Open Education in the Liberal Arts: A NITLE Working Paper

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1. Executive Summary

Open education has grown into a potentially transformative force for higher education. The growing amount and quality of open content, the emergence of new forms of online learning, and the maturity of open source tools combine to present liberal education with institutional challenges and pedagogical opportunities.

Liberal arts colleges and universities are now engaging with open education in diverse ways, usually at the level of pilots and early adoption. Some campuses encourage the production of open content through textbooks, social media, or entire courses. Others focus on consuming externally created and supported open materials, exploring resultant pedagogical and curricular opportunities. The rationale for doing so recalls reasons for using open source software: reduced financial costs, greater flexibility in usage. Such reasons also echo the rationale for open access scholarship: reaching a broader audience, contributing to the commonweal, raising personal or institutional profile. But perhaps the most compelling reason to explore open education is the opportunity to improve learning by sharing educational resources that can then be built upon, making innovative pedagogical approaches more visible, enhancing students' information fluency, developing new learning models, and enlarging access to educational opportunities. Challenges include building faculty awareness, identifying and creating more content appropriate to the liberal arts curriculum, addressing concerns about quality and developing appropriate economic models to support and sustain open education.

Open education also offers opportunities beyond the campus. Inter-institutional use of open content, sometimes mediated through open platforms and open source technology, has opened new venues for collaboration and learning. As populations increasingly socialize and learn digitally, open education articulates new ways of shaping and supporting online instruction. While individuals on campus may follow these routes on their own, institutions can grapple with openness by taking strategic steps. These include: launching and assessing pilot programs; recognizing open work by faculty, staff, and students; exploring new business models or changes to current ones; and adopting a stance of willing yet critical experimentation.

2. Introduction

The past 12 months witnessed significant developments in open education, such as the increasing visibility of the Khan Academy and the flipped classroom model, the launch of MITx's open learning platform and its plans to provide certificates for a small fee,[1] and Stanford professors Peter Norvig and Sebastian Thrun's Massive Open Online Course (MOOC) that attracted 160,000 registrants.[2] Such developments are sparking concerns about looming disruptions to higher education and speculations about the ways that colleges should position themselves. With global competition, the ongoing growth of blended and online learning, and pressures to reduce cost, colleges face a strategic challenge to define their value and plan for the future in an environment of uncertainty and fluctuation. As Siemens and Matheos ask, "What value does a university provide society when educational resources and processes are open and transparent?"[3]

Now, as we shift into an era defined by the open, participatory web, new educational structures and competitors are emerging, although elite liberal arts colleges may be cushioned somewhat by their ability to offer "more of a customized collaborative experience."[4] OER initiatives such as MIT OpenCourseWare (OCW) suggest that universities no longer derive key strategic value from delivering educational content, but instead from fostering community and conversation among faculty and students.[5] Already we are seeing new approaches to open education emerge, such as Massive Open Online Courses to deliver learning; the development of badging systems to accredit learning; and assessment-driven, personalized learning systems such as the Open Learning Initiative.[6]

According to David Wiley, if universities do not adapt to this world of digital content and open education, "Your institutions will be irrelevant by 2020."[7] Likewise, Richard DeMillo sees open education and for-profit education as parts of looming disruptions facing higher education. He suggests that universities—particularly those in the "Middle," "reputable" but not elite—face critical decisions: "The Middle desperately needs a new way of doing

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[1] Marc Parry, "MIT Will Offer Certificates to Outside Students Who Take Its Online Courses," *The Chronicle of Higher Education*, December 19, 2011, sec. Technology, http://chronicle.com/article/MIT-Will-Offer-Certificates-to/130121.

[2] Steve Kolowich, "Massive Courses, Sans Stanford," *Inside Higher Ed*, January 24, 2012, http://www.insidehighered.com/news/2012/01/24/stanford-open-course-instructors-spin-profit-company.

[3] George Siemens and Kathleen Matheos, "Systemic Changes in Higher Education," *In Education* 16, no. 1 (May 2010), http://ineducation.ca/article/systemic-changes-higher-education.

[4] Don Tapscott, "The Impending Demise of the University," *Edge*, June 4, 2009, http://edge.org/3rd_culture/tapscott09/tapscott09_index.html.

[5] Siemens and Matheos, "Systemic Changes in Higher Education."

[6] Kevin Carey, "The Quiet Revolution in Open Learning," *The Chronicle of Higher Education*, May 15, 2011, sec. Commentary, http://chronicle.com/article/The-Quiet-Revolution-in-Open/127545/.

[7] Elaine Jarvik, "Universities Will Be 'Irrelevant' by 2020, Y. Professor Says," *Deseret News*, April 21, 2009, http://www.deseretnews.com/article/705298649/Universities-will-be-irrelevant-by-2020-Y-professor-says.html.

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business that can navigate these waters. Technology cannot come to the rescue, but without new technology change may be impossible. Technology may lie on every road to the future, but only for those universities that can explain why they should survive."[8] Colleges and universities must devise strategies appropriate to the digital age, strategies that define their value and unique identity as well as the role that technology (and open education) will play.

Will such developments threaten small liberal arts colleges, open up opportunities for them to offer students a wider range of educational opportunities, or have minimal impact? How should small liberal arts colleges respond to the open education movement, in which they have been under-represented: join in? join together? ignore it? This working paper represents an initial attempt to answer such questions, drawing upon a survey of CIOs at NITLE member colleges, interviews, and an analysis of published literature.

3. Defining Open Education

In 2012 we are in the second decade of the open education movement. Several major universities have published large amounts of open educational resources (OER) to the Web, winning media notice and academic mindshare. Even as higher education continues to produce open educational resources, we are seeing other approaches emerge, including open courses, platforms, and even universities. Although people tend to associate open education with content (OER), we embrace the broad definition given by Open Education Week:

> Open education is about sharing, reducing barriers and increasing access in education. It includes free and open access to platforms, tools and resources in education (such as learning materials, course materials, videos of lectures, assessment tools, research, study groups, textbooks, etc.). Open education seeks to create a world in which the desire to learn is fully met by the opportunity to do so, where everyone, everywhere is able to access affordable, educationally and culturally appropriate opportunities to gain whatever knowledge or training they desire.[9]

Such a broad definition enables us to emphasize the rationale for open education: enlarging access to education, as well as enabling collaboration and innovation. Aspects of open education[10] include *content* such as syllabi, exercises, readings, and textbooks; open learning *tools* such as wikis, blogging platforms, and open Learning Management Systems; open *standards and protocols* such as Creative Commons licenses and the IMS metadata standard; open courses such as the Open Learning Initiative and the "Change: Education,

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[8] Richard A. DeMillo, *Abelard to Apple: The Fate of American Colleges and Universities* (The MIT Press, 2011), 231.

[9] "About Open Education," *Open Education Week*, February 2012, http://www.openeducationweek.org/about-open-education/.

[10] Ibid.

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Learning, and Technology" MOOC [11]; and open universities such as OERu. By offering such an expansive definition, we hope to address the larger implications of open education: not only what students use to learn, but how they participate in learning communities, how their learning is credentialed, what underlying technical, social and organizational systems support that learning, and how educational institutions should position themselves strategically.

Open education manifests itself in a range of approaches:

- *Open teaching* brings transparency to the classroom, such as Mark Sample's commitment to sharing syllabi, assignments, and even evaluations online.[12]
- *Open curricula*[13] enable learners to participate in shaping their own learning program, as at Empire State University.
- *Open learners*[14] build and share their learning online, such as the Language Learning Forum's Language Learning Log.[15]
- *Open educational resources* (OER) can be defined narrowly as educational materials explicitly licensed for zero-cost consumption and remixable use, such as animations, assignments, textbooks, images, videos, simulations, and syllabi. [16] "Licensing" usually refers to one or more Creative Commons (CC) declarations, or to material placed in the public domain. Such licenses support the "4Rs": revising, so that the OER can be adapted; reusing, so that the content can be used in a range of contexts; remixing, so that OER can be "mashed up" or combined; and redistributing, so that one can copy and share. [17]
- *Open courseware* is a subset of OER that typically includes syllabi, lecture notes, lectures, and assignments, as at MIT Open CourseWare (MIT OCW).
- *Open courses*: Open courses take different forms; most offer curated content and some type of assessment, but some also feature interactive exercises and/or networked learning communities. As open textbooks provide more interactive features, such as embedded assessments, simulations, and integration into a

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[11] http://change.mooc.ca/

[12] Mark Sample, "Transparency, Teaching, and Taking My Evaluations Public," *Sample Reality*, August 4, 2009, http://www.samplereality.com/2009/08/04/transparency-teaching-and-taking-my-evaluations-public/.

[13] Dave Cormier and George Siemens, "Through the Open Door: Open Courses as Research, Learning, and Engagement," *EDUCAUSE Review* 45, no. 4 (July/August 2010).

[14] Ibid.

[15] "Language Learning Forum: Language Learning Log," http://how-to-learn-any-language.com/forum/forum_topics.asp?FID=4.

[16] David Wiley, Cable Green, and Louis Soares, *Dramatically Bringing Down the Cost of Education with OER* (Center for American Progress/EDUCAUSE, February 2012), http://www.americanprogress.org/issues/2012/02/open_education_resources.html.

[17] This definition echoes some applied for learning objects a decade ago. OER inherits much from that movement. See http://www.opencontent.org/definition/ for one of the fullest, most stringent definitions.

community of learners, they become more like open courses.[18] Indeed, Carnegie Mellon's Open Learning Initiative (OLI) offers not only content, but also personalized exercises and embedded assessments designed by a team of learning scientists, content experts, and instructional designers. The Saylor Foundation[19] provides open courses in a range of disciplines, laying out learning objectives, curating a set of freely accessible (though not always explicitly open) online readings and lectures, and giving assignments and a final exam. Massive Open Online Courses such as Cormier and Siemens' "Education Futures"[20] and Jim Groom's "Digital Storytelling"[21] enable instructors to reach new audiences beyond the college gates; build networked learning communities that exchange ideas via social technologies such as blogs, Facebook and Twitter; and innovate in how they structure and support learning.[22] Openness in the context of open courses typically focuses more on access and transparency than re-usability.[23]

- *Open learning tools:* Although open source tools used for administrative, library or scholarly functions fall outside the scope of this report, we do include software that supports learning. These tools can include learning management systems such as Moodle and Sakai, blogging platforms such as WordPress, open e-portfolio and social networking systems such as Mahara, and wikis such as MediaWiki. We also include tools that support the use and production of open educational resources, such as Creative Commons licenses, authoring tools, repositories, and search engines.
- *Open assessment:* Through badges, portfolios, and other mechanisms, the open education community is developing ways to certify learning that often depends upon open educational resources and approaches. For example, Mozilla's Open Badges program provides an infrastructure for organizations to recognize skills that people develop outside of traditional educational contexts.[24]
- *Open universities:* The term "open university" initially referred to a university (first in the UK) that aimed to provide flexible higher education to those facing barriers such as poor health and disabilities. Now the term also applies to networked, online universities that expand access to higher education at a minimal or no cost to the students, often using open educational resources and leveraging peer-to-peer learning. Open universities include Peer2Peer University[25], OERu[26], and University of the People.[27]

[18] Gary Matkin, *Open Learning: What Do Open Textbooks Tell Us About the Revolution in Education?* (Center for Studies in Higher Education, University of California, Berkeley, March 2009), http://cshe.berkeley.edu/publications/publications.php?id=332.

[19] http://www.saylor.org/

[20] http://edfutures.com/

[21] http://ds106.us/

[22] Cormier and Siemens, "Through the Open Door: Open Courses as Research, Learning, and Engagement."

[23] Ibid.

[24] "Badges/About," *MozillaWiki*, December 2, 2011, https://wiki.mozilla.org/Badges/About.

[25] "P2PU", http://p2pu.org/en/.

[26] "OER University," *WikiEducator*, http://wikieducator.org/OER_university/Home.

[27] "University of the People", http://www.uopeople.org/.

