content in a mashup (Belliston, 2009, pp. 286-287; Stacy, 2007, Providers section, Conclusion section, para. 3). Consequently the complexities of creating useful OERs have become part of an ongoing discussion exploring and debating the issue of educationally effective open learning objects. This debate is occurring among those in the movement who are attempting to find sustainable methods of creating educationally useful OERs.

Sustainability: Production Models, Resources, Awareness, and Policies

Broadly defined, *sustainability* refers to the ability of OER projects to (1) meet their goals of perpetuating the production and sharing of open educational resources, and (2) sustain the use and reuse of OERs by their end users (the wider educational community of teachers and learners. (Wiley, 2007, p. 5) Achieving this is a complex task. Different authors deal with a broad range of concerns, such as funding and resources, staffing, developer methodologies, technology, licensing, quality of resources, policy issues, and questions as to whether OERS will become one more thing that higher education institutions provide as part of their day to day operations. (de Langen, 2013, pp. 59-62; Downes, 2007, pp. 34-40; Wiley, 2007, pp. 5-20). They also highlight that quality is achievable only when there is (1) an increased awareness of OERs among ideal producer / end user communities and (2) when producers / end users are able to access the technologies, creative commons licenses and expertise required for creating, adapting, archiving, and open licensing both original creations and derivative works (Wiley, 2007, 5-6). Ultimately, It all comes down to finding the best means of achieving the creation of quality content in the most effective and efficient manner. Debates over the most feasible method revolve around how the content is produced /adapted and how it is funded. No model comes without costs. Instead, it is a matter of degree of cost as weighed against desired outcomes (Downes, 2006, para 31).

Although there is a wide range of production models adopted by different OER projects, when it comes to sustainability, it is useful to broadly classify them by the type of production they encourage or enable: centralized versus decentralized content. In centralized [aka producer-consumer] projects, such as MIT's OpenCourseWare, an institution or organization devotes subject expertise and resources (e.g. instructional design, pedagogical, technological, intellectual property and internal / external funding) to the development of educational products (Wiley, 2007, pp. 7–8). Such projects are generally recognized for producing quality resources, but they require more funding (Downes, 2007, p. 40). Decentralized projects can be subdivided into two types of projects that encourage contributions from people but provide little support. The first is a repository project which typically operates by accepting voluntary contributions from a wide range of people (for lack of a better term “disassociated contributors”), and is typified by projects such as Connexions. The second are co-producer projects that strive to address the issue of quality OER creation by tapping into the “Wisdom of the Crowds,” encouraging contribution from a “community” of individuals focused on a topic, and facilitating access to community created OERs for use and modification by others in the community (Downes, 2009, Scalability/Access section, para 1, Gourley & Lane, 2009, pp. 59, 61–62; Rodriguez, 2012, Analysis of the Tools Used section, para. 7). They can best be exemplified by the student coursework done in cMOOCs or Open University's OpenLearn courses. Overall repository and co-producer decentralized projects expend resources to encourage contributions, provide links to content-creation tools, and maintain their repositories, instead of directly creating [or guiding the creation of] content (Wiley, 2007, p 9). They also require less funding to produce content, but their OERs are more variant in quality, and they may be less consistently adaptable, depending on whether the suggested tools are provided and used (Downes, 2007, p40).

F. T. E de Langen, who recommends the utilization of an Open Business Model (in which the preferences of consumers are central and there is a focus on alliances and partnerships on the part of suppliers in order to meet unique customer needs) (de Langen, 2013, p 56), put forward a more advanced version of the OER co-producer model. de Langen offered this business model as an example of a sustainable co-creator model that relies less on money and more on a non-monetary exchange of goods (de Langen, 2013, p 59), a model wherein Governments, Organizations, Individual suppliers, Institutional suppliers / users and Individual users with a wide range of motives share in development by using an OER Organization that:

- Creates a system that enables customers to interact with one entity, the OER organization, instead of trying to interact with governments, individuals, institutions or organizations (de Langen, 2013, p 59),
- Organizes exchange of products between different stakeholders (including libraries) by targeting those with similar goals (de Langen, 2013, p 59),
- Coordinates the:
 - Incoming streams of money, materials and testimonials from customers, and

- Outgoing streams, distributing comments with respect to products, materials supplied, testimonials and publicity (de Langen, 2013, p 59),
- Provides hosting, quality controls and distributions; services that also serve as revenue streams for their endeavors (de Langen, 2013, p 59), and
- Takes the lead in enticing participation among various stakeholders (de Langen, 2013, p 62).

By coordinating relationships via the creation an Open Business Model for OERs, such a system could (1) lead to the creation of rewarding *community-based models of co-production* known as value networks (de Langen, 2013, p 59-60) the success of which could lead to further interest among potential stakeholders, and could (2) create a mechanism whereby the needs of customers are identified and quickly responded to; a system that replicates the success of the open source movement in collaboratively identifying needed resources and engaging its community in continuously developing and improving said resources (de Langen, 2013, p 61). This scalable model of volunteer production across communities with shared interests could conceivably facilitate quality OER production and adaptation in a sustainable (i.e. affordable) fashion as people voluntarily participate/collaborate in activities that are a priority for them. As Wiley (2007) states:

In place of money, people [and organizations] find other incentives sufficient to merit their involvement in projects. . . . When people find more value in participating in an activity than the cost of participating in the activity, they are likely to participate. [Therefore, OER projects that increase the inherent value of participating] may be able to decrease the extensive incentives [such as money] that are necessary to sustain [OER] projects (p. 6).

The adapted co-producer model has additional advantages. First of all it might be designed to include the capturing of big data in a centralized system; data that could be used to do research on a variety of issues including user / stakeholder preferences, effectiveness of product design, etc. Secondly, it is an approach that empowers users and supports cultural exchange, diversity and internationalization instead of the cultural imperialism that makes the provider-user paradigm resented by people in many countries (Sperber, 2013, para. 1, 5-7; Stacy, 2007, Better Support for Customization section, para. 7).

Regardless of the model of production chosen, quality OERs need to include the knowledge and oversight of subject experts (e.g., faculty). Therefore, it is important to deal with awareness, preparedness, and policy issues that prevent their involvement in OER creation, as such issues are a second area of concern that impacts sustainability (Downes, 2007, pp. 34-37, Wiley, 2007, pp. 5-6). In particular, research indicates that there is a need to address

- the lack of awareness of OERs by the professoriate (Stacy, 2007, Better support for customization, para 17) and students,

- the need to find ways to assess OERs, (which are usually not reviewed for quality or effectiveness prior to release) in order to evaluate quality and provide faculty with opportunities to include OERS in their application for tenure or promotion (Note: Connexions is attempting to address this issue via post-publication reviews and “lenses” (Connexions, n.d.),
- the visibility and ease of locating OERs in order to enable students or faculty to easily find OERs useful for research, courses, or textbook creation (O’Hanlon, 2008, para 15-17),
- institutional policies and procedures (e.g., institutional policies on intellectual property rights that prohibit faculty from signing a CC license (Stacy, 2007, Facilitation of Self and Lifelong Learning section, para. 8–10), and
- the widening of institutional open-access policies and publication addenda in order to (1) make open access the default for MOOC content and (2) make collecting open content easier for libraries with a mandate to archive it (Butler, 2012, pp. 14–15).
- Professorial preparedness also requires that faculty have access to the instructional design, educational technology and intellectual property support needed by those who are interested in creating a wide range of OERs from open textbooks, to data point maps, to video games, to entire open courses. Not only do these services aid with the creation of a wide range of OERS, they also enables faculty to introduce new methods of teaching into traditional courses and fit well into new services supportive of the digital humanities, transformations in scholarly communication and flipped classrooms.

Finally, sustainability issues affecting OERs always involve financial resources because no OER project comes without costs. At present, many projects are experimenting with funding models for OER production. Among these models are endowment, membership, donations, conversion, contributor-pay, sponsorship, institutional support, government support, replacement (substitution), partnership, segmentation, and volunteer support initiatives (Dholakai, King, & Baraniuk, 2006, pp. 18–21; Downes, 2007, pp. 35–36; Wiley, 2007, p. 17). No one model is deemed more successful, although some models work better for certain projects (e.g., where a conversion model is used to print paper copies of a digital OER textbook for a low cost). In addition, some models hold out more promise of ensuring that a project can continue in the long term (e.g., institutional restructuring that deems OERs to be a priority because of their educational and financial implications).

In summary, sustainable development of OERs is complex and requires

- addressing institutional, professorial, and student awareness in conjunction with policy preparedness,
- supporting creators and users in order to allow creation and adaptation of effective, quality resources,

- assisting with the visibility, housing, and archiving of OERs in a manner that encourages contributions and use, and
- finding a means of funding development long term.

Different models are being experimented with. However, it is reasonable to assume that any institution that determines its best long-term interests lie in participating in the world of open education—and in particular in the development and adaptation of OERs—will look for ways to engage as efficiently (i.e., sustainably) as possible. Such an effort would likely lead to OER services being centralized so as to eliminate duplication of work across the institution and allow for better use of resources, on-the-fly team building, and synergy.

Challenges Faced by MOOCs

Despite the hype surrounding MOOCs, they too face significant challenges (although awareness is obviously not one of those challenges). With only two years of practical application, they are a largely experimental undertaking that has yet to demonstrate its effectiveness as an educational tool. Furthermore, the open registration used among many MOOCs offered by higher education institutions means that it is “not entirely clear how the MOOC approach to online education will make money.” (Yuan & Powell, 2013, p 10) As such is the case, it is safe to say that MOOCs also face the sustainability and effectiveness issues that are challenging the OER community. As in the OER community, a multitude of experiments are underway seeking to address these issues.

Effectiveness

The effectiveness of MOOCs relates to a host of issues. A traditional definition of *effectiveness*, as measured against activities in a face-to-face classroom, would imply that effectiveness measures how successful MOOCs are in imparting knowledge to people seeking to complete a course. However, this definition may be insufficient, as the technology, visibility, and big data used in MOOCs provide institutions of higher education with opportunities to use MOOCs for more than educational purposes. Therefore, their success or effectiveness largely depends upon the objectives identified by their home institutions and what is actually achieved over the course of the next few years.

Those measuring the educational effectiveness of traditional classes generally use a range of measures, including enrollment, retention, assessments by deans, and mandatory student feedback forms. Those assessing the effectiveness of MOOCs in transmitting knowledge utilize two of these methods: enrollment and dropout rates of registered students. Student feedback can be submitted, but it is unclear whether it is mandatory, or whether it is submitted only by those who really like or really hate the class, and as a result there are questions around its usefulness as few believe it is demographically representative enough to be suitable for analysis.

The size of any MOOC indicates that enrollment is far in excess of what is traditionally considered good for a fee-based course, so that measure points to effectiveness. But what about retention? This is a hot and contentious debate that centers around

- low retention rates,
- whether the retention rates for different types of MOOCs (cMOOCs versus xMOOCs) make one a superior educational medium, and
- the importance of people who do not do all the assignments (i.e., complete a course) but remain engaged in the activities. These people—lurkers—are similar to those who audit an on-campus course.

In a comparative study of different MOOCs, C. Osvaldo Rodriguez (2012) determined that xMOOCs had a higher dropout rate (85%) than cMOOCs (40%) (Discussion and Conclusions section, para. 7). He attributed the difference to the presence of lurkers in cMOOCs, the class structure of which enabled students to enter discussions when something engaged them (Rodriguez, 2012, Vast Lurker, No Lurker section, para. 6–8). That ability was not present in xMOOCs at the time of the study. More recent data provided by Deidre Woods (2013) at an OCLC conference indicated that xMOOCs might be catching up with cMOOCs in retaining students. She reported a 5–10% completion rate and a 30–40% retention rate in the University of Pennsylvania's xMOOC classes due to people who remained and did some of the work—lurkers (10:46–11:05).. Another analysis by Jeffrey Pomerantz (2013) indicated that, depending on how enrollments are measured completion rates are 5, 10, 15 or 48% (para. 7–16). A retention rate of 30–48% is still below that of the cMOOCs (60%), but Casey (2012, p. 10) pointed out that a higher retention rate may not indicate that cMOOCs are a more successful medium because different areas of knowledge have different educational goals. xMOOCs or cMOOCs may be more useful depending on what the course is trying to achieve. The interactive nature of newer xMOOCs, which enables student interaction, sharing of generated knowledge, and the creation of study groups, as well as a resolution of what counts as an enrolled student, may also close the gap and eliminate the debate about which model is more effective as measured by retention rates (Blom, Verma, Li, Skevi, & Dillenbourg 2013, pp. 1–2).

Of more concern than overall completion rates are data about who graduates from a MOOC. Students who enroll and succeed in a MOOC (whether an xMOOC or a cMOOC) are usually people who already have a higher education degree (Christensen et al, 2013, pp. 4–5; Hylén, 2009a, p. 132; Kolowich, 2012b; Yuan & Powell, 2013, p. 12). Weaker, more unprepared students do not fare as well, and Lederman (2013) quoted Russell Poulin as suggesting that for these people, “student support services . . . could be the differentiator” (The Study's Implications section, para. 5). Salam (2013) suggested that these programs need to think of a university education more broadly.

For some, the current model is exciting despite poor completion rates because the big data gathered about MOOCs indicate that even with completion rates of 5–10%, a professor is able

to educate more students in one class than he or she otherwise would in an entire career (Lurie, 2013, 10:45–11:03; Schwartz, 2013, What Is a MOOC? section, para. 1; Woods, 2013, 10:16–10:23). This fact is used as a measure of true success. For others, the weaker students are evidence of ineffectiveness, with some believing that MOOCs have no place in the higher education of those who have never completed a degree. Still others call for more use of instructional design, pedagogy, educational technology, lab opportunities, and assessments of the role of services, such as libraries and student services, in measures of student success. Pritchard (2013, p. 127) argued that many questions could be analyzed and compared to determine what does and does not work, but doing so requires assessing different approaches taken within the same class. This means that each class must be archived for later evaluation (Schwartz, 2013, Why Would They Need the Library? section, para. 15).

If retention rates were the only measure of importance to institutions offering MOOCs, it is likely that the multitude of universities currently developing these courses would deem them a waste of resources. Consequently, one has to ask: What other drivers are involved? What else is important to the determination of success? Altruism and openness are the first that come to mind, and indeed, they were first and foremost in MIT's motives when it developed OpenCourseWare. For those with a public-service approach to MOOCs, there have been a number of benefits:

- Student feedback often testifies to the ability of MOOCs to provide education to those who, for a number of reasons, traditionally could not attend a face-to-face or distance education class. In one course alone—Penn's Poetry MOOC—testimonials came from a 17-year-old autistic youth; elderly people living in an assisted-care facility, who gathered around the TV to view and later discuss each class; and US Senator Dick Durbin (Rock, 2013, 10:30–13:17).
- Many students enroll not to complete a course, but for purposes of lifelong learning or to learn more about a course, institution, or topic before entering a course of study (Christensen et al., 2013, pp. 5–6; Woods, 2013, 2:40–3:08, 10:50–11:05; Yuan & Powell, 2013, p. 11).
- MOOCs afford people without the resources to pay full tuition the opportunity to learn and gain certification of accomplishments that may be turned into transfer credits in the near future. MOOCs can accomplish this without geographic restrictions provided that the technology supportive of attending a class is available.
- MOOCs enable institutions to make their knowledge and scholarship available to the world, thereby fulfilling their public service mandates (Lenthall, Terwiesch, Candido, Bennett, & Delaney, 2013, 43:21–44:16).