Two related open movements should be distinguished from open education for our purposes in this paper. *Open access scholarly communication* refers to articles and monographs published to be publicly accessible, rather than restricted only to paid subscribers. Open educational resources share a similar mission, but are focused on teaching materials, rather than research work, notwithstanding any overlap. With *open source software,* which refers to programs whose code can be accessed and locally modified, we only include those applications that have been used specifically to support teaching and learning. Thus we regard open source software such as the Kuali Financial System to be outside the scope of this paper, although we do include learning management systems such as Moodle and blogging platforms such as WordPress. Some cross-fertilization occurs between these movements within academia.

4. Surveying the Open Education Landscape

To understand the landscape of open education, we can arrange materials along a continuum based on curricular representation. We can also consider the extent of each offering: how rich the media and what interactive capacities are available.

Since the open education movement launched in the early 2000s, the amount of open educational content has grown. Over 3500 courses are listed in the Open Course Catalog, and OER Commons indexes 32,352 open resources.[28] Open courseware produced by universities has been developed alongside a parallel world of open content. If we enlarge our definition of OER to include free online content, an even greater wealth of material is available through sites such as Flickr, YouTube, blogs, and iTunesU. Creative Commons licenses appear on many blogs and Flickr sites. Most of the social Web remains free of charge and accessible through a simple browser click.

Open educational resources are usually asymmetrically positioned within higher education. That is, most OER materials are produced by a small number of academic institutions. The degree and quantity of OER use is the subject of research, but the intended scope of OER consumption is global, the flipside of a small production base.[29] Occupying one pole of this curricular continuum is MIT's OpenCourseWare (OCW). The full range of that campus' academic offerings are now represented therein, with over two thousand courses.[30] At the other end is Open Yale Courses (OYC), which currently hosts lectures (video, audio, and text transcript) and related materials from 35 classes, with a focus on liberal arts

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[28] http://www.ocwconsortium.org/en/courses/catalog, http://www.oercommons.org/

[29] Taylor Walsh, *Unlocking the Gates: How and Why Leading Universities Are Opening Up Access to Their Courses* (Princeton University Press, 2010), 71–72, http://www.ithaka.org/ithaka-s-r/research/unlockingthegates/projects-in-progress2.

[30] Stephen R. Lerman, Shiger Miyagawa, and Anne Margulies, "OpenCourseWare: Building a Culture of Sharing," in *Opening Up Education: The Collective Advancement of Education Through Open Technology, Open Content, and Open Knowledge*, ed. Toru Iiyoshi and M.S. Vijay Kumar (The MIT Press, 2008), 213–227, http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11309.

disciplines.[31] Occupying intermediate positions between these two poles are projects like Connexions (Rice University) or the Open Learning Initiative (OLI; Carnegie-Mellon), which cover uneven swaths of the curriculum. Whereas Connexions (which accepts contributions from the larger community) is strongest in engineering and music, OLI is skewed towards the sciences.[32] Every campus seeking to add to open courseware ultimately makes strategic decisions about the extent of OER coverage.

These offerings vary based on other factors, such as media resources, disciplinary engagement, and even classroom types.[33] Some OER content appears in rich multimedia, with multiple formats and helpful redundancies (i.e., captions for voiceovers, transcript for video). OYC courses, for example, may feature well-shot and –edited video (in several sizes), audio files, text transcripts, and PDF handouts. In contrast, a Connexions item may consist of a web-based module that contains just text (although multimedia can be embedded, and the use of XML means that content can be output as PDF, ebook and other formats). Some OCW courses offer mostly PDFs. The wide variety is based on many factors, including budgets, variable media costs, licensing, and faculty choices. As with the Web itself, the form and extent of individual OER items are somewhat unpredictable.

Interactivity also varies. Materials may be static documents, such as images or text files. They may allow for some degree of media interaction, from scrubbing video content (moving the playhead back and forth) to remixing audio tracks (the primary materials for webcast.berkeley). The most sophisticated level of OER interaction comes from the OLI project. OLI represents Carnegie Mellon University's unique contribution to the open education movement, as it not only provides free (or low-cost) access to learning materials, but also an adaptive learning environment that gathers detailed data on the learner's progress and delivers activities and feedback based on the needs of the learner. The instructor can use this data to understand the gaps in learning and provide appropriate support.

While statistics indicate that some open education initiatives such as MIT OCW and Connexions get used a great deal (Connexions claims 2 million users per month,[34] whereas MIT OCW gets 1 million visitors per month and hopes for one *billion* over the next decade[35]), we don't yet have a clear sense of their impact on learning.[36] Critics have pointed out that open courseware does not necessarily implement the insights of learning

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[31] http://oyc.yale.edu/

[32] Candace Thille, "Building Open Learning as a Community-Based Research Activity," in *Opening Up Education: The Collective Advancement of Education Through Open Technology, Open Content, and Open Knowledge*, ed. Toru Iiyoshi and M.S. Vijay Kumar (The MIT Press, 2008), 229–246, http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11309.

[33] Walsh, *Unlocking the Gates*, 155–56.

[34] "About Us," *Connexions*, http://cnx.org/aboutus/.

[35] "Site Statistics," *MIT OpenCourseWare*, January 3, 2012, http://ocw.mit.edu/about/site-statistics/. http://ocw.mit.edu/about/media-coverage/press-releases/tenth-anniversary/.

[36] Vicki Davis, "Questioning the Future of the Open Student," *EDUCAUSE Review*, August 2010.

science and the best practices of online learning, including interactivity and assessment.[37] Kevin Carey suggests that the impact of the open education movement has been limited because it is difficult to find appropriate learning resources among such abundance and because learners do not have the opportunity to acquire credit for their work (although that is beginning to change).[38] However, we are seeing efforts to move from providing content to more systematic approaches to motivating, structuring, supporting and certifying learning. OLI brings the insights of learning science to open education, developing carefully designed courses that reflect expert knowledge, scaffold learning, provide interaction and feedback, and deliver detailed assessment data to learners, instructors, and researchers. NYU links some of its open courses with Open Study, which facilitates online study groups.[39] Open badges provide a mechanism for students to get credit for the learning they accomplish using freely available resources.[40] Massive open online courses support learning at a large scale by providing a structure, a curated collection of freely available resources, opportunities to come together in weekly webinars (often featuring guest experts), and aggregated content produced by learners (such as blog posts, Tweets, and online forums).

5. The Rationale for Open Education

What motivates institutions and faculty to use, adapt, or produce open educational materials, offer open courses, and/or develop strategies that focus on open education? In making the case for open education, advocates point to several advantages for institutions, students, and society, including lowered costs, improved learning, and greater visibility.

5.1 Lowered Costs, Increased Flexibility

With increasing public attention to the rising costs of higher education, adopting OER offers one strategy for saving students money on course materials and expanding access to education. According to the student PIRG's 2010 report *A Cover to Cover Solution: How Open Textbooks are the Path to Textbook Affordability*, the typical student spends about $900 per year on textbooks, which represents 26% of annual tuition costs at a public, four-year university.[41] Not only could open textbooks cut students' costs by as much as 80%, but

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[37] Eric Jansson, "Open Questions on Open Courseware," *Inside Higher Ed*, July 7, 2011, http://www.insidehighered.com/views/2011/07/07/essay_on_unanswered_questions_about_open_courseware.

[38] Kevin Carey, "The Quiet Revolution in Open Learning," *The Chronicle of Higher Education*, May 15, 2011, sec. Commentary, http://chronicle.com/article/The-Quiet-Revolution-in-Open/127545.

[39] Audrey Watters, "OpenStudy Partners With Yale and NYU to Offer More OER Study Groups," *Hack Education*, January 11, 2011, http://www.hackeducation.com/2011/01/11/openstudy-partners-with-yale-and-nyu-to-offer-more-oer-study-groups/.

[40] "Badges - MozillaWiki", https://wiki.mozilla.org/Badges.

[41] Wiley, Green, and Soares, *Dramatically Bringing Down the Cost of Education with OER*.

they could also pressure publishers to reduce their prices.[42] Open textbooks could also offer more options to students, who could choose the format that they prefer (such as color or black and white for printed materials, digital for various platforms).[43] The Internet radically lowers the costs of copying and distributing materials; whereas it would cost $5 to print a 250-page book and around $5 to ship it, it costs about $0.0008 to copy a digital version of that book and about $0.0007 to distribute it.[44]

Although colleges could save students some money by adopting open textbooks, the impact would likely be fairly limited at many liberal arts colleges, since textbooks are typically a small part of the overall cost of education. Yet given increasing pressure on administrators to reduce costs, saving students nearly potentially hundreds of dollars a year could generate goodwill and make a tangible impact.

5.2 Improve Learning

While lowering costs is important, Cable Green argues that the key advantage offered by OER is "that it encourages and gives educators legal permission to take content and make it better."[45] By sharing existing resources and supporting re-use, open education can enable instructors to build upon, learn from, and improve educational resources.[46] With the current system, educational innovation is typically hidden behind classroom walls, while open education brings that innovation out into the open and breaks down silos. [47] For example, MIT's OCW encourages collaboration and the use of digital teaching materials and methods across campus.[48] A JISC study argues that OER's benefits to educators include meeting learner's needs for supplemental or targeted learning, "[b]enchmarking their own practice," and fostering collaborations among teachers, since instructors can see how others are approaching a particular topic and work together to create and use OER.[49] Rather than having to create images, animations, activities, and other content themselves, instructors can adapt resources created by others and thus support multiple approaches to

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[42] Nicole Allen, *A Cover to Cover Solution* (The Student PIRGs, September 2010), http://www.studentpirgs.org/textbooks-reports/a-cover-to-cover-solution.

[43] Ibid.

[44] Wiley, Green, and Soares, *Dramatically Bringing Down the Cost of Education with OER*.

[45] Quoted by Hal Plotkin, *Free to Learn Guide* (Creative Commons, October 2010), 17, http://wiki.creativecommons.org/Free_to_Learn_Guide.

[46] OECD, *Giving Knowledge for Free: The Emergence of Open Educational Resources* (OECD, 2007), http://www.oecd.org/document/41/0,3746,en_2649_35845581_38659497_1_1_1_1,00.html.

[47] Plotkin, *Free to Learn Guide*.

[48] Margulies, Sinou, and Thille, *Models of Open Educational Resources: OpenCourseWare, Sofia, and the Open Learning Initiative*.

[49] Liz Masterman and Joanna Wild, *OER Impact Study: Research Report* (JISC, July 31, 2011), ii, http://www.jisc.ac.uk/whatwedo/programmes/elearning/oer2/oerimpact.aspx.

learning.[50] By embracing open education, institutions can foster more concerted, collaborative efforts to develop content and strategies that improve learning.[51]

Open education also benefits students seeking to review material, fill in gaps in their knowledge, and pursue subjects independently. Indeed, MIT found that nearly 70% of its on-campus students use OCW heavily to go over past material, reinforce their learning in current courses, or delve into other academic areas;[52] more broadly, the heaviest users of OCW are self-learners (43%) and students (42%).[53] Students can use open resources best suited to how they learn (such as podcasts, videos, texts, or images) and can participate in virtual study groups that allow them to get help, broaden their perspectives, and motivate their learning.[54]

5.3 Improve Outreach and Visibility

According to an OECD study, educational institutions have pursued open education to advance outreach to potential students, alumni, instructors, and the broader community.[55] By producing OER, some universities have indeed raised their profiles. In a 2005 survey, MIT found that 31% freshmen were aware of OCW before applying, and of those 35% of those said it was a very significant or significant influence on their decision to attend MIT.[56] Global goodwill toward MIT was likely strengthened by OCW, which is used around the world. Of course, there is a risk that as more and more colleges and universities produce OER, it will be more difficult to raise their visibility unless they do something unique or powerful.

In addition to raising the profile of universities and colleges, open education initiatives such as MIT OCW also increase the visibility of participating faculty.[57] Perhaps one reason that colleges and universities tend to value teaching less than research is that teaching occurs away from public view. Bringing teaching out into the open may mean that instructors get more credit for their work and are recognized for their contributions. Witness, for example, professors hailed by *The New York Times* as "the tweedy celebrities of

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[50] Masterman and Wild, *OER Impact Study: Research Report*.