For those institutions not as driven by altruistic motives, the use of MOOCs to advance education (either on or off campus) is often mentioned as a measure of effectiveness:

- Awareness of MOOCs and the experience of professors who teach in a MOOC are generating major discussions on campuses about technology and teaching. One discussion revolves around how instructors can use technology to “flip classes” by recording lectures and using course time for other activities (e.g., deep discussions about topics) that make instruction more interesting and effective. This discussion, in turn, is leading to discussions about how to pull together resources that enable instructors to facilitate current / ongoing changes to how they offer courses, regardless of whether they are teaching a MOOC or not (Rock, 2013, 3:07–6:06).
- MOOCs are generating extensive amounts of information or data that not only aid fellow students in a course but also create major repositories of knowledge that benefit researchers and practitioners in their professional work, thereby expanding the impact of a course beyond its simple educational role (Lenthall et al., 2013, 10:25–13:34).
- Attempts to provide MOOC students with learning opportunities similar to those enjoyed by on-campus students are leading to the integration into courses of technological innovations such as cognitive tutors (intelligent machines programmed to understand course materials and provide lab students with immediate feedback) (Lovett, Meyer & Thille, 2008, pp. 5–9). The creation of a Cognitive Tutor Authoring Tools by Carnegie Mellon makes their programming easier and more likely to become widespread (CTAT, 2013).

Recruiters and faculty have also not been slow to understand the possibilities MOOCs offer in recruiting students. Benefits include

- showcasing courses to garner interest in the institution among potential students (Casey, 2012, p. 3), international collaborators, donors, endowments, and government research funding agencies,
- demonstrating the value of higher education to the general public and governments,
- providing potential alternatives to granting acceptance to a university without the traditional SAT, and
- identifying students of excellence, such as 15-year-old Mongolian student Myanganbayar Battushig, who took edX’s Circuits and Electronics course, received 100% on his final mark, and is now attending MIT on a scholarship (Lurie, 2013, 11:52–12:16; Randall, 2013).

Finally, there is the elephant in the room—money—as even extremely low tuition fees from large numbers of people could garner a significant return on investment if MOOCs are deemed effective educational tools that attract students and are competing for students in the same educational market as exists today (i.e., unaffordable). Until cost recovery and effectiveness are proven, however, MOOCs, like OERs, face a second challenge: that of sustainability.

Sustainability

For MOOCs, *sustainability* refers to an institution's ability to fund the creation of free, effective online courses. Constructing such a course requires a great deal of time and resources. All course content must meet these requirements:

- It must be capable of being displayed to nonpaying students without violating copyright laws—laws that tend to be more generous when applied to the educational purposes of traditional courses. This requirement means that course materials and readings must undergo a rigorous assessment of images, charts, videos, texts, and so forth. Institutions clearing materials typically expend 380 hours for one course (Proffitt, 2013, 7:59–9:40) in order to ensure that all content is
 - open access or Open Educational Resources (Kanchanaraksa et al., 2009, p. 42),
 - used in a manner that it falls within a more restricted interpretation of fair use, and
 - licensed such that all involved in the course's creation are given attribution and have granted permission for the use of their contributions in the MOOC.
- It must be educationally effective despite the absence of faculty support, which means that the institution needs to invest in
 - educational technology and instructional design (Casey, 2012, p. 3),
 - the inclusion of technology and technological standards to ensure that courses are compatible with various platforms and useful for individuals accessing educational modules from areas of low and high bandwidth (usefulness, interoperability), and
 - housing and preserving all class content across various offerings so as to measure what practices work best for each course.

As MOOCs require an investment and are usually free, it is only natural that there are several debates about what would enable MOOCs to be sustainable in the long run. These debates are evenly divided among the type of MOOCs being offered. cMOOC supporters argue that connectivist MOOCs (where the teacher is less a developer of resources and more a facilitator of learning via the creation of learning communities that generate, share, and assess educational resources and knowledge) are pedagogically innovative, more sustainable and facilitate learning (i.e., are effective) better than xMOOCs with lower completion rates (Downes, 2009, 1:28:25). However, data related to their higher retention rates aside, not everyone agrees that cMOOCs are conclusively more effective. Some have concerns that the content produced by participants may not be either educationally useful or legally open. These questions are derived from concerns about student awareness of issues of intellectual property rights, plagia-

rism, and the accuracy and authority of resources used to create a learning object (Bohle, 2013, para. 3). So the debate around the ability of a cMOOC to be useful and be created in a sustainable manner is one that will continue until research provides demonstrable conclusions.

The other MOOCs, xMOOCs, do not yet lay claim to sustainability, but providers are experimenting with various funding models that they believe will enable them to offer their courses in a sustainable (if not profitable) manner. These include the following:

- Providing an institutional commitment to offer courses (e.g., edX) by
 - creating policies supportive of open content (Harvard University Library Office for Scholarly Communication, 2010; MIT Libraries, n.d.),
 - encouraging faculty members to create these courses, and
 - hiring people to assist with their creation.
- Institutions that participate in this activity do so out of an ongoing commitment to openness (Wiley, 2007, pp. 7–8). They, like others, also view MOOCs as an institutional investment in brand extension, recruitment of potential students, identification of high-performing students for scholarships and admissions, and gaining experience with online learning or an experimental space whereby educators can learn how to educate their on-campus students more effectively by trying educational technologies, peer grading, or flipped classrooms (Calter, 2013, 3–4; Casey, 2012, p. 7; Educause, 2012, p. 3).
- Experimenting with the possibility of streamlining institutional development of open courses by using technology that reduces the cost of developing a course to the degree that it might require very little to fund. As of 2006, this approach was under investigation by Sakai and eduCommons. The effort sought a one-button solution to enable the creation of Sakai courses that would allow Sakai courses to be imported into OpenCourseWare. This, in combination with scrubbing to ensure that things like intellectual property clearance occur before a course is published, would minimize costs, making courses more affordable to create (Dehlin, Hardin, & Qian, 2006, Wiley, 2007, 17).
- Generating revenue by charging for on-demand accreditation or transfer credits if requested by MOOC students, who would have to pay for assessments or proctoring of an exam. Although data reflect that some students are ready to trade in their informal studies for credits, certificates, or recognized qualifications (Gourley & Lane, 2009, 60), the issue of accreditation is raising many questions, including these:
 - What will be important measures of educational attainment in the future (degrees, paid certificates, etc.)?
 - Who will have the ability to assess credits for MOOC courses? University faculties? Governments or government bodies advocating on behalf of MOOC providers? (This is a hotly contested issue, and initial efforts to

circumvent higher education institutional processes have been blunted)

(Kolowich, 2013a, para 2–7, Duke Deal Scuttled section, para. 1–2; Kolowich, 2013b, para. 3–5);

- Who will do the assessments? Instructors? Commercial entities? Peers?
(Yuan & Powell, 2013, p. 16)
- How will identity theft and cheating be prevented? Via the use of biometrical protocols and online proctoring practices? (These practices remove a major roadblock to offering transferable credits so that institutions can provide credits for as little as \$200 for a course [Rock, 2013, 17:35–19:10; Schwartz, 2013, What Is a MOOC? section, para 10] or \$700 for a course sequence [bundled courses in related areas [Meyer, 2013]; which converts to a substantial amount of revenue even if only 5–10% of a large MOOC class pay for an assessment.)
- Using MOOCs to market their courses to other, less prestigious institutions that would pay to use the MOOC courses as part of their calendar and trade on the name of institutions such as MIT or Harvard (Bady, 2013).
- Increasing the use of automated grading systems that are “no longer limited to true/false and multiple choice . . . and include complex essays, computer programs, scientific and financial systems modeling, spreadsheets, and mathematical equations” (Bohle, The President’s Top Advisors section, para. 4).
- Charging fees for certificates of participation (Yuan & Powell, 2013, p. 10).
- Obtaining sponsorships, grants, or foundation funding.

Given the need to fund course-design support services in order to improve the effectiveness of online courses where there is minimal instructor support, MOOCs cannot be offered without institutional commitments to devote resources to this enterprise (Casey, 2012, p. 3; Salem, 2013). Currently, there is a real debate. One group sees this investment as a means to enable all institutions, challenged by demands for more seats, lower tuitions, reduced transfer payments, and so forth, to rethink higher education and adopt openness (Yuan & Powell, 2013, 15-18). Others believe it will be feasible only for larger institutions with the money to invest to enter the MOOC marketplace and benefit from MOOCs. What is indisputable is choosing to broadly adapt and accept openness as defined by MOOCs (i.e., open offering of many institutional courses) would likely result in a dramatic restructuring of higher education offerings and operations; open up curriculum, learning, assessment, teaching, funding, degree provision, and services; and alter institutional business models. In other words, MOOCs become a disruptive innovation (Yuan & Powell, 2013, p. 17-18). The impact is, as yet, unknown. But many institutions are worried that if the issue of credentialing and transfer credits is resolved in the direction of MOOCs—and MOOCs are proven to be effective, sustainable, and highly profitable commercial or higher education enterprises—that their traditional business and educational models will be threatened by a system where most resources go to a few institutions that have the resources to commit to this new model of open education formulated around MOOCs.