[51] A. Kanwar, S. Uvalić-Trumbić, and N. Butcher, *A Basic Guide to Open Educational Resources (OER)* (Commonwealth of Learning & UNESCO, 2011), http://www.col.org/resources/publications/Pages/detail.aspx?PID=357.

[52] Charles M. Vest, "Open Content and the Emerging Global Meta-University," *EDUCAUSE Review* 41, no. 3 (June 2006): 18–30.

[53] "Site Statistics."

[54] Plotkin, *Free to Learn Guide*.

[55] OECD, *Giving Knowledge for Free: The Emergence of Open Educational Resources*.

[56] Stephen Carson, *MIT OCW 2005 Program Evaluation Findings Report* (MIT, June 5, 2006), 52.

[57] Margulies, Sinou, and Thille, *Models of Open Educational Resources: OpenCourseWare, Sofia, and the Open Learning Initiative*.

cyberspace," those whose free lectures on topics such as anatomy, physics, or economics become popular on iTunes U or YouTube.[58]

5.4 Promote Social Good and Extend Access

In the United States, colleges and universities are facing increasing pressure to broaden access to higher education. Since educational institutions fundamentally aim to diffuse knowledge, embracing open education enables them to serve this mission. As David Wiley argues, openness upholds the core function of education: "Education is sharing. Education is about being open."[59] Liberal arts colleges, which face criticism for high tuition costs, can contribute to this larger mission. Indeed, Barry Mills, president of Bowdoin College, recently called upon elite liberal arts colleges to harness technology to enlarge access: "Elite institutions with the brightest minds and the most ambitious programs would be well served to consider how we flatten the curve to make this quality education available readily to a much broader section of our society."[60] At the local level, lowering the cost of learning materials can make education more accessible to current students.

5.5 Shape Innovation

In a 2011 talk at Bryn Mawr, Candace Thille, director of OLI, insisted on the importance of the Open Learning Initiative remaining open so that its research can be freely shared and it can drive further innovation. Rather than having a publisher sell learning materials and systems to universities, the higher education community can exercise great control by collaborating to produce them. As Thille asked, a revolution in learning is underway; "who is going to lead it?"[61] Likewise, the edupunk movement emphasizes that colleges and universities should not pay corporations for constraining technologies, but instead run their own flexible, open systems that enable information and ideas to flow freely.[62]

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[58] Katie Hafner, "Higher Education Reimagined With Online Courseware - Education Life," *The New York Times*, April 16, 2010, sec. Education / Education Life, http://www.nytimes.com/2010/04/18/education/edlife/18open-t.html?pagewanted=1.

[59] David Wiley, "Openness as Catalyst for an Educational Reformation," *EDUCAUSE Review*, August 2010.

[60] Barry Mills, "Convocation 2011: President Mills' Opening of the College Address," *Bowdoin Campus News*, August 31, 2011, http://www.bowdoin.edu/news/archives/1bowdoincampus/008795.shtml.

[61] Candace Thille, "What Is CMU OLI? The History, Definition and Demonstrated Success of CMU" (presented at the June 2011 Blended Learning Workshop, Bryn Mawr College, June 28, 2011), http://nextgenlearning.blogs.brynmawr.edu/conferences/june-2011-blended-learning-workshop/.

[62] DeMillo, *Abelard to Apple*.

6. Open Education on Campus

Increasingly chief academic officers see open educational resources playing a role on campus.[63] According to *Going the Distance*, the ninth annual survey on online learning in the US, 72.4% of the chief academic officers at for-profit universities agree that OER will have value for their institutions; among public and private non-profit universities, 57 or 58% of CAOs agree that OER will be valuable, except that the percentage drops to 48% at the largest institutions.[64]

It's worth noting that a majority of the chief academic officers at all but the largest institutions see OER as having value, but what accounts for the gap between for-profits and other types of institutions? First, most for-profits already have the infrastructure and practices in place to adopt electronic course resources such as OER. As Going the Distance suggests, many for-profit colleges are heavily engaged in online learning; furthermore, they already incorporate e-textbooks into many of their classes.[65] In addition, for-profits likely see adopting OER as an opportunity to reduce costs. Some for-profits, such as American Public University System (APUS), bundle textbook costs into tuition, so they have a strong interest in cutting expenses. Indeed, APUS recently announced an initiative to recruit its own faculty members to produce e-textbooks, some of which will be released with open licenses.[66]

But it's not just the for-profits that see strategic advantages in promoting open educational resources. Community colleges, in an effort to lower costs, broaden access, and improve learning and retention, are taking a leadership role in fostering the development and use of OER. According to a 2008 survey of "1,203 faculty from 12 community college districts and 28 colleges" by the Community College Consortium for Open Educational Resources[67] (CCCOER), 91% were interested in using OER in their classes, but only 34% were currently using them.[68] Various efforts are underway to help community college faculty produce,

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[63] This section draws heavily on a post to the NITLE's New Learning Resources blog, Lisa Spiro's "Institutional Strategies for Open Education." *New Learning Resources, a NITLE Initiative*, November 15, 2011. http://newlearningresources.wordpress.com.

[64] Babson Survey Research Group, "Going the Distance: Online Education in the United States, 2011", November 9, 2011, http://www.babson.edu/Academics/centers/blank-center/global-research/Pages/babson-survey-research-group.aspx.

[65] Steve Kolowich, "The E-Book Sector," *Inside Higher Ed*, June 8, 2010, http://www.insidehighered.com/news/2010/06/08/ebooks.

[66] Paul Fain, "American Public University Enlists Faculty to Write E-textbooks," *Inside Higher Ed*, November 7, 2011, http://www.insidehighered.com/news/2011/11/07/american-public-university-enlists-faculty-write-e-textbooks.

[67] http://oerconsortium.org/

[68] Megan Driscoll, "Bringing Open Education to Community Colleges: Dr. Judy Baker Introduces the Community College Consortium for Open Educational Resources," *Education Insider*, June 22, 2011, http://education-portal.com/articles/Bringing_Open_Education_to_Community_Colleges_Dr_Judy_Baker_Introduces_the_Community_College_Consortium_for_Open_Educational_Resources.html.

identify and use appropriate OER. Over 200 community colleges from 15 states now belong to CCCOER, which aims to help community colleges find and produce OER. As part of the Obama administration's strategy to broaden access to higher education, the Department of Labor launched a $2 billion program to prepare students for careers in emerging industries and stipulated that any job training resources developed would be released under Creative Commons attribution licenses.[69] At the state level, Washington's community college system recently released the first phase of its Open Course Library, which contains high quality, affordable, adaptable educational materials to support 42 courses.[70] According to the Student Public Interest Research Groups, this project is anticipated to save students at least $1.2 million a year and could save them as much as $41 million annually, assuming every class in the system adopts the textbooks.[71]

Likewise, some research universities see strategic advantages in pursuing open education. Perhaps most notably, in 2001 MIT decided to share course resources openly through OpenCourseWare, thus contributing to global knowledge, raising its online profile, and enhancing teaching at the university.[72] MIT recently launched MITx, which will provide access not only to open courses, but also to certificates marking successful completion of the course.[73] In 2009 NYU launched an open education pilot project to advance its goals to be "a private university in the public service" and a "globally networked university."74 Aiming "to reinvent the 19th century tutorial model–on a global scale, to boot," NYU envisions students at its global campuses watching a lecture by an NYU faculty member before coming to class, leaving more time for discussion.[75] NYU has established a partnership with the open University of the People to "identify" potential students who could enroll at NYU Abu Dhabi; some financial support would be available.[76] Open (or at least freely available) education now seems to be leaping from research universities to the private sector. In the fall of 2011, Stanford faculty experimented with several Massive Online Open Courses that attracted thousands of registrants. Recently several faculty

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[69] Timothy Vollmer, "New Federal Education Fund Makes Available $2 Billion to Create OER Resources in Community Colleges," *Creative Commons*, January 20, 2011, http://creativecommons.org/weblog/entry/26100.

[70] Tom Caswell, "Three Things You Should Know About the Open Course Library," *Tom's Two Cents*, November 10, 2011, http://tomcaswell.com/2011/11/10/three-things-you-should-know-about-the-open-course-library/.

[71] Steve Kolowich, "Advocates Say Public Money for Open Educational Resources Is Smart Investment," *Inside Higher Ed*, November 1, 2011, http://www.insidehighered.com/news/2011/11/01/advocates-say-public-money-open-educational-resources-smart-investment.

[72] Walsh, *Unlocking the Gates*.

[73] Parry, "MIT Will Offer Certificates to Outside Students Who Take Its Online Courses."

[74] "About the Pilot Project," *NYU Open Education*, http://www.nyu.edu/academics/open-education/pilot-project.html.

[75] "About the Pilot Project," *NYU Open Education*, http://www.nyu.edu/academics/open-education/pilot-project.html.

[76] John Beckman, "NYU Partners with University of the People for Global Learning Opportunity at NYU Abu Dhabi," *NYU Today*, June 9, 2011, http://www.nyu.edu/about/news-publications/news/2011/06/09/nyu-partners-with-uopeople.html.

involved in these initiatives started up their own for-profit companies: Sebastian Thrun left Stanford to launch Udacity, while engineering professors Andrew Ng and Daphne Koller started up Coursera.[77]

Indeed, "open education" seems to be gaining traction throughout higher education. The 2010 Horizon Report (disclosure: the authors served on the advisory board) selected open content as a practice likely to come into mainstream use within one to two years.[78] Openness is a guiding principle of the Next Generation Learning Challenges[79] and a key value for Educause.[80] Even publishers and developers of course management systems seem to be jumping on the open education bandwagon. For example, Blackboard recently announced that instructors will be able to share course materials housed in its course management system through a Creative Commons Attribution license, and Pearson launched its "open" learning management system, OpenClass (although, as Audrey Watters suggests, it's not clear how "open" such systems really are, and Anya Kamanetz suggests that these moves represent "open-washing.")[81]

So what about U.S. liberal arts colleges? Although several liberal arts colleges (including Trinity, Oberlin, Bucknell, and Hope) have embraced mandates promoting open access to scholarship, we are not aware of many that have made institutional commitments to open education, which focuses on teaching and learning rather than research. U.S. members of the Open Courseware Consortium include research universities (e.g. University of Michigan), community colleges (e.g. Anne Arundel Community College), and even a for-profit (Kaplan University), but only one liberal arts college (Sterling College).[82] Liberal arts colleges do not appear much in three of the major recent books and reports about open education: Toru Iiyoshi and M.S. Vijay Kumar's *Opening Up Education: The Collective Advancement of Education through Open Technology, Open Content, and Open Knowledge;* Taylor Walsh's *Unlocking the Gates: How and Why Leading Universities are Opening Up Access to Their Courses*; and Daniel Atkins, John Seely Brown and Allen L. Hammond's *A*

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[77] Steve Kolowich, "An LMS for Elite MOOCs?," *Inside Higher Ed*, March 7, 2012, http://www.insidehighered.com/news/2012/03/07/stanford-professors-spin-company-support-free-online-courses; Steve Kolowich, "Massive Courses, Sans Stanford," *Inside Higher Ed*, January 24, 2012, http://www.insidehighered.com/news/2012/01/24/stanford-open-course-instructors-spin-profit-company.

[78] Larry Johnson et al., *2010 Horizon Report* (Austin, TX.: The New Media Consortium, 2010), http://wp.nmc.org/horizon2010/.

[79] "Guiding Principles," *Next Generation Learning Challenges*, http://nextgenlearning.org/the-program/principles.

[80] "EDUCAUSE Strategic Directions," *Educause*, http://www.educause.edu/stratdir - values.

[81] Susan Aspey, "Pearson Launches OpenClass: First Full-featured Learning Environment That's Free, Easy to Use and Scalable," *Pearson*, October 13, 2011, http://www.pearson.com/media-1/announcements/?i=1487; Audrey Watters, "Blackboard: Now More 'Open'," *Hack Education*, October 19, 2011, http://www.hackeducation.com/2011/10/19/blackboard-now-more-open/; Audrey Watters, "Pearson's 'Free' LMS," *Hack Education*, October 13, 2011, http://www.hackeducation.com/2011/10/13/pearsons-free-lms/; Anya Kamenetz, "DIY U at Educause." *Diy U*, October 23, 2011, http://diyubook.com/2011/10/diy-u-at-educause/.