Libraries and Open Education

So how do libraries fit into these new models of education? To answer this question, it is important to know what they are doing to assist in a host of interrelated and unique resource needs presented by OERs and MOOCs, as well as their potential roles.

Libraries and Open Educational Resources

Presently, there are few data assessing just how many libraries are involved in supporting OER initiatives, what types of activities they are involved with, and how important their activities are to OER projects, with one possible exception: a survey conducted by the Centre for Educational Technology, Interoperability, and Standards (CETIS) in 2010. This survey was distributed to number of specific e-mail lists and had 36 completed responses from people in 12 countries, most of which were from Britain and the United States, and 53% of which were completed by librarians. The data revealed that in many instances (3 out of 4 times), the library played a leading role in many OER initiatives (Bueno-de-la-Fuente, Robertson & Boon, 2012, pp. 6–7) and that most respondents (61%) considered the library’s contributions to be indispensable or very valuable, with an additional 23% viewing library involvement as valuable (Bueno-de-la-Fuente et al., 2012, p. 37).

The survey indicated that the main areas of library involvement were description, classification, management, preservation, dissemination, and promotion, with some involvement in intellectual property and licensing rights, discovery of OERs, evaluation of OERs, use of OERs in teaching, and the creation or repurposing of OERs, but that in many instances, librarians needed to develop expertise in other areas, such as search engine optimization, e-learning, and OER knowledge (Bueno-de-la-Fuente et al., 2012, p. 7). Despite the need for additional skills, the responses

confirm[ed] that the expertise of librarians in most of the general LIS technologies and skills is needed at OER initiatives. Furthermore, OER project librarians also offer expertise in some specific e-learning technologies, as learning content management tools or learning metadata (Bueno-de-la-Fuente et al., 2012, p. 36).

This expertise means library involvement in OER initiatives would be of “great benefit to those [OER] projects not yet engaged with them” (Bueno-de-la-Fuente et al., 2012, p. 7). Despite this, the survey found the importance of library involvement was not widely understood:

Even if the library and/or librarians are well valued by the projects they are already engaged with, the participation of the library is still not widespread, and a significant lack of awareness exists both from OER initiatives with regards to library activities and from libraries about the resources released by OER initiatives (Bueno-de-la-Fuente et al., 2012, p. 7).

Consequently, the study's authors concluded that there is a need for libraries, library associations, and LIS education programs to engage with the OER movement and that facilitating increased participation by libraries could be an important contribution towards making OER initiatives more sustainable (Bueno-de-la-Fuente et al., 2012, pp. 7–8, 11).

The CETIS survey demonstrated that librarians have a host of skills and technologies needed by OER projects, which, if further developed and expanded upon, would enable the OER community to address some of its most pressing problems: awareness and promotion of OERs, capacity building, communities and networking, sustainability, quality, copyright, learning support services, accessibility, facilitation of finding and use of OERs, and the embedding of OERs into institutional policies, structures, and programs (2012 Paris OER Declaration, 2012; d'Antoni, 2008, pp. 11–13; UNESCO & Commonwealth of Learning, 2011, pp. 17–20). Addressing each of the identified issues is complex, but the professional literature and blogs are pointing to a number of ongoing and desirable activities that can, for the sake of comprehension, be broken down into four broad categories: creation, discovery and use of existing OERs, preservation, and sustainability.

Creation of OERs

The literature demonstrates that anyone who wishes to be a key player in facilitating the creation of OERs must be capable of addressing two important issues: (a) advancing stakeholder awareness, policies, and services supportive of OER development, and (b) assisting with capacity building (2012 Paris OER Declaration, 2012; d'Antoni, 2008, pp. 11–13; UNESCO & Commonwealth of Learning, 2011, pp. 6–9). Any library involved in open access or providing assistance via an intellectual property, an information commons, faculty service areas, or a specialized multimedia, data, or map library will recognize that these are exactly the types of services performed in many libraries (Kleymeer et al., 2010, The advantages of libraries, para 1-13).

As regards advocacy work, support of OERs involves a number of activities that garner support for OERs and remove any impediments to their development. These activities include the following:

- increasing awareness of OERs among key stakeholders in higher education (i.e., governments, higher education administration, faculty, and students) and creating an understanding of their benefits, activities suited to librarians due to their commitment to openness and their key relationships with senior administration, educators, and students (Kleymeer et al., 2010, Advantages of Libraries section, para 1; Robertson, R. J., 2010, 3; UNESCO & Commonwealth of Learning, 2011, pp. 5–12),
- addressing concerns about OERs (workload, reduced course enrollments, giving away accumulated knowledge in open courses, proper use of OERs by others who adapt them, etc.) and their educational value (Kanchanaraksa et al., 2009, p. 42; Plotkin, 2010, p. 5; Wiley & Gurrell, 2009, p. 19),

- creating institutional support for OERs via senate, faculty, or departmental discussions and endorsements that can be used to lobby for necessary services, resources, and policies (Belliston, 2009, p. 286; Read, 2008, p. 75; Robertson, J. R. 2010, pp 9, 12; UNESCO & Commonwealth of Learning, 2011, pp. 7–9),
- addressing collective agreement and contract issues that work against OER creation, such as intellectual property policies that prevent creators from signing a Creative Commons license or issues around recognition of OERs for the purposes of tenure or promotion (Hylén, 2009a, p. 133; UNESCO & Commonwealth of Learning, 2011, pp. 7–8),
- upon creating agreement from all necessary stakeholders, then creating policies and procedures that support OER creation (e.g., guaranteeing that all institutional products are to be released under a Creative Commons license), while at the same time eliminating policies and procedures that inhibit their creation (Belliston, 2009, p. 286; UNESCO & Commonwealth of Learning, 2011, pp. 7–8),
- advocating for institutional assistance with content creation by (1) providing faculty with access to needed technology and advice (Hylén, 2009a, pp. 131–132) and (2) ensuring that content is created in a sustainable, affordable, and rational manner via the consolidation of all those important to content creation into one service area to
 - avoid duplication of valuable, scarce, and expensive staff,
 - encourage team building, and
 - make locating advice easier for creators (Read, 2008, pp. 76–77, Robertson, J. R. 2010, pp 4),
- working with institutions, consortia, and government agencies to ensure that OERs are properly supported and funded (Robertson, J. R. 2010, pp 9; UNESCO & Commonwealth of Learning, 2011, pp. 5–11, 19),
- using relationships with institutional publishers, campus bookstores, print centers, and faculty to lobby for open textbook creation, distribution, and reuse (Bell, 2010, pp. 3–4) in order to
 - create a win-win situation for students and libraries by ending the cycle where libraries “buy [costly textbooks] and students win while [libraries] lose, or [libraries] refuse to buy them and [libraries] win but the students lose.” (Bell, 2010, p. 2),
 - allow for the mass customization of textbooks by faculty so they can
 - » use, assemble, or mash only those “chapters, articles, videos or other learning materials that truly meet the needs of their students” (Bell, 2010, pp. 2–3),
 - » change content to appropriate reading levels or include relevant examples and cross-cultural information in the text (Hilton & Laman, 2012, p. 267),

- » work with publishers (such as Flat World of Knowledge), foundations (such as OpenStax), or campus initiatives to create and disseminate open textbooks that potentially lead to better educational outcomes (Hilton & Laman, 2012, pp. 267–269),
- enable faculty to freely use this educational content in
 - » online courseware systems like Blackboard, Canvas, or Moodle in a manner that was not supported by more traditional static, costly, hardcover textbooks (Bell, 2010, pp. 2–3),
 - » open-content courses because students are not prevented from accessing the content due to intellectual property restrictions,
- potentially enable institutions to assist with
 - » the reduction of student debt as it relates to soaring textbook costs via the creation, use and support for open textbooks, (Note: support includes, but is not limited to, intellectual property clearance, advice related to mixing [if some content comes from other open materials], and the hosting / archiving of open textbooks) (Hilton & Laman, 2012, p. 265; Casey, 2012, p. 6);
 - » eliminating textbook costs as one factor impacting student retention, as textbook costs would not preclude students accessing necessary texts or require reduced course loads; factors that lead to a reduction in student completion (Carr, 2013a, para. 8; Hilton & Laman, 2012, pp. 266, 269);
 - » educational outcomes that can be improved by the introduction of open textbooks are modified to meet the needs of local students (e.g. adapting reading levels, incorporating additional learning objectives, inclusion of additional materials supporting learning); modifications that some can improve both outcomes and retention (Hilton & Laman, 2012, pp. 267–269);
- creating OERs within the library for the purpose of educating stakeholders and demonstrating the OERs’ utility (Belliston, 2009, pp. 285–286, Robertson, J. R., 2010, pp 12)..

These advocacy activities are complex, requiring the development and nurturing of relationships and an understanding of technology, intellectual property, publishing, and education in the postsecondary realm. Between librarians’ history of advancing open access; their relationships with publishers, administrators, government, funding agencies, faculty, students, IT, and consortia; their subject, technology, preservation, intellectual property, educational technology, indexing, and preservation expertise; and their experience teaching in the classroom, it is hard to envision another service area better able to serve as educators and advocates for

Open Educational Resources in higher education. Despite this, the connection between OER advocacy and libraries has been mentioned in relatively few professional publications, which is of concern (Bell, 2010, pp. 3–4; Belliston, 2009, p. 286).

More prominent in the literature are discussions about the types of support that libraries might provide to assist in the actual creation of OERs by using the systems or expertise found in many libraries today (Belliston, 2009, pp. 285–286; Robertson, J. R., 2010, pp. 12–13). A few libraries have been leaders in this area and offer support that has evolved into a complex production workflow (Kleymeer et al., 2010, Case Study section, para. 5; Robertson, J. R., 2010, pp. 4). In most instances, libraries have not systematically assessed how they might aid with OER capacity building, but a number of authors have indicated that libraries are in a good position to provide this help by offering

- intellectual property advice, including information on copyright clearance for items used in any OER, replacing proprietary content with open content, and open licensing (i.e., Creative Commons licenses) (Belliston, 2009, p. 286; Hylén, 2009a, p. 133; Kleymeer, et al., 2010, Case Study section, para. 5; Robertson, J. R., 2010, pp. 4),
- instructional design and pedagogical assistance by people who work in libraries, understand OERs, understand what is needed to make OERs useful and effective, and are capable of integrating OER design requirements into their instructional design services (Belliston, 2009, p. 285),
- assistance with mixing or adapting OERs in a wide range of formats to facilitate the creation of new educational materials (widely defined literature as *aid in OER use*) (Robertson, J. R., 2010, pp. 12),
- access to the technology used to create OERs via multimedia labs, data and mapping labs, 3D modeling, and so forth (see, for example, MeshLab, <http://meshlab.sourceforge.net/>),
- expertise in cataloging, indexing, tagging, and metadata in order to facilitate the search for, retrieval of, and discovery of learning objects (Belliston, 2009, p. 286; Kleymeer et al., 2010, Advantages of Libraries section, para. 2; Robertson, J. R., 2010, p. 4, 12),
- housing and archiving of OERs via content management systems or institutional repositories (IRs) with harvesting, metadata and indexing, searching, building, and preservation functions (Belliston, 2009, p. 285; Former Talis staff member, 2010, Synergies section, para 1; Kleymeer et al., 2010, Advantages of Libraries section, para. 2; Robertson, J. R., 2010, pp. 4, 12),
- dissemination of OERs to facilitate discoverability (sites possibly including places like Archive-It, iTunes U, Internet Brands sites, LibGuides, etc.) (Robertson, J. R., 2010, pp. 4, 12), and
- ongoing support for the creation and publication of open textbooks.

Discovery and Use or Reuse of Existing OERs

The second way that libraries could play an important role in enabling OERs to become both effective and sustainable would be to facilitate the use or reuse of existing OERs. In so doing, libraries could ensure that OERs are modified to better serve specific needs (local, diverse, linguistic, cultural, demographic, pedagogical), that their institutions are not reinventing the wheel, and that their institutions are making use of affordable resources (instead of going through the costly process of locating intellectual property owners and paying for permissions). Libraries can do several important things that assist with the use or reuse of OERs:

- Libraries can educate people about OERs by
 - using their valuable teaching and research relationships to make faculty members aware of OERs and the advantages they present (Belliston, 2009, p. 286; Singh, 2008, p. 6; SPARC, n.d.-b, How Do We Enable? section, para. 2),
 - including OERs and digital and OER literacy in information literacy courses (J. Robertson, 2010, para. 3–7; R. J. Robertson, 2010, pp. 5–6), and
 - creating and using OER modules or open textbooks in information literacy classes (Belliston, 2009, p. 286; R. J. Robertson, 2010, pp. 5–6; Singh, 2008, pp. 2–3).
- Libraries can assist with the location of existing OERs by
 - training reference staff to identify, use, or recommend quality OERs in a reference session (J. Robertson, 2010, What Institutional Role? section, para. 3),
 - creating better finding aids for quality OERs across projects (Cakmak et al., 2012, p. 1004; Kleymeer et al., Advantages of Libraries section, para. 3; Robertson, J. R., 2010, pp. 4, 12; Stacy, 2007, Recommendations section, para. 2),
 - using collection development skills to evaluate OERs for quality and inclusion in LibGuides, catalogs, publications, and so forth (Belliston, 2009, p. 286),
 - improving standardization of the cataloging, indexing, and metadata standards for projects so that learning objects are easier to locate and disseminate, making them more visible online (Belliston, 2009, p. 286; Robertson, J. R., 2010, pp. 4), and
 - creating and maintaining a useful home for all OERs, a place that makes sharing easier and aids in OER sustainability by enabling educators in primary, secondary, and higher education to
 - » easily deposit OERs,
 - » identify and access OERs by topic, level, language, or content type,
 - » locate additional useful information, such as reviews, peer reviews, post-publication reviews, and so forth (Pryde, 2009, pp. 4–8), and
 - » identify content in need of development and adjust development according to prioritized projects.

- Libraries can provide users with access to both the technology and the assistance required to effectively use, adapt, or remix existing OERs regardless of type of resource (e.g., data mapping).

Preservation of OERs

A third way that libraries can support OERs revolves around the creation of a stable, long-term home for OERs so as to avoid both the disappearance and the degradation of these digital resources. Here libraries have a significant advantage over any other institutional system, as they have a long record of ensuring that digital materials are preserved.

Most libraries today have either an institutional repository (IR) or a content management system (CMS). These are tasked with creating homes for a myriad of digital objects or collections, as well as ensuring that all content in them is preserved, discoverable, and even downloadable, depending on the level of permission granted by the authors/uploaders. These sites became the natural home for educational materials at institutions wishing to preserve them and many IRs already house a number of OERs as content creators have signed a Creative Commons License granting the 4R rights associated with OERs (reuse, revise, remix and redistribute) when uploading their educational materials. Virtual learning environments (VLEs), on the other hand, are designed to support course management, not manage or curate educational materials; and finding ways to enable content creators to easily move content from an VLE to an IR/CMS would ensure that content is at a minimum preserved, if not easily converted into an OER.

Aside from working with institutional repositories and content management systems, libraries have also taken digital preservation one step further: shared archiving so as to ensure digital content remains available, even when servers go down in one location. The best-known initiative in this regard is Lots of Copies Keep Stuff Safe ([LOCKSS](#)), a system that works across institutions. Libraries have also worked with publishers on a system to preserve their content, be it textbooks or journals. This system is known as the [CLOCKSS](#), or Controlled LOCKSS, project.