[82] http://www.ocwconsortium.org/

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Review of the Open Educational Resources (OER) Movement: Achievement, Challenges and New Opportunities.[83]

Why hasn't open education been more prominent among liberal arts colleges? Let's speculate about possible reasons. Perhaps liberal arts colleges, particularly elite institutions, don't feel the same pressure to bring down textbook costs that community colleges and for-profits do. (However, with rising concern about the expense of elite liberal arts colleges and the sustainability of their business models, promoting OER may be one relatively straightforward, visible way to lower costs.[84]) Perhaps they are not fully aware of OER, given that a third of chief academic officers responding to the Going the Distance survey said they are just "somewhat aware" of OER and 13.3% said they are not at all aware of OER. Perhaps open educational resources are still at the early adopter phase at liberal arts colleges. Maybe liberal arts colleges don't have sufficient scale and resources to pursue open education, or they haven't been as successful in competing for funding for OER initiatives. It could be that there aren't enough appropriate OER available to support the liberal arts curriculum. Perhaps instructors at liberal arts colleges, who typically select course reading lists, have established preferences for proprietary course materials, worry about the quality of OER, or simply don't know about open alternatives. In contrast, many instructors at for-profits and at community college have less autonomy in choosing course texts. Perhaps most importantly, liberal arts colleges may not see strong strategic reasons to pursue open education.

To develop a sharper understanding of the status of open education at liberal arts colleges, we analyzed published sources, created case studies based on semi-structured oral and email-based interviews with liberal arts college faculty and staff doing innovative work in open education,[85] and conducted a survey of CIOs at liberal arts colleges.

7. Survey Results

To inform this report, we conducted a survey of chief information officers from NITLE member colleges. With this survey, we aimed to develop an understanding of ongoing developments in and attitudes toward open education at liberal arts colleges. Originally the survey was sent to chief information officers at forty-seven NITLE member schools, but we also invited these recipients to forward the survey to appropriate faculty or staff contacts at their institutions. Ultimately 32 started the survey and 23 completed it by March 14,

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[83] Toru Iiyoshi, M.S. Vijay Kumar, and John Seely Brown, *Opening Up Education: The Collective Advancement of Education Through Open Technology, Open Content, and Open Knowledge* (The MIT Press, 2008), http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11309; Walsh, *Unlocking the Gates*; Daniel E. Atkins, John Seely Brown, and Allen L. Hammond, *A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities* (William and Flora Hewlett Foundation, 2007).

[84] Kevin Kiley, "Starting to Worry," *Inside Higher Ed*, October 10, 2011, http://www.insidehighered.com/news/2011/10/10/decisions_at_smith_other_liberal_arts_colleges_raise_questions_about_financial_model_s_sustainability.

[85] We selected case studies based upon our personal knowledge of the liberal arts and open education communities as well as calls for examples issued via the NITLE-IT list, Twitter, and Google+.

2012, for a completion rate of 71.9%.[86] The survey adopted a broad definition of open education, which may have made it difficult for some respondents to generalize about the status of open education at their institutions. Of the 21 respondents who defined their institutional role on campus, 47.6%(10) are the CIO of a non-merged organization, 23.8% (5) were the CIO of a merged organization, 19% (4) are an academic computing leader, and 4% (1) are the library director, an IT manager, or a faculty member. 83.6% represented schools with between 1001 and 3000 students, while 17.3% came from schools with more than 3000 students.

Please see the appendix for survey questions.

7.1 Levels of Engagement with Open Education

It seems that most liberal arts colleges are engaged in open education in limited ways, if at all. Most survey respondents said their colleges was doing "nothing at present" (30.4%) or studying potential approaches (30.4%), while others were running a departmental pilot (13%) or campus pilot (8.7%) or offering a "campus-wide program or service" (17.4%). Speaking generally of faculty attitudes at their institutions, the greatest number of respondents said faculty were "interested but not committed" (50%) or "not convinced that quality open educational resources are available" (45.5.%), while 4.5% (1 respondent) said faculty were "Not aware of open education." These numbers suggest that there is potential interest in OER, but that there is a need for more quality resources relevant to the liberal arts curriculum, that these resources should be more easily discoverable, and that faculty may need to be convinced that they are sufficient quality. For example, in conducting a through search for OER to support some of its courses (in STEM and social sciences), Bryn Mawr encountered some significant gaps, so they had to create some materials themselves.[87]

Relatively few faculty members are either using or producing OER. Among those colleges that have open education initiatives, 56.3% of respondents described the proportion of faculty consuming OER to be 1-10%, while 81.3% said only 1-10% of faculty members were producing open content. Likewise, most of these colleges do not have institutional initiatives to produce open educational resources. While 31.3% are producing "open learning objects such as exercises and animations" in a piecemeal way, most are not producing open curriculum, and only 25% are producing open textbooks in a piecemeal way or piloting in a few departments. Tracking the production of open content across campus itself seems to be a challenge: 25.0% (4) didn't know to what extent their institution was producing open textbooks, and 18.8% (3) didn't know about the production of open learning objects.

More colleges seem to be involved or least considering getting involved in producing open learning tools than open curriculum or open textbooks, perhaps indicating growing use of

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[86] In reporting on the results, we included only the 23 responses defined by SurveyMonkey as completed; even these respondents did not necessarily answer every question.

[87] Thanks to Jennifer Spohrer for this point.

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Moodle and WordPress across liberal education. That trend may also reflect the nature of decision-making at many colleges, where IT departments make campus-wide decisions about software systems (in consultation with users), while individual faculty members select course materials. While 6.3% (1) of survey respondents are implementing the production of open source tools for teaching and learning across campus, 18.8% (3) are producing them in a piecemeal way, 6.3% (1) are piloting in a few departments, and 18.8% (3) are considering producing open tools. Among the software tools developed by liberal arts colleges is Eckerd College's IPAL ("In-class Polling for All Learners") software.[88] Customizing or extending existing open source software such as WordPress or Moodle may be more common at liberal arts colleges than developing new learning software. For example, NERCOMP recently held a conference focused on the use of WordPress at liberal arts colleges featuring presenters from Vassar College, Wesleyan University, The College of Wooster, Bentley University, Middlebury College, Wheaton College (MA), Emerson College, and more.[89] The Tri-Co consortium (Bryn Mawr, Swarthmore, and Haverford Colleges) recently moved from Blackboard to Moodle to cut costs, saving the consortium around $100,000 per year.[90] Of course, the choice of software has an impact on teaching and learning; for example, some open source systems may encourage greater sharing. As Jennifer Spohrer noted on our survey, "Moodle has a much wider culture of sharing materials, however, and a few instructors are starting to get interested in this aspect." Yet implementing open source software comes with its own costs and challenges, particularly in support. As one respondent noted, "On the one hand, gaining access to resources without significant licensing costs will be a big impact, but if those resources will require some type of technical expertise on campus to maintain that is not already there, that will be a significant challenge."

Among those institutions with some engagement in open education, reasons for pursuing open education varied. The reasons most frequently cited as being important or very important included fostering pedagogical innovation at 62.5% (10 respondents), providing more learning opportunities for students at 56.3% (9), and lowering costs at 46.7% (7). On the flip side, reasons most frequently cited as being "not at all important" were strengthening the campus community with 53.3% of respondents (8); reaching a larger community beyond the campus with 46.7% (7); and meeting ethical obligations with 46.7% (7). Perhaps not surprisingly, the prime drivers motivating open education initiatives appear to be improving learning and reducing costs. Although 40% said meeting ethical obligations was important or somewhat important in the college pursuing open education (none said it was "very important"), most seem to view it pragmatically, seeing open education as one of many potential approaches. As one respondent noted, "It is not a

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[88] "Eckerd College Awarded $184,000 Next Generation Learning Challenges Grant for In-Class Polling Project," *Eckerd College*, April 7, 2011, http://www.eckerd.edu/news/index.php?f=detail&id=3081.
[89] "WordPress in the Liberal Arts," *NERCOMP*, September 15, 2011, http://www.nercomp.org/index.php?section=events&evtid=56.
[90] Menghan Jin, "College to Transition to Moodle by Fall 2012," *The Phoenix*, August 26, 2010, http://www.swarthmorephoenix.com/2010/08/26/news/college-to-transition--to-moodle-by-fall-2012/print.

passion but everything is on the table when faculty, students or staff are looking for the right solution."

Of course, colleges face some significant obstacles in implementing open education. Among colleges engaged in some form of activity around open education, respondents identified the following obstacles as being a factor or a key factor: lack of time (68.8%) and perceived lack of quality of open educational resources (53.3%). Conversely, many respondents agreed that the following were either not a factor or a minor factor: "binding contracts with vendors" (80%), "not in the college's strategic interest" (66.7%), "lack of student support" (66.7%), "too complex technically" (60%), or "lack of appropriate institutional policy" (66.6%) and "lack of administrative support" (60%). Lack of faculty support seems to be an issue, with 40.0% reporting that it was somewhat of a factor, 20% identifying it as a factor, and 26.7% saying it was a key factor.

7.2 Supporting Open Education

At institutions with some engagement in open education, respondents identified a range of groups and individuals that are involved in campus efforts, particularly individual faculty (87.5%), Academic Computing/IT (81.3%), and the library (75.0%). At some campuses, academic departments (37.5%), the Academic dean or provost (31.3%), students (31.3%), or the teaching and learning center (25%) play a role. In terms of how colleges are providing support for open education, the most common answers included "providing technical support to faculty" (75.0%), "helping faculty to identify relevant open resources" (62.5%), "providing high-level administrative support" (43.8%) and "providing technical support to students" (43.8%). Few reported "collaborating with other colleges to produce open resources" (18.8%), "developing open tools and resources locally" (18.8%), "sending representatives to meetings about open education" (25%), or "joining organizations such as the Open Courseware Consortium" (0%). Although most respondents skipped our question about how they implemented an open education program, pilots emerged as an important strategy among those who did respond.

7.3 Reasons for Not Pursuing Open Education

For the 30.4% (7) of our respondents who said that their institutions were not currently engaged with open education, we asked a more targeted set of follow-up questions. The top reason that their colleges had not pursued open education was "my institution does not see open education as being in its strategic interest" (66.7%). According to this group, the most powerful way to boost open education on campus was "demand from faculty" (83.3%), followed by grant funding in support of open education (50%).[91]

7.4 Impact of Open Education, Current and Future

Of those who said their college was currently involved with open education, most agreed that the impact on their campus has been limited to date: "minor," "spotty," "nil," "It is too

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[91] Spiro and Alexander, 2012.

soon to say." In terms of *potential* impact of open education, some respondents said they were unsure, but others predicted that it could lower costs. Two respondents indicated that they were trying to raise awareness of open education on campus through presentations. As one noted, "I will continue to push this dialog as I think it is an important piece to be considering as we move forward." In contrast, one respondent was particularly skeptical of the open education "movement," suggesting that it is "just a marketing tool for the zealots to capitalize on the good work done by the open source community."

In looking forward 5-7 years, 52.1% of all respondents saw "open source Learning Management Systems such as Moodle or Sakai" as having a significant or high impact, and 47.8% pointed to "using open source blogging platforms such as WordPress." Among the liberal arts community, it seems that open source software has gained more traction than open content or courses, although these responses may reflect the fact that most of our respondents are involved with IT organizations. Opinion was mixed about the impact of "open courses + certification, such as MITx": 8.7% said it would have high impact, 17.4% said it would have significant impact, 21.7% some impact, 17.4% slight impact, 21.7% no impact, and 13% didn't know. Similarly, 27.3% saw "open courses such as Stanford's open courses" as having a significant impact, 27.3% some impact, 22.7% slight impact, 9.1% no impact, and 13.6% didn't know. "Some impact" was the most popular answer for open textbooks (52.2%), engaging students in producing open content (47.8%), open learning objects such as exercises and animations (39.1%), and interactive open learning platforms such as Carnegie Mellon's Open Learning Initiative (30.4%).