Sustainability of OERs

What is undoubtedly the most important contribution that libraries can make to the OER movement is to aid in efforts towards sustainability. As mentioned above, libraries have relationships with all major higher education stakeholders. Therefore in efforts to generate awareness of OERs and support capacity building, libraries could facilitate growth in the number of OER developers and adaptors—and thereby help with issues of scalability. This might not happen overnight—as libraries' efforts to promote open access can attest—but it would ensure that the movement has on-the-ground advocates who know all about intellectual property issues, higher education, educational technology, teaching, curriculum, publishing, and the open-content movement. It would be an important step for the ongoing efforts of these

advocates to encourage the development and use of quality OERs, address issues of concern, lobby for policy changes, lobby for financial support, and aid with creation and adaptation.

Beyond this, libraries have a history of managing resources—whether physical or digital—in a way that facilitates in their discovery, dissemination, usage, intellectual property licensing, and preservation. These systems are already capable of supporting and preserving digital materials in a wide range of formats. Adapting them to include services such as indexing or reviewing of content—and providing technologies that support OER location and usage—is a natural evolution in service. Such an evolution would facilitate the awareness, visibility, and preservation of OERs in the most efficient manner for higher education institutions (Former Talis staff member, 2010, Synergies section, para 2; Kleymeer et al., 2010, Case Study: Moving OER into the Library section, para 1; Read, 2008, pp. 75–76). This effort would involve expanding what libraries currently do to include a centralized repository valued by contributors and locators. Such a repository would have search, retrieval, sharing, categorization, sorting, distribution, evaluation, review, preservation, creator and user interaction, user behavior measures, and the means of collaboratively identifying resources for creation, updates or improvements. The site should be supported by national or international library consortia, an OER organization, governments, and foundations. The existence of such a repository would, in all likelihood, encourage contributions and serve as one of the most important steps in advancing sustainable development of OERs since the initiative gained support from important foundations such as the Hewlett Foundation.

No one in the literature is arguing that this could be done with existing staff and resources (Former Talis staff member, 2010, Money, Money, Money section, para. 1). Instead, the argument must be made that by integrating libraries' existing knowledge, experience, technologies, and stakeholder relationships with institutional service areas that may not be aware of library activities but carry on related work (e.g., instructional design, textbook publishing), institutions could rationalize activities and resources, increase opportunities for synergy, while at the same time furthering the agenda of open education (Read, 2008, pp. 76–77). That agenda would bring advantages to institutions of higher education struggling with student recruitment and retention, unreasonable licensing costs and hassles, and institutional reputation. If this argument is made and won, libraries would be in a position where they could assist the "Learning Object economy [with the development] of less complex, more scalable and more sustainable approaches to sharing OERs" (J. Robertson, 2010, para. 5).

Proponents of OERs share librarians' fundamental belief in providing citizens of the world with free access to knowledge. Therefore, it is reasonable to assume that lobbying and supporting OERs will become a core library activity and that libraries will be given resources to develop them—much as happened with other open-access initiatives. It is likely only a matter of time and of awareness by librarians. But when awareness and support occur—and they will, if for no other reason than the emergence of MOOCs with their open-content requirements—li-

libraries will increasingly be furthering open education as a means to advance their curricular and community service agendas, as well as the wider agendas of their institutions.

Libraries and MOOCs

Like OERs, MOOCs are presently facing a host of issues related to their effectiveness and sustainability. However, they are not facing issues related to awareness. One is already hearing a number of discussions about how libraries can support students and faculty using this potentially disruptive innovation. Questions such as these are being raised: How could libraries support students doing research in massive classes consisting of individuals from around the world? How might one supply information and digital literacy or reference services for students in these courses? How could one possibly resolve issues around copyright, given differences in international copyright laws? What role will MOOCs play in driving libraries towards more open licensing models for commercial content—models that do not preclude people from accessing these resources? Can libraries facilitate this access? If not, would libraries be unable to meet MOOC students' information needs? Is it to be left to the MOOC's community of students to supply one another with information?

Addressing questions related to the capacity and roles of libraries in supporting MOOCs can, in part, be aided by learning what libraries that support existing MOOCs are doing. This approach also helps to clarify the broader challenges facing the movement and what role libraries and the open-content movements might play in supporting MOOCs. Because MOOCs are a recent phenomenon, there is not a great deal published about library involvement. Nevertheless, much can be gleaned from a few recent conferences, as well as from some current discussions on the topic. From them, one learns that some libraries are already active participants in MOOCs. Most library involvement is centered around these functions:

- Providing important intellectual property services and advice from copyright experts—services and advice that enable an institution to offer an open course without fear of legal retribution. These experts generally
 - provide advice related to comprehending these issues:
 - » territoriality and copyright (Butler et al., 2013, 46:00–50:52),
 - » exercising fair use in a more restrictive but achievable manner (Butler et al., 2013, 4:40–18:11),
 - » the importance of using OERs and open-access and public domain materials, and
 - » the importance of avoiding restrictions on access to scholarly and educational material by being good stewards of one's intellectual property with publishers and with those that host your course con-

tent (i.e., MOOCs; Butler, 2012, p. 14; Butler et al., 2013, 51:30–53:13, Schwartz, 2013, Why Would They Need the Library? section, para. 16),

- facilitate usage of restricted materials by doing the following:
 - » finding reasonable agreements with publishers for access to the materials with small fees or without cost (Butler et al., 2013, 25:09–28:17),
 - » encouraging faculty members who want to use their published materials to submit the materials to their university’s institutional repository (Butler et al., 2013, 21:21–57), and
 - » using faculty contacts with publishers to advantage, such as having a faculty member ask a publisher to provide a textbook for free by methods that do not encourage copying and pasting of the publisher’s content (e.g., a JPEG; Butler et al., 2013, 28:19–29:32),
 - ensure that all rights holders for a course (faculty, instructional designers, etc.) are part of any agreement related to openly broadcasting material (Butler et al., 2013 33:00–39:30),
 - advocate for a coordinated approach to policies and procedures supporting ownership, usage, and archiving of educational materials created for MOOCs (Butler et al., 2013, 42:16–42:52, 52:16–52:30), and
 - ensure that those in the library who are responsible for licensing vendor or publisher content do not sign agreements that contain language or clauses problematic for open education (e.g., Agreements should include multi-platform permissions; Butler, 2012, pp. 7–8; Butler et al., 2013, 22:35–24:43, 42:16–52).
- Aiding with the pedagogical needs of courses where MOOC students need to perform research but do not have access to library resources. Such assistance can include
 - recommending to faculty how courses can be structured to accommodate both students with access to regular services and students without access to faculty office hours, libraries, or librarians (Hassen et al., 2013, 44:25–44:45; Schwartz, 2013, Why Would They Need the Library? section, para. 6),
 - developing FAQs and library instructional content
 - » for different types of students (e.g. teenagers, undergrads, lifelong learners),
 - » that take into account instructional design principles,
 - » that are made available at the library website for professors to link to from their course management system, distance education course, or MOOC, and
 - » that are developed in a manageable, sustainable manner that enables the library to provide large classes with more front-end sup-

port so it does not need to provide as much support once a course is in session (Becker, 2013, p. 138; Hassen et al., 2013, 58:26–1:00:00),

- taking MOOCs to become familiar with how such courses are offered and the information needs that result for the learners—who often share information, making them less information consumers and more a community of information sharers, with all the opportunities and concerns that may entail (Bohle, 2013, What Will the Ivy League Look Like? section, para. 1–3; Hassen et al., 2013, 1:00:34–1:02:22).
- Continuing to advocate for open access, open data, open science and, increasingly, OERs, as this advocacy enables usage of open content in MOOCs. In addition, usage of “Open Educational Resources helps librarians conserve resources and speed innovation by drawing upon pre-existing, high-quality materials, freeing some time and energy to focus on breaking new ground” (Mahraj, 2012, p. 364).
- Using MOOCs for continuing education and staff training (Todd, 2013, 2:36–12:35; Ecclestone, 2013, p. 2-3).

As for potential services that libraries might provide, it is instructive to examine the instructional design, intellectual property, and digital resource management needs that MOOCs share with OERs. The research on OERs and MOOCs demonstrates that MOOCs, which are difficult and time-consuming to produce, would benefit from many of the same services and technologies that are important for the scalability, effectiveness, and sustainability of OERs. In particular, it is reasonable to conclude that libraries and institutions wishing to offer MOOCs could invest in an infrastructure that effectively supports both OERs and MOOCs—coordinated services including the following:

- production technologies and creator advice in the areas of instructional design, videography, graphic design, intellectual property, using data or mapping to create learning objects, and so forth (Schwartz, 2013, Why Would They Need the Library? section, para. 2, 6), allowing the creation of
 - OERs that can be remixed, adapted, and freely used by students and faculty across borders without restrictions and
 - effective MOOC courses that utilize technology and pedagogy within the constraints of copyright, fair use, and licensing,
- indexing, metadata, and organizational services that make OERs visible, as they can also be used to
 - structure student forums and make them easier for students to use (Lenthal et al., 2013, 1:08:00-1-08:58), and
 - categorize and organize content created by participants in MOOCs into useful databases of knowledge (Lenthal et al., 2013, 13:13, 107:30–107:53),

- housing and preservation of both OERs and MOOCs (Calter, 2013, p. 7; Lenthall et al., 2013, 1:00:32–1:01:10) so as to allow
 - the location, use, and adaptation of old and new OERs,
 - the comparison of each offering of a specific MOOC course in order to assess what works best (i.e., assess effectiveness; Pritchard, 2013, pp. 127–128; Schwartz, *Why Would They Need the Library?* section, para. 15), including measuring the impact of the library and other student-support services on student success to determine whether MOOCs could facilitate undergraduate education if appropriate support was provided,
 - a means of ensuring that MOOC content remains in the ownership of institutions and faculty instead of being locked behind the closed doors of a MOOC provider (Schwartz, *Why Would They Need the Library?* section, para. 16),
- creation of a centralized value-added contributor and searcher repository that makes contributing both easy and desirable and makes the location of content easy to identify for both OER supporters and MOOC students and faculty,
- library advocacy among all stakeholders to
 - encourage OER contributions,
 - locate funding for OER projects, including funding that might be provided by MOOCs providers,
 - create policies and procedures that are congruent with the goals of OER creation and MOOC development—in other words, the goals of open education,
 - educate stakeholders about issues surrounding license agreements, ownership of MOOC content, and the need to sign only nonexclusive licenses with MOOC providers (Butler, 2012, pp. 10, 14),
 - ensure that institutions that have adopted an open-access policy and do not sign agreements contrary to that policy (Butler, 2012, pp. 10-11), and
 - continue lobbying for open-access policies under which all institutional stakeholders agree to make their content openly available for free (Butler, 2012, p. 14).

Beyond the services that some libraries currently perform in support of MOOCs, it is important to understand the unique challenges of MOOCs and the unusual service demands they place upon libraries. These needs are leading libraries to contemplate a host of services specific to MOOCs. These ideas are constantly evolving, but they currently involve the following:

- embedding subject librarians into MOOC forums, where they

- assist students with research when other students cannot answer a question—an approach that will likely prove challenging due to numerous technical and proprietary issues resulting from working on third-party MOOC platforms, (Schwartz, *Why Would They Need the Library?* section, para. 11; Wright, 2013, *Resources and Methods* section, para. 4),
- provide forum participants with an understanding of what libraries can do, and
- provide students with information related to intellectual property rights, plagiarism, the authority of different resources, finding and managing information, and so forth (Bohle, 2013, *Academic Librarians and STEM Professors* section, para. 2; Mahraj, 2012, p. 366),
- training subject librarians in instructional design and subsequently embedding them in different faculties to
 - aid faculty in achieving their educational objectives from a pedagogical point of view,
 - enable libraries to be at the design table, and
 - make librarians more able to understand and serve the needs of students in these disciplines (Hassen et al., 2013, 51:35–52:18),
- ensuring that librarians deal with the unique intellectual property issues posed by MOOCs by
 - becoming avid advocates for new licensing models (Hassen et al., 2013, 47:50–48:32),
 - continuing the acceleration towards open access and OERs (Hassen et al., 2013, 48:35–49:03),
 - working to ensure that all coursework by students remains in the public domain through informed consent and the archiving of course materials in institutional repositories,
 - exercising and asserting fair use rights by working to ensure that they apply in the context of MOOC courses (Butler, 2012, pp. 6, 9, 13), and
 - ensuring that “accessibility [is] . . . ‘baked in’ to all the content that makes up a MOOC course” (Butler, 2012, p. 15),
- developing broad service agreements between libraries that would include
 - leveraging existing relationships between academic libraries and public libraries to garner public library support for students (Schwartz, 2013, *MOOCs and the Public Library* section, para. 1) and
 - creating important local, national, and international connections between academic and public libraries in the service of students needing research assistance, affordable interlibrary loans, and so forth when taking courses from dispersed communities;

- assessing different methods of delivering resources and information literacy instruction to different courses and to a variety of students across borders (Hassen et al., 2013, 0:30:00-0:35:25).

It is fair to say that most libraries are only beginning to understand what can be done to support MOOCs based upon their existing services and relationships with various library stakeholders. What has been missing from the mix is a discussion about the information we already have about Open Educational Resources and libraries: how what is recommended for OER support could be of equal value to MOOC library services and, by implication, what it means for libraries curious about the kinds of work they would perform in the world of open education. Also missing is a discussion of what OERs tell us about true open education and what that means for libraries faced with the decision of whether they should support MOOCs either by (1) providing services to their students or (2) advocating for them in their home institution. The former question has been glimpsed already in this article. The latter question raises an important ethical issue for libraries that are coming to understand that although they share a core set of values with proponents of OERs, MOOCs are different. First of all, commercial interests play a role in most (but not all) MOOC development and may have “highly proprietary terms and conditions that claim ownership of course content and prohibit sharing or remixing of material” (Educause, 2012, p. 3). This fact is leading to important questions about loss of ownership of intellectual property, questions that plagued librarians for decades as part of the serials crisis. Second, MOOCs may become a disruptive innovation within higher education where only the richest universities fund and profit from MOOCs and the rest lose market share, tuition revenue, and research grants, undercutting both teaching and research: two central values that academic libraries support. And so, with the problem of scarce resources plaguing libraries, the question arises: Why should libraries get involved? Why should they expend time and energy to delve into this movement with all of the complex problems associated with it? At present, there are a number of reasons—some pragmatic, some opportunistic, and some ethical—reasons that sometimes apply to libraries within institutions offering MOOCs but not to libraries within institutions that do not. They include the following:

- While MOOCs are not open in all desirable aspects, most are open in a financial sense, providing people with the opportunity to learn from established scholars for free.
- There is every indication that policy makers intend to provide transfer credits as well as use MOOCs to do things like flip classrooms or evaluate performance for admission to university. If MOOCs are integrated into the curriculum, libraries, which have professional standards in support of distance education library services, will find themselves with a whole new set of responsibilities that they must be prepared to address (Association of College and Research Libraries, 2008; Wright, 2013, MOOC Description section, para. 5).
- MOOCs are a new means for libraries to engage in university partnerships, including pedagogical ones with faculty, and have others see them in a new light (Proffitt, 2013, 10:36–10:49).

- Big data gathered by MOOCs would enable librarians to
 - understand more about how their students learn, improve pedagogy, and improve information literacy (Proffitt, 2013, 10:00–10:28), and
 - gather and organize these big, unstructured data generated by student assignments whenever their work is shared with peers and, in the case of interesting assignments, generate new repositories of knowledge that are openly available to anyone to use and possibly adapt.
- The mandate of academic libraries is to support education, scholarship, and community engagement, all three of which are highly visible in MOOCs, which reach massive numbers of people who benefit from the knowledge scholars bring to the table and thereby demonstrate the value of higher education.
- MOOCs provide libraries with an unheard-of opportunity to openly engage citizens in a dialogue that supports and advances information literacy on a global scale (Mahraj, 2012, p. 364).
- Library involvement during the early phases of MOOC development enables libraries to play a key role in their evolution and
 - provide intellectual property advice that ensures that content remains the property of the institution and that it is open in every sense of the word—financial, legal, and technological,
 - ensure that libraries are able to provide service to students in this new educational medium,
 - use the awareness of open education generated by MOOCs and the proprietary difficulties raised by the crisis in scholarly communication to lobby for institutional and government policies, procedures, collective agreements and contracts, and programs supportive of Open Educational Resources, and
 - lobby for support of, and provide assistance with, the creation of useful educational content as defined by OER requirements, content that can be used and adapted to meet both MOOC and non-MOOC user needs.
- Via their expertise, stakeholder relationships, and services, libraries can aid in the effectiveness and sustainability of MOOCs, making them a critical service area that has a strong voice, even in institutions where the educational and business models of higher education have been transformed. This perhaps is the most important reason for librarians to aid in the MOOC movement. As they do so, however, it is important that they
 - remember the long, hard, fight for open access and work to ensure that their institutions are fully aware of the importance of preventing commercial entities from controlling our intellectual property again,

- remember our responsibility as advocates for scholarly communication by illustrating the long-term societal impact of setting up a system that reduces the amount of scholarship being produced, and
- offer a vision of openness where libraries play a role in enabling institutions to be open, affordable, effective, and sustainable via smarter service units that bring together the pedagogical, educational technology, media production, and intellectual property experts needed to create OERs or MOOCs.