Among all the respondents, there was little consensus about the impact open initiatives such as MITx will have on liberal arts colleges. 38.1% said "they will extend educational opportunities to those outside the traditional education system." 19% responded that **"**they will have little impact," and the same number indicated that "they will allow liberal arts colleges to expand their course offerings." 14.3% said "they will enable liberal arts colleges to develop new business models," while 9.5% said "they will directly compete with liberal arts colleges." These numbers suggest that it is too early predict the impact, but most do not see a direct threat to liberal arts colleges. As one interviewee suggested, most 18-22 year olds need the structure, community, and support provided by higher education; indeed, liberal arts colleges define their value largely by enabling students to interact with faculty.[92] Even though most respondents didn't see initiatives such as MITx having an immediate impact, some are examining the long-term implications of these developments. As Jennifer Spohrer noted in her survey response, "Concerning MITx: currently there is no demand from students to provide credit for something like this. (The programs aren't really there yet.) However, the administration is actively thinking forward about the role a liberal arts college might play in a world where such credits were more widely available. Most colleges already accept credit for courses taken off campus under circumstances (ex., AP, IB, study abroad, transfer credit), so it is conceivable that this will someday be another one of those circumstances." In addition, one respondent said that a student at his or her college took Stanford's Machine Learning MOOC in the fall of 2011 as an independent study, perhaps indicating an emerging trend.

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[92] Spiro, "Interview with Pat Schoknecht."

In free text comments speculating on the significance of open education for liberal arts colleges, respondents suggested that it could improve pedagogy and lower costs, but that it could also lead to threats. One respondent indicated that open education is not likely to have a significant impact on selective colleges. Another respondent suggested that open education would expand availability of educational resources, but also open up "[q]uestions of content ownership and IP." Although the impact of open education at LACs has as of yet been limited, one respondent believes that open education poses significant questions for liberal arts colleges: "It is early days in this latest set of concepts (massive open online courses, things like the khan academy, modules like those developed at CMU) but it seems like there is much to be learned about how these might be integrated into our instruction. We also need to think through whether or not we want to get involved on the production side of the equation." Another respondent thought that open education could enable liberal arts colleges to extend course offerings and experiment with new pedagogical approaches: "1) Increased access to speciality [sic] courses 2) Greater ability to flip content of courses 3) Reduce stress on remedial intro courses by having students refresh in online content." Likewise, a respondent saw open education "[l]ower[ing] cost and improv[ing] quality. It may also force some schools out of existence." Some saw open education sparking opportunities for liberal arts colleges. Referring to the approximately 140,000 people who did not complete Sebastian Thrun's MOOC vs. the approximately 23,000 who did, a respondent noted the value add offered by liberal arts colleges: "We don't sell the content, we sell access to people who can understand and contextualize it and give you a support network so that you're not in the 85% who can't manage to complete it on your own." In an environment of open content, then, liberal arts colleges may be able to distinguish themselves by emphasizing the value of human interaction and support. One respondent even saw open education as offering "A sustainable way forward given the trends in economy and perceptions of value of liberal arts education." Yet we also heard from skeptics, including one who indicated that open education "will waste time and create a barrier for communication and collaboration."

As for how an organization like NITLE can help support liberal arts colleges in exploring open education, 72.7% of all respondents said "raise awareness of open education"; other answers selected by 50-60% of respondents included "help secure funding for open education initiatives," "provide strategic guidance on how liberal arts colleges should approach open education," "support inter-institutional collaboration," "help colleges find and evaluate open educational resources," and "connect campuses to thought leaders in open education." These responses indicate that liberal arts colleges see a role for organizations to play in studying, promoting, and helping to curate open educational resources and tools. However, few see a need for NITLE or similar organizations to play a role in helping to coordinate the production of open source software, with only 27.3% selecting that choice. Another potential role for an organization—unfortunately, not represented on the survey—would be to aid in evaluating the impact of open education at liberal arts campuses. Five of the eight respondents to our question about how campuses are evaluating the impact of open education on campus said they weren't, but one is

conducting "[a]ttitudinal surveys," one is running surveys about Moodle, and one is evaluating "course by course."

8. Case Studies

Although survey results can help us understand some of the ways that liberal arts colleges are approaching open education, case studies enable us to develop a much more detailed perspective. With these case studies, we hope to describe some of the innovative ways that liberal arts colleges are experimenting with open education to promote strategic goals such as improving learning, building community, and broadening access to education. Often this work on open education occurs more at the faculty level than the institutional level. For example, faculty at liberal arts colleges are producing freely available resources, crafting wiki assignments for their students, offering MOOCs, and integrating OER into their courses. At a more institutional level, liberal arts colleges are adopting (and in some cases enhancing) open learning systems such as Moodle and WordPress. Still, liberal arts colleges seem to be scattered and fragmented in their efforts around open education. What is the strategic significance of open education for small liberal arts colleges? What are colleges doing and why, and what should they be doing? This working paper offers case studies of several approaches as well as recommendations for colleges interested in exploring their own open education initiatives.

8.1: Openness as Academic Mission: Empire State College

As a university committed to enlarging access to education, Empire State College makes openness and social justice core to its academic mission. Founded in 1971 by Ernest Boyer, then the chancellor of the SUNY System, Empire State College (ESC) takes as its mandate providing educational opportunities to adult learners. In celebrating ESC's fortieth anniversary, president Alan R. Davis affirmed that open education is an important part of its institutional identity and pointed to "its future as New York's open university, a mandate we proudly share with other SUNY institutions. Like open universities around the world, the college is committed to eliminating barriers that restrict access to higher education."[93] Such barriers include "those limiting access, affordability, and quality; obstacles having to do with time and distance; the lack of recognition for prior and informal learning; the lack of diversity within a student body; inappropriate pacing relative to learners' abilities; and the absence of relevance to each learner's experience."[94] To clear away those barriers, Empire State delivers learning in a variety of ways (online, face-to-face, small groups) and enables the student to design his or her own program in consultation with a mentor. Mentoring is a key part of ESC's learning model, as the mentor works with the student to define his or her goals and guide the learning process. Through the Prior Learning Assessment, students can receive credit for work and other educational

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[93] Alan Davis, "SUNY Empire State College: 40 Years of Innovation in Higher Education," January 3, 2011, http://suny-empire.esc.edu/40th-anniversary/innovation-higher-ed/.

[94] Alan Davis and Ed Warzala, "Talk About Big and Hairy!: What Open SUNY Could Mean," *Vision 2025*, April 11, 2011, http://commons.esc.edu/vision2025/2011/04/11/talk-about-big-and-hairy-what-open-suny-could-mean/.

experiences based on essays, interviews, or other means.

From its early days, Empire State focused not on residential education, but on providing flexible education to under-served learners, supporting different "modes of study" from a range of locations.[95] As Ernest Boyer declared in a 1971 memo explaining the vision for Empire State, "With rising aspirations and the impact of the communications and transportation revolution, we now see the need for institutions that are more open, more imaginative, more versatile, and more flexible, both in their structure and their style... We are now beginning to understand that the university of tomorrow will be more like a public library than a private club."[96] The example of Empire State demonstrates that the ideals of open education and educational reform pre-date the emergence of the open education movement in the early 2000s and that they have been tied to ongoing transformations in information technologies. Of course, the communications revolution of 1971 involved delivering learning through television and cassette tapes, but even then Empire State planned to use technology, experiential learning, and independent study to "bring the university to the student."[97] In planning Empire State, its founders challenged some inherited notions about higher education, such its emphasis on time (hours spent in a classroom) and place (the campus). As its first president James W. Hall stated, "At Empire State, the places for learning will become the places where it works best, and this frequently means at the place where the student is. And the time for learning will be integrated with the times people have, and the times when they can best learn."[98] Rather than focusing on fixed inputs, Empire State emphasized outputs, what the student learned. In re-envisioning the model for education, Empire State explored independent learning, lifelong learning, technology, and the college/community relationship. Hall spoke to the need to use technology wisely to support learning, not replacing teachers with a cassette, but using media to free up time for the instructor to provide more specialized, human support.

Empire State now has 35 regional learning centers in New York, as well as several international locations; in addition, it operates the Center for Distance Learning and is the largest provider of online learning in the SUNY system. Empire State facilitates learning through independent study guided by a mentor, online learning, small seminars, and study groups, or a combination. Most of its students are adults between 25 and 55 years old, with over 18,000 from New York State and about 1200 students coming from all 50 states and 50 other countries.[99] About 50% go to one of the regional learning centers, while 40% attend classes via the Center for Distance Learning. Initially distance learning meant

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[95] "Interview with Tom Mackey," interview by Lisa Spiro, February 13, 2012.
[96] Ernest Boyer, "Background of the Recommendation for the Creation of a Non-residential Degree-granting College Within State University," January 27, 1971, 1, http://suny-empire.esc.edu/media/ocgr/anniversary/esc40th/board-resolution-1971.pdf.
[97] Ibid., 2.
[98] James W. Hall, "Investiture Address" (Empire State College, September 1972), 2, http://suny-empire.esc.edu/media/ocgr/anniversary/documents/Sept-20-72-ESC-Newsletter.pdf.
[99] Alan Davis, "What's a Nice US College of Open Learning Like Ours Doing for International Social Justice?", September 25, 2011, http://www2.open.ac.uk/r06/conference/.

mailing course packets to students, but the operation moved fully to the Web in 2005.[100] Empire State's 11 undergraduate degree programs include cultural studies, business, management and economics, historical studies, and educational studies.[101] Although Empire State is not a traditional liberal arts college—its student body is large, its focus is on adults, it is non-residential—it does embrace liberal education by taking an interdisciplinary approach, offering degree programs in the liberal arts, and promoting the values of liberal education, including lifelong learning and curiosity. Empire State's first president emphasized that the college both values people's jobs as part of their learning and "brings the perspectives of the liberal arts to the illumination and service of the things people do," so that liberal education helps people do their work better and gives that work meaning and context.[102]

Under the leadership of president Alan Davis, who previously served as vice president at Athabasca University ("Canada's Open University"), the college has affirmed its commitment to being an open university. As part of its efforts in global, open learning, ESC is the first US anchor partner for the new OERu, "a virtual collaboration of like-minded institutions committed to creating flexible pathways for OER learners to gain formal academic credit."[103] OERu is engaging in a transparent planning process through its wiki, which covers elements such as open curriculum, pedagogy, student support, and technical infrastructure.[104] Currently, partners (which include Athabasca University, University of Southern Queensland, and Southern New Hampshire University) are prototyping courses on topics such as College Composition, General and Applied Psychology, and Mathematical Journey (Empire State's contribution). OERu aims to respect each institution's individuality while developing common practices. Partners are still working out how credits will be awarded, but one aim is that a student who completes a course offered by one of the partners would be given credit at his or her home institution. All courses must use only open educational resources, although host institutions have freedom in defining how learning will be facilitated and assessed. Mathematical Journey will ask students to build a portfolio demonstrating their learning,[105] while other courses will use Moodle-based quizzes, learning journals, and discussion forums.[106] By joining OERu, Empire State hopes to internationalize, enlarging its impact and upholding its mission to promote social justice. As Alan Davis remarked, "we will join the global community of learners who contribute to and benefit from the expansion and dissemination of open educational resources."[107]

As part of Empire State's experimentation with open, networked learning models, in the fall

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[100] "Interview with Tom Mackey," interview by Lisa Spiro, February 13, 2012.

[101] "Frequently Asked Questions," *SUNY Empire State College*, http://www.esc.edu/about-esc/faq/.

[102] Hall, "Investiture Address."

[103] "OER University."

[104] http://wikieducator.org/OER_university/Planning

[105] OERu supports the open source e-portfolio and social networking software Mahara.

[106] "Interview with Jill Buban and Betty Hurley-Dasgupta," interview by Lisa Spiro, March 14, 2012.

[107] "SUNY Empire State College Joins Open Education Resource University," *SUNY Empire State College*, October 4, 2011, http://www.esc.edu/news/releases/2011/-suny-empire-state-college-joins-open-education-resource-university-.html.

of 2011 faculty members Betty Hurley-Dasgupta and Carol Yeager collaborated to offer a 13-week MOOC on Creativity and Multicultural Communication.[108] The course attracted approximately 350 registrants from around the world as well as 13 students who registered for credit. Since the course included global participants, it provided "a natural environment for thinking about multicultural creativity."[109] The course was free unless students registered to take the course for credit through Empire State (which required students to keep a blog, do a project, and report on the project to other enrolled students through a closed Blackboard Collaborate session). To facilitate a networked community, the MOOC used a number of channels for communication, including weekly live sessions via Blackboard Collaborate, Twitter, Facebook, LinkedIn and GoogleSites. (Facebook proved more active than LinkedIn and GoogleSites.) By using the RSS aggregator and "personal web environment" gRSShopper, the instructors pulled together feeds from registered blogs as well as Twitter feeds and discussion posts made to the CMC11 site, which took some time to manage. According to student evaluations, the course transformed "how they thought about creativity and life long learning."[110] As is typical with MOOCs, it was difficult to keep up with all the course-related feeds, and some participants who did not take the course for credit lost focus. Both the MOOC and OERu more generally illustrate the intersections between open education and liberal education, in that people can share their passion for learning with others in a global networked environment. Open education can enrich lifelong learning by providing people with flexible opportunities to engage in the academic experience and pursue a wide range of topics.[111]

Further expanding the possibilities of open education, Empire State faculty are developing the Project for Online Open Learning (POOL), a social learning model that opens up the "iron triangle" constraining higher education: the calendar (the semester), content (the pre-determined syllabus), and the credit (the standardized measure of learning). In a typical college course, students do not exercise over much control over what they study, how long the course runs, or how many credits they attain. If a student gets interested in questions raised in a course, the close of the semester brings those explorations to an artificial, often premature ending. Instead, says POOL creator Frank Vander Valk, the project "re-negotiates the contract with the student" to build on what was already learned and enable him or her to take learning into new directions, in a more seamless way than is possible in an independent study course.[112] For the 2011-2012 academic year, POOL focuses on the broad theme of "Freedom," offering twelve interrelated one-credit units that cover disciplinary perspectives such as political theory, public history, economics, religion, and sexuality. Students can put together their individualized combination of units, exercising control over how they shape their studies. Students can either enroll in advance, as most do, or test out the project. Those enrolling in advance can register for 1-8 credits, which commits them to completing the corresponding number of units. Since students have so much flexibility in enrolling, POOL uses open educational resources so that students do

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[108] "Creativity & Multicultural Communication", http://www.cdlprojects.com/cmc11blog/.
[109] "Interview with Jill Buban and Betty Hurley-Dasgupta."
[110] Ibid.
[111] Ibid.
[112] Lisa Spiro, "Interview with Frank Vander Valk," March 13, 2012.

not have to purchase books they will not necessarily use; however, many students end up buying course readings, preferring hard copy. Empire State's Center for Mentoring and Learning provided support for the initial development of POOL.

POOL also seeks to break down the walls dividing classes. Instead of operating within the confines of a course management system, students and faculty participate in an open online community that aggregates feeds from all of the units on a landing page and highlights outstanding content. Students pursue their own questions and report back to the group, contributing to a base of knowledge and engaging in larger discussions within this community space. For example, one group of students was investigating the cultural and legal contexts surrounding the use of water, while another was reading John Locke, who wrote a passage on water rights. These two groups came together for common discussions, during which a paralegal shared her extensive knowledge of water rights, something that would not have happened if the two groups of students were in separate spaces, as happens with traditional approaches. In the spring term, 42 students are participating in the program; around 35 took part last term, and some are continuing into the spring. POOL works particularly well for students eager to try out social learning strategies and approaches, including prospective teachers. Students who are primarily interested in the content appreciate the flexibility but don't necessarily seek to break down the iron triangle, while students who prefer a more linear approach to learning (often those who have been at Empire State the longest) sometimes feel overwhelmed by the choice. POOL has faced some challenges, including technical issues like figuring out how to handle enrollments, dealing with on-the-fly changes, and communicating what the program is all about. Ultimately POOL creator Frank Vander Valk hopes that this open approach "encourages students to practice and live the values of liberal education by developing the capacity for self-directed critical inquiry in the context of an open learning framework."[113] Students have the freedom to follow through on their questions and search for answers with the guidance of faculty, investigating what matters to them, why it matters, and how to put their values into practice. In recognition for his work in promoting a new approach to open learning, Vander Valk received Empire State's Hall Innovation Award as well as Honorable Mention for the National University Technology Network's 2011 Distance Education Innovation Award. As Empire State's vice president for external affairs commented, "Within this new system, students are able to not only design their own degrees, but also design the pace and direction of their learning."[114]

Empire State's mission and history both frame its approach to openness as enlarging access and foster its innovative approaches to learning. From its early days, Empire State has focused on experiential learning and offered a more flexible learning model. By harnessing networked technologies, Empire State can continue to evolve its approach to learner-centered education, building learning communities and delivering learning with even greater flexibility. According to Mackey, faculty at Empire State tend to innovate because

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[113] Lisa Spiro, "Interview with Frank Vander Valk," March 13, 2012.
[114] "Frank Vander Valk Receives Hall Innovation Award." *Empire State College*, March 31, 2011. http://www.esc.edu/news/releases/2011/frank-vander-valk-receives-hall-innovation-award.html.

the college's model supports collaboration, flexibility, and creativity. Faculty already have some experience and comfort with online learning, so making the jump to a MOOC is not as challenging as it would be for novice faculty. Likewise, Vander Valk says that ESC faculty are accustomed to a certain amount of ambiguity, since the institution has a rich history of individual study and encourages faculty to invent new ways of operating.[115]

8.2 Using OER to Support Learning: Bryn Mawr[116]

Liberal arts colleges pride themselves on the high quality educational experiences that they offer, which typically feature small classes, rich face-to-face interaction with faculty and peers, a residential experience, civic engagement, and undergraduate research. Indeed, commentators such as Kevin Carey, Clayton Christensen, and Henry Eyring suggest that elite liberal arts colleges are not as vulnerable to the disruptions of online education as many other universities are.[117] Some see blended and online learning as opposed to what makes liberal arts colleges unique and effective, perhaps fearing that face-to-face learning will be undermined. But blended learning—which Bryn Mawr defines loosely as courses in which students both participate in face-to-face classes and work through computer-based, interactive tutorials and quizzes that provide customized learning and instant feedback—can support the goals of liberal education. Recently Bryn Mawr won a $250,000 grant from the Next Generation Learning Challenges (NGLC) to explore blended learning from a liberal arts perspective, making use of modules developed by Carnegie Mellon's Open Learning Initiative and other sources. As Bryn Mawr's provost Kim Cassidy said in introducing the blended learning workshop it hosted this summer, its fundamental goal is to "improve student learning." Bryn Mawr's project is not yet complete, but already there are some promising results that point to the potential of using open educational resources (particularly OLI) and other interactive materials to enhance learning.

A number of students who enter college aspiring to science, engineering, or medical careers abandon those plans, often because they lack strong pre-college preparation and thus

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[115] Lisa Spiro, "Interview with Frank Vander Valk," March 13, 2012.

[116] This section revises Lisa Spiro's "Blended Learning and the Open Learning Initiative in a Liberal Arts Context: Bryn Mawr's Next Generation Learning Challenge Grant," *New Learning Resources*, December 23, 2011, http://newlearningresources.wordpress.com/2011/12/23/blended-learning-and-the-open-learning-initiative-in-a-liberal-arts-context-bryn-mawrs-next-generation-learning-challenge-grant/. It is based upon a November 15, 2011, interview with Jennifer Spohrer, who is the educational technologist supporting Bryn Mawr's Next Generation Learning project, as well as Bryn Mawr's December 15 webinar (http://nextgenlearning.blogs.brynmawr.edu/2011/12/20/webinar-presentation-video-posted/)about the project and the three videos(http://nextgenlearning.blogs.brynmawr.edu/conferences/june-2011-blended-learning-workshop/)documenting the Blended Learning workshop that Bryn Mawr hosted in the summer of 2011.

[117] Kevin Carey, "College for $99 a Month," *Washington Monthly*, October 2009, http://www.washingtonmonthly.com/college_guide/feature/college_for_99_a_month.php; Clayton M. Christensen and Henry J. Eyring, *The Innovative University: Changing the DNA of Higher Education from the Inside Out*, 1st ed. (Jossey-Bass, 2011).

struggle in introductory courses.[118] As part of its efforts to address the disparities in preparation for college science and math courses, Bryn Mawr is experimenting with blended learning, providing targeted opportunities for students to practice and get immediate feedback on their learning. OLI courses help address these goals by focusing on specific, "measurable" learning objectives and providing content, interactive exercises, and intelligent tutors. Studies have demonstrated that OLI can accelerate learning (particularly in a blended environment) and increase completion of courses at a large public university. By using OLI modules and other blended learning materials, Bryn Mawr hopes to devote more class time to discussion and problem solving and increase the number of students who complete STEM courses (and, ultimately, majors).[119]

Originally Bryn Mawr proposed to focus on four courses, but faculty interest was so high that it enlarged the program to approximately twenty courses (including multiple sections) in subjects such as biology, chemistry, computer science, quantitative skills, environmental science, geology, and psychology taught in the fall of 2011 and spring of 2012. Faculty are turning to blended learning to address a range of pedagogical goals, such as accommodating students' diverse backgrounds, enabling students to practice key skills, and freeing up class time to delve into more complex issues. For example, in a half-semester introductory chemistry course designed for students with weak science and math backgrounds, students work through the OLI chemistry modules prior to coming to class, honing their understanding of key concepts. By having students use OLI to study and practice basic concepts, the instructor can devote class time to focus on problem solving instead of lecturing and target areas where students need the most help. In a general chemistry class, instructors are testing OLI as an alternative to commercial software. Prior success with interactive commercial software piqued instructors' interest in an open alternative, since the price for the proprietary software is increasing and students experienced login problems.

In some classes, appropriate OLI resources were not available, so instructors either found other open or freely available resources,[120] adopted commercial resources, or developed their own tutorials, primarily using Moodle. For a quantitative (developmental math) seminar, no single open course resource was available, so the instructor used a combination of online resources, including the Khan Academy, Open University, and the OLI Probability and Statistics modules. For a half-semester biology fundamentals class that explores biology through the lens of cystic fibrosis, the instructor could not find a single

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[118] Christopher Drew, "Why Science Majors Change Their Minds (It's Just So Darn Hard)," *The New York Times*, November 4, 2011, sec. Education / Education Life, http://www.nytimes.com/2011/11/06/education/edlife/why-science-majors-change-their-mind-its-just-so-darn-hard.html.

[119] Josh Fischman, "Liberal-Arts Colleges Venture Into Unlikely Territory: Online Courses," *Wired Campus (The Chronicle of Higher Education)*, June 29, 2011, http://chronicle.com/blogs/wiredcampus/liberal-arts-colleges-venture-into-unlikely-territory-online-courses/32029; "Next Generation Learning", http://nextgenlearning.blogs.brynmawr.edu/.

[120] Sources for open educational content include OLI, the Open University (http://openlearn.open.ac.uk/), and OER Commons (http://www.oercommons.org/).

textbook that addressed diverse topics such as genetics, proteins, and ethical issues as they relate to cystic fibrosis, so she is curating her own readings, drawing from open educational resources. In addition, she uses frequent Moodle quizzes to assess student comprehension, so she can come into class with a better sense of what students need. Likewise, a professor who is teaching an introductory course for the geology major is developing a series of Moodle practice quizzes that draw from a database of images of minerals. By enabling students to test and reinforce this basic knowledge at home, the professor can free up class time to explore the more compelling aspects of the field.