As for reasons not to become involved in the MOOC phenomenon, critics of MOOCs would simply state that they have the potential to have a negative impact on students, teaching, and research: areas that academic libraries are duty-bound to support. But beyond this, an equally important, though pragmatic, factor is that involvement in and support of MOOCs would require libraries to expend energies supporting the second-best alternative to true open education instead of using resources in creating and supporting a model of Open Educational Resources that are free, adaptable, and sharable. A truly open model would provide institutions of higher education with opportunities to

- advance knowledge globally,
- modify content to make it more useful for students who belong to different demographic groups and different cultures, speak another language, might benefit from seeing it in a different format, have limited bandwidth, or have handicaps,
- reduce students' costs via open textbooks,
- leverage taxpayer dollars by
 - allowing free sharing and adaptation of materials developed by publicly funded institutions and in so doing enabling institutions and individuals to stop reinventing the wheel and instead improve existing work via adaptations and enhancements,
 - reducing the cost of content development and speeding up the turnaround time on quality improvement by enabling others who wish to adapt content to do so without the hassle of seeking permission (Hylén, 2009b, pp. 136, 138),
 - utilizing all kinds of innovative pedagogical content not envisioned by the original author (a practice advocated by OER and cMOOC supporters; Vollmer, 2012),
 - utilize innovative learning objects which institutions or professors might never have access to due to the cost of purchasing or licensing some products (e.g. computer simulations),

- provide faculty with opportunities to learn from different pedagogical approaches, the types of learning tools used by their peers, and so forth,
- provide students with opportunities to work with open content and, in particular,
 - optimize their learning experiences by having access to high-quality educational resources over time (Hylén, 2009b, p. 137) and
 - contribute to educational materials by adapting or remixing and potentially be rewarded for work based upon evaluation of it and institutional policies and practices (e.g., an adaptation resulting in recognition for another course if the content is deemed to provide evidence of knowledge, scholarship, etc.),
- increase institutional and professorial visibility and thereby improve opportunities for student recruitment; recognition and awareness of one's work by colleagues within and external to one's institution; and outreach to alumni, the general community, and potential donors, sponsors, funding agencies, and funding organizations,
- reduce the costs and headaches associated with copyright clearance because institutions do not have to contact copyright holders or deal with submissions for clearance of their materials,
- escape licensing restrictions that say content can be used only in a content management system, a MOOC, or another specific venue and instead use the educational content anywhere, including social media sites, provided attribution to the original author is provided (Vollmer, 2012),
- experiment with new business models during a period of globalization and open educational content that increases competition within higher education (Hylén, 2009b, p. 139), and
- participate in open education that is not tied to MOOCs' need to secure accreditation and transfer credits in order to be sustainable. This is particularly important as MOOCs are facing stiff resistance from established programs, which means that they may become a flash in the pan, a failed panacea intended to provide higher education to a multitude of people. On the other hand, OERs, which do not threaten traditional institutions but instead work with them, are a more realistic approach to openly advancing knowledge.

From these pros and cons, it should be clear that libraries in institutions offering MOOCs will be professionally obliged to participate in the MOOC movement for many of the reasons discussed. However, they can use this opportunity (and their service areas that support MOOC production) to advance open access to educational materials, as have many research libraries such as Harvard or MIT and as recommended by professional organizations such as the Association of Research Libraries (Butler, 2012, p. 14). It should also be clear that libraries that are not in institutions offering MOOCs can offer an alternative vision of open education that would

- enable their institutions to deal with many issues have an impact on them (such as the textbook dilemma),
- provide institutions with many of the benefits associated with a MOOC (e.g., exposure to different pedagogical approaches, experimentation with educational technologies, visibility, brand extension, etc.),
- provide for efficiencies,
- provide their users with useful educational materials designed to meet different needs, and
- offer institutions and governments an approach to open education that is sustainable and advances education globally.

However, one driving factor that cannot be ignored is money. If xMOOCs prove to be educationally effective (still a significant question mark), able to gain transferable credits for their courses (difficult due to stiff resistance), and able to attract enough paying students to be highly profitable for institutions and investors (likely dependent upon the amount of support needed to make their courses succeed), the xMOOC model of open education will be fully implemented by richer institutions, which may or may not opt to make their content open. On the other hand, a drive towards openness that facilitates improvements and sharing of educational content, as well as smarter ways of working, will be the driver towards the second model of open education (OERs) for other institutions. Libraries can and should play a central role in either, and in so doing ensure that their institutions and users are best served by a sober look at the pros and cons of different models of openness for learners, educators, institutions, and governments, not just in the immediate future, but in the long term as well. By placing themselves at the heart of this movement—and making themselves indispensable with their knowledge, technology, and services—libraries will be in the best position to advance true openness and carry on their long tradition of providing people, institutions, and society with services and resources that advance knowledge and provide opportunities for all.

Conclusion: Libraries and the Path Forward

The world of academia is transforming into an open education model for many people. Some—particularly those with a university degree looking for continuing education or life-long learning—might be well served by the current xMOOC model of higher education. Others—those with geographic, linguistic, or disability limitations, to name a few—would be better served by an Open Educational Resources model (which includes cMOOCs), where individuals, institutions, groups, or even crowds can adapt educational materials for a wide range of purposes. However, the creators of both MOOCs and OERs are facing the need to ad-

dress two important issues: effectiveness and sustainability. In order for the OER movement to address the issue of sustainability, it also has to address one other issue: awareness.

Libraries can and should play a key role in addressing all three of these issues due to the knowledge, expertise, technology, and stakeholder relationships they possess, and in so doing become important partners in open education. Their role would enable them to have a voice in the evolution of the open education movement to ensure that institutions

- clearly understand the advantages and drawbacks of MOOCs and Open Educational Resources for students, faculty, institutions, governments, society, and research,
- understand the common needs of OERs and MOOCs in their drives towards effectiveness and sustainability, including the service needs of faculty and students,
- understand library operations and how the needs of both MOOCs and OERs can best be met within libraries,
- understand the value of all open content (be it open access, open data, open textbooks, or OERs) to open education and are committed to aiding with its sustainable development,
- pay close attention to policies and agreements that constrain open education, and
- have a plan that will enable them to adapt to a world of open education.

MOOCs have finally raised awareness of open education among governments, university administrations, and the general public. Libraries seeking to provide citizens of the world with access to knowledge are in a good position to work with higher education stakeholders and provide them with an alternative model of open education: a model that is open, rationalized, sustainable and provides more useful (i.e., effective) content—a model capable of working in both MOOC and non-MOOC institutions alike. No one believes it to be easy, but libraries' battles on behalf of open access, together with their increasing encapsulation of relevant publication, multimedia, instructional design, and intellectual property services, means they have the credibility, knowledge, and relationships needed to argue for and support an open education consistent with all of their values, not just some. In so doing, libraries might ensure that higher education

- is not entering into a world where it loses control of its content again,
- is not the sole property of a few major institutions, with potentially devastating impacts on tuition and research in smaller universities,
- is capable of both developing and taking advantage of open content in a rationalized and sustainable fashion, and
- is providing content that aids people with diverse cultural, linguistic, and learning needs.

That is a vision of open education that all libraries could get behind, champion and sustain.

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