The Bryn Mawr experience demonstrates that there is no "one size fits all" approach to integrating educational resources into the curriculum. In some cases, appropriate OER are not available or don't serve the instructor's and students' needs. In domains such as in chemistry, excellent commercial resources are already available, which raises the larger question of when it makes sense to go with the commercial option. Commercial content often comes with support, whereas open materials may lack a sufficient user community to keep them up-to-date and bug-free. At the same time, commercial materials can be expensive, or may only be used for part of the course. Open educational resources can be particularly useful for reviewing core concepts, since students may not have textbooks covering prerequisite material.

Ultimately faculty will use what works best for their course—or even produce it themselves. Most faculty begin by using already available content (whether open or commercial), in part because they do not necessarily have the time or technical expertise to create their own materials. But content isn't available to support some courses, especially interdisciplinary, thematic courses, such as the course on cystic fibrosis. Thus some faculty create their own blended learning resources. Developing such materials requires a "significant up-front time investment," so it is most efficient if course resources can be re-used. Some of these resources are so focused on the particular needs of one course that they may be difficult for other faculty to customize for their own courses. These examples suggest a range of approaches to OER, from using OLI as a cornerstone of the course to choosing course content from multiple sources to producing educational resources independently.

Although results of Bryn Mawr's program are still preliminary, they are on the whole positive. Students report appreciating being able to practice until they understand a concept or approach, which enables them to improve without risking their grades. They also like getting immediate feedback on their performance. However, students see a computer-based resource as being a "waste of time" if they need to invest too much time in figuring out the interface, have to wait for content to load, or struggle to input data in an appropriate format. In particular, entering chemical symbols and mathematical formulas on a web browser has proven to be a hassle, a problem that Bryn Mawr is addressing by loading a WYSIWG equation editor into Moodle.

Likewise, instructors are on balance enthusiastic about their experiences with blended learning. Instructors most appreciate the dashboards provided by OLI and some other

systems that allow them to monitor how either individual students or the entire class perform on particular projects. By examining data on student performance, instructors can tailor their lectures and assignments to meet student needs, practicing "agile teaching." Instructors say that students ask more sophisticated questions and can be more specific in pointing to where they are confused. In selecting OER, faculty may want to consider the extent of support for tracking the learner's progress. According to Spohrer, Moodle provides performance data on quizzes and lessons that are equivalent to OLI and many commercial systems, and Moodle developers continue to make improvements. Unfortunately, dashboards aren't as robust for older OLI courses, and with the Open University, the instructor does not have access to data about the learner's progress.

Ultimately, according to Spohrer, blended learning can support several pedagogical innovations. OLI and other systems support formative assessment, so that students can detect gaps in their knowledge and instructors can draw on the learner data to improve teaching. Likewise, blended learning materials like OLI can promote mastery, providing low-stakes testing that enables students to practice until they master material without fearing that they will get a bad grade for making multiple attempts. As Spohrer says, liberal education aims to help students learn how to learn and direct their own education. OLI and other assessment-driven learning materials help students reflect on their own knowledge (metacognition), see where they have weaknesses, practice key skills, and grow in their knowledge and abilities. Likewise, these technologies can help faculty deliver the support that students need, eliminating some of the guesswork while retaining, perhaps even deepening, and the human connection.

In addition to Bryn Mawr, faculty members at other liberal arts colleges have been experimenting with OLI. At the Bryn Mawr workshop, Lisa Dierker of Wesleyan University spoke about how OLI helped her bring her "best stuff" to her statistics class.[121] By providing customized hints and feedback, OLI delivers whatever support individuals need to make progress. The Learning Dashboards make it easier for faculty to track what students are learning, particularly in larger classes, and intervene where necessary. The statistics tutor engages students and taps into their curiosity, so that they are not just performing calculations but thinking about the data they are working with. Dierker did identify some weaknesses with OLI. For instance, she would like to customize an OLI course more easily, cutting out particular sections and pulling in components from other OLI courses. She also wonders how to incorporate social learning into OLI. Integrating OLI into existing courses can also be a challenge, since doing so requires changing the syllabus and instructional approach. OLI faces challenges such as scaling up its approach (given the significant expense of developing new courses); providing more flexibility and modularity so that instructors can more easily adapt OLI courses; and supporting different formats for reading. As Thille noted at the Bryn Mawr workshop, new authoring and course builder

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[121] Lisa Dierker, "Faculty Panel: 'Using OLI and Opportunities and Challenges in the Classroom'" (presented at the June 2011 Blended Learning Workshop, Bryn Mawr College, June 28, 2011), http://nextgenlearning.blogs.brynmawr.edu/conferences/june-2011-blended-learning-workshop/.

tools may help address these challenges, as well as a partnership with Knowledge Forum[122] to explore integrating OLI with social spaces.

8.3 Open education and the MOOC: University of Mary Washington

The massively open online course (MOOC) can be seen as a way of combining open education with online learning. Jim Groom has pioneered a different form of that emerging class structure at the University of Mary Washington, through his innovative digital storytelling class, DS106.[123] Like other MOOCs, DS106 is open to interested learners without formal campus registration. However, it differs in several important ways. First, it is anchored firmly on a face-to-face, registrar-enrolled UMW class. That component matters crucially to the class, impacting even distance-only learners and audiences. In fact, the interpenetration of online and offline ways of learning helps structure the class. Second, it is not as "massive" as others. Third, instructor and leaners collaboratively create class content. Students actually help design the class itself. Fourth, there is no single, stable DS 106 model. It changes with each iteration. Other classes at other institutions can use and remix DS106 components, in the spirit of openness. Groom reports being inspired by the "Looking for Whitman" inter-institutional class, which linked together courses on Whitman at four different institution through a shared curricular focus and the use of BuddyPress, a plug-in that brings social networking features to the blogging platform WordPress.[124]

Moreover, DS106 not only performs online teaching, but also encourages students to reflect on what it means to teach and learn in the digital world. This last point connects DS106 in logistical, operational, and content levels, as students use technologies to learn, then to socially respond to that learning. For Groom, the class allows students (and instructors) to ask major questions for liberal education: what does it mean to teach interactively? How can we use the online experience to extend the face-to-face? How can we more fully use the Web in teaching and learning? If we are still in the early days of online learning, and MOOCs are a transition stage from classical university learning, to what new pedagogical forms do they point?

That next stage could be a liberal arts approach to distance learning. Groom argues that DS106 is structured in ways consonant with the liberal education tradition: high-level student-learner interaction, a focus on community relationships, and a civic emphasis, using tools while reflecting critically on them. The class ethos of creativity, intimacy, and high-touch experience fully translates the liberal arts online. For Groom, open education is essential to this way of thinking. For example, since classes are not housed in digital siloes, inter-class commenting occurs, which expands class discussion while building a larger community. Similarly former students and alumni can reconnect with the class and current students, with alumni serving as mentors. At a curricular level DS106's openness makes it easier for classes to connect across disciplinary boundaries. Groom notes that humanities and social sciences tend to be more fully represented in this than STEM fields, but has

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[122] http://www.knowledgeforum.com/index.htm

[123] http://ds106.us/, accessed March 13, 2012.

[124] http://lookingforwhitman.org/

National Institute for Technology in Liberal Education | www.nitle.org

hopes for connections across the entire curriculum. "The DS106 experience makes the life of the mind… more transparent."

8.4 Faculty production of open textbooks: Southwestern University, Washington and Lee University, and DePauw University

A group of classicists is collaboratively producing an open ebook for Greek courses. The Cyropaedia[125] is based on one text (so far), Xenophon's *Education of Cyrus*. In a sense the project resembles a familiar primary source documentary presentation: a document or collection of documents, complemented by student-oriented annotations, not unlike a Norton Critical Edition. But the Cyropaedia differs by taking advantage of two elements of open education. First, an open source platform, the WordPress blogging engine, hosts the documentation, offering the classic advantages of open source: greater control over format, freedom from external policy changes, and no licensing cost. Second, at some point Cyropaedia will be released to the world for open commentary. Any user will be able to add questions, translations, reflections, or answers to any item within Cyrus' text, or in response to other commentators. This is also an example of open source's versatility, as the software enabling that commentary is another piece of open source software, the CommentPress plugin (developed by the Institute for the Future of the Book).[126]

Why have classical studies professors chosen this open strategy for their project? First, the ease of Web-based collaboration through social media (WordPress, a blogging engine) allows faculty to see this edition in use more rapidly than if it were built via non-digital processes. Second, the ongoing nature of commentary will let readers "witness scholarship in action and stay abreast of the newest developments."[127] In other words, Cyropaedia should function as a living document. Third, there are fewer limitations on the length and medium of digital contributions, as compared to the non-digital options (i.e., print).

Another case of liberal arts faculty producing open textbooks comes from the sciences. David Harvey (professor of chemistry and biochemistry and vice president of academic affairs at DePauw University) published an analytical chemistry textbook to the Web as a Creative Commons-licensed open e-book.[128] This is actually the second edition of his *Modern Analytical Chemistry*, which McGraw-Hill published in print form in 1999. The publisher declined to publish a second edition, returning the copyright to Dr. Harvey and thereby legally freeing him to make new use of the materials.

How did Harvey actually perform the necessary work, and how did DePauw support it?

Dr. Harvey used a variety of software tools, beginning with the original textbook's Microsoft Word files, revising them to reflect updates and rethinking. He then migrated the content to Adobe InDesign for improved layout. Lacking permissions to reuse the print

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[125] http://www.cyropaedia.org/ .

[126] http://www.futureofthebook.org/commentpress/: http://wordpress.org/.

[127] http://www.cyropaedia.org/about-cyrus-paradise/, accessed March 12, 2012.

[128] http://web.me.com/dtharvey1213/Analytical_Chemistry_2.0/Welcome.html, accessed March 12, 2012.

book's art, Harvey created new illustrations, using two other Adobe products, Photoshop and Illustrator. The finished e-book first appeared on DePauw's Web site, then moved to Apple's [me.com](me.com) hosting service. One form of outside support came from the Analytical Science Digital Library, which hosted a copy of the e-book.[129] DePauw supported this work primarily by a sabbatical, which Harvey devoted to his book project; without this support, the project would have taken much longer.

Dr. Harvey chose to publish an open e-book rather than seek another publisher for several reasons. First, the print marketplace did not appear very innovative at the time, especially in terms of new textbook forms, multimedia, and different tools for thinking. Second, controlling the means of textbook production gave Harvey greater creative control: "[s]elf-publishing let me be true to myself." For example, he developed a new visualization tool, the ladder diagram, but the publisher did not allow him to focus on it. In general, he sees open content as "bringing more voices to the table," which "generally are better quality materials."

One benefit ascribed to open content is wider access to materials, and *Analytical Chemistry 2.0* seems to be on track to realize that good. Some of Dr. Harvey's DePauw colleagues have used it, as have "a number of people" beyond DePauw, including residents of other countries and ASDL peers."

Harvey is now considering next steps for his *2.0*, or a possible 3.0. He wonders about Apple's textbook model, including a relatively easy-to-use authoring tool, and what it means for higher education.

8.5 Student Production of Open Resources: Vassar College and Kenyon College

At several liberal arts colleges, students as well as professors are contributing to open education projects such as wikis, blogs, and digital collections, verifying the truism that the best way to learn is to teach. By working on such projects, students can enhance their information fluency skills as they learn how to find, evaluate, analyze and present information in a public forum. For example, students largely produce Kenyon College's MicrobeWiki,[130] a web reference source on microbes and microbiology. Dr. Joan Slonczewski founded the wiki because she wanted students to produce writing for audiences other than the professor, thinking they would take the assignment more seriously.[131] Students see their work as part of a community of knowledge on the Internet, and indeed Slonczewski hears from people around the world who use it as a "quick research site"; some report corrections (as is typical with wikis). Often Slonczewski's students select topics that reflect a broad liberal arts approach and have public relevance, such as silver as an antimicrobial or the health potential of yogurt. Classes around the country contribute to it, including at University of California at San Diego, Sacred Heart

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[129]http://www.asdlib.org/onlineArticles/ecourseware/Analytical Chemistry 2.0/Welcome.html, accessed March 12, 2012.

[130] http://microbewiki.kenyon.edu/index.php/MicrobeWiki

[131] "Interview with Joan Slonczewski," interview by Lisa Spiro, March 8, 2012.

University, Loyola University Chicago, and Michigan State University. As a result of collaborating with other classes to add to the wiki, Slonczewski can broaden its content, learn about a range of approaches (such as collaborative student authoring) and advance outreach for Kenyon. Building and maintaining MicrobeWiki has not required many resources; it uses the Wikimedia Foundation's free wiki software, although an IT staff member occasionally has to upgrade the software and fix bugs. When the wiki got started, Slonczewski used some grant funds to hire a student over the summer to add content, which gave it a critical mass; now a student spends a couple hours of a week approving new accounts and maintaining the wiki. Since the site is a wiki, it is easy to edit, add links and figures, and roll back to previous versions if necessary. MicrobeWiki's story suggests that a wiki project can benefit student learning and public knowledge without requiring large expenditures.

For professors who don't want to take on coordinating the production of open resources, they can challenge students to hone their research and writing skills by contributing to an open content project such as Wikipedia. Through its US Education initiative, the Wikimedia Foundation, the parent organization for Wikipedia, is partnering with American colleges and universities to increase participation in the Wikipedia community, enhance the quality of Wikipedia, and improve students' research, writing, and collaborative skills.[132] Several liberal arts colleges are currently participating or recently took part in Wikipedia's campus initiatives, including Shenandoah University, Davidson College, Mills College, St. Edward's University, and Vassar College.[133]

At Vassar, Senior Academic Computing Consultant Cristián Opazo, a Wikipedia Campus Ambassador, has supported classes that integrate Wikipedia into the curriculum since 2009. An overarching goal of Vassar's Wikipedia initiative and Wikipedia campus programs more generally is to advance digital literacy of students (and faculty), so that they can find evaluate, analyze, use, and produce digital media.[134] In surveying students about Wikipedia, Opazo found that 100% (n=43) have used it for academic purposes, but 0% have edited a Wikipedia article related to their academic needs. According to Opazo, the passive way that students approach Wikipedia reflects an attitude that it is "extraneous to them," but one of his goals is to convince them that this open resource is "us, not them."[135] We have collective responsibility for ensuring the quality of this common resource. For Associate Professor of Chemistry Christoper Smart, who used a Wikipedia assignment in his Vassar course on Advanced Organic Chemistry, the openness of Wikipedia is its attraction, as students were motivated in contributing to this public resource and participating in an active community: "The academic world tends to quickly dismiss Wikipedia on the basis of its openness and its lack of formal peer-review by experts, but the way I see it is that this openness is precisely what makes it a great resource: you have this huge community of contributors all

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[132] http://en.wikipedia.org/wiki/Wikipedia:United_States_Education_Program

[133] Disclosure: Co-author Lisa Spiro is a former Wikipedia Campus Ambassador.

[134] Richard Knipel, Cristian Opazo, and Christopher Smart, "Wikipedia and Academia, Friends at Last: Curricular Initiatives in Higher Education" (presented at the EDUCAUSE 2011, Philadelphia, PA, October 19, 2011), http://www.educause.edu/E2011/Program/SESS055.

[135] "Interview with Cristián Opazo," interview by Lisa Spiro, February 15, 2012.

over the world that care about particular topics, and many of them are committed enough to criticize existing content, and to go to great lengths to make a certain article accurate and cohesive."[136] By contributing to Wikipedia, students learn about the strengths and weakness of how this open online community works, as well as how to write well-supported, concise encyclopedia entries. In Smart's chemistry class, students transformed stubs (brief starting points for an article) on chemical reactions into Wikipedia articles. Rather than just passively consuming information, students actively contributed to public knowledge. Many students even continued to edit the articles after the assignment was officially completed. In addition, the instructor learned more evaluating the Wikipedia articles than he did grading typical papers.

Likewise, Vassar Professor Katherine Hite found that a Wikipedia assignment engaged students in her course "Conceptualization of Latin and Latino(a) America." An intensive six-week class that introduces students to interdisciplinary approaches to Latin America, the course aimed to "take students out of their intellectual comfort zones."[137] Students worked in pairs to expand a stub. In the process, they gained a deeper, more hands-on understanding of the open source paradigm, enhanced their research skills (including how to conduct library research and evaluate sources), developed deeper subject knowledge, and learned how to write a succinct, well-supported article for a much larger audience. Although the instructor found it frustrating to identify and select stubs, she believes that the assignment turned out well. Students liked producing something of "real meaning," as well as the opportunity to work together and the novelty of writing a Wikipedia entry instead of a traditional paper. As Opazo, the Campus Ambassador, noted, students commented on "how engaged they were, how much ownership they took."[138] Openness was part of the appeal, since students felt that they were contributing to public knowledge. Likewise, the instructor appreciated the way the assignment fostered collaboration and motivated students to think about writing for larger audiences. People in her field have commented that they are happy to have Wikipedia articles on the topics they study, so the student work has had a "concrete impact" on colleagues.[139] A key component of the success of this curricular initiative was the long-term involvement of the Campus Ambassador, who was formally associated with the class as a co-instructor, had input in the course design, conducted in-class sessions and did individual consultations with students.

8.6 Open courseware and multi-campus collaboration: the case of CLAMP

A group of liberal arts colleges and universities has been leveraging the combined powers of open source software and inter-institutional collaboration to better support campus learning management systems (LMS). The Collaborative Liberal Arts Moodle Project (CLAMP) began in 2006, as six schools from across the United States launched a peer

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[136] Cristián Opazo, "Your Homework Today: Improve Wikipedia," *Techademia*, September 13, 2010, http://blogs.vassar.edu/acs/your-homework-today-improve-wikipedia/.

[137] "Interview with Katherine Hite," interview by Lisa Spiro, February 24, 2012.

[138] "Interview with Cristián Opazo."

[139] "Interview with Katherine Hite."

support network using Moodle, a leading open source tool.[140] (NITLE provided early support for the project.) Instructional technologists and other support staff pool their knowledge, share implementation experiences, identify and fix bugs, seek answers to challenges, and develop Moodle code together. While most collaboration occurs online, participants sometimes meet face-to-face for "Hack/Doc Fests". They were able to help each other transition LMS systems away from very large, challenging platforms, such as Blackboard.

CLAMP has grown into a robust and fruitful tool for these campuses, whose number has grown to twenty-three as of this writing.[141] By 2010 CLAMP was able to publish its own edition of Moodle, aimed specifically at the liberal arts campus. Benefits are numerous, according to participants, starting with the ability to use multi-campus feedback to identify code development priorities, usage pain points, and needed features. CLAMP participants have focused on the American small college experience, which is very different from the broader Moodle world, consisting of institutions around the world, many K-12 schools, community colleges, and public state universities. Participation saves IT staff time, as debugging and coding help from many peers reduces the number of hours one single team would otherwise require. Staff can apply patches and fixes more rapidly. Learning from others' experience allows workflow streamlining. As one IT leader put it, "I've gotten way more out of CLAMP than I would have on my own."

9. Obstacles Facing Open Education at Liberal Arts Colleges

What does it take for a campus to make use of open educational resources? At first glance, it may seem that free, accessible, and high quality educational resources surely win an audience rapidly. Yet surveys show using OER holding little interest for faculty.[142] As Harley et al. found in their 2010 study of open textbooks, faculty want "flexibility and choice in textbook options," as do students.[143] Faculty attitudes seem to vary according to

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[140] A good introduction and survey is Joanne Cannon, Joseph Murphy, Jason Meinzer, Kenneth Newquist, Mark Pearson, Bob Puffer, and Fritz Vandover, "The Collaborative Liberal Arts Moodle Project: A Case Study", Academic Commons, September 9th, 2009.
http://www.academiccommons.org/commons/essay/collaborative-liberal-arts-moodle-project . Accessed 3/12/12.

[141] From the CLAMP site, http://www.clamp-it.org/: Anderson University, Beloit College, Bucknell University, Carleton College, Connecticut College, Davidson College, Dickinson College, Eckerd College, Furman University, Hampshire College, College of the Holy Cross, Lafayette College, Luther College, Macalester College, Mid-Michigan Community College, Millsaps College, Purchase College SUNY, Regis College, Smith College, University of Redlands, Vassar College, Wheaton College, Williams College.

[142] Roger C Schonfeld and Ross Housewright, *Faculty Survey 2009* (ITHAKA S+R, 2010), http://www.ithaka.org/ithaka-s-r/research/faculty-surveys-2000-2009/faculty-survey-2009; Diane Harley, "Why Understanding the Use and Users of Open Education Matters," in *Opening Up Education: The Collective Advancement of Education Through Open Technology, Open Content, and Open Knowledge*, ed. Toru Iiyoshi, M.S. Vijay Kumar, and John Seely Brown (The MIT Press, 2008), 197–211, http://mitpress.mit.edu/catalog/item/default.asp?ttype=2&tid=11309.

[143] Diane Harley et al., *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes* (UC Berkeley: Center for Studies in Higher Education, 2010), 4, http://escholarship.org/uc/item/1t8244nb.

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the type of institution (e.g. public research university, state university, community college). Some faculty may not find appropriate high quality open textbooks to support their teaching; others believe that students need to have a print option because ebooks do not support annotation and other practices that help students learn better (although ebooks do increasingly support such features now). However, faculty also worry about the rising costs of textbooks and have pursued "temporary solutions" such as placing readings on reserve, adopting earlier editions, or creating course readers.[144]

OER adoption is, as noted earlier, difficult to ascertain. Major courseware projects have only recently started sharing usage metrics; use cases are the subject of ongoing research. At present we can identify several obstacles to OER usage by faculty:

- *Lack of awareness.* Even though the open education movement has been active for over a decade, many faculty remain unaware of it. According to a 2010 survey, 50% of University of Michigan faculty have never heard of OCW; more faculty were aware of open courseware at Universidad Politecnica de Valencia, Spain (65%), University of Cape Town, South Africa (80%), and Danubius University of Galati, Romania (92%).[145]
- *Inertia.* If faculty already have course resources that satisfy them, they are unlikely to seek alternatives.
- *Concerns about quality:* A common concern around OER focuses on quality, as people may equate free with less valuable. Without the imprimatur of a publisher or of peer review (although OER could include both), faculty are less likely to trust freely available materials. As Harley et al. found with open textbooks, faculty "expressed concerns about open textbooks as an affordability solution, citing, in particular, issues around remuneration for authors, protection of intellectual property, quality of the content, and overall accessibility."[146] Inexpensively produced open textbooks may not go through the same editorial process as do textbooks released by publishers, such as editorial review and copy editing.[147] As Jennifer Spohrer noted in her survey response, quality has several dimensions, including content, ease of use, and effective instructional design: "'Quality' is an issue on more than just a content or pedagogical design level. Students care about ease of use and how quickly elements run and load, and they often respond negatively to things that 'look dated' even when they are otherwise satisfactory. Faculty want not only solid content and pedagogical design, but also material that is easy to implement, has intuitive student and instructor interfaces, is modular and/or customizable, and is likely to continue being available and up-to-date in the future."

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144 Ibid., 8.

145 Joseph Hardin and Cheryl Hodgkinson-Williams, "Reviews of Current International OCW Surveys" (presented at the OCWC Global 2011: Celebrating 10 years of OpenCourseWare, Cambridge MA, May 4, 2011).

146 Harley et al., *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes*, 4.

147 Judy Baker and Jacky Hood, "7 Things You Should Know About Open Textbook Publishing," March 2011, http://www.educause.edu/Resources/7ThingsYouShouldKnowAboutOpenT/225383.

- *The character of teaching at liberal arts colleges.* Many liberal arts classes, particularly in the humanities, do not use textbooks, instead relying on articles, books published by university presses, and other content.
- *Not Invented Here syndrome.* Unlike using other off-campus material (e.g. textbooks), employing open textbooks could risk making the instructor look less professional, no matter its quality. Paul Stacey notes that while institutions such as MIT and Carnegie Mellon enthusiastically author OER, they typically do not use OER produced by others: "They are encumbered by a "not-invented here" syndrome where OER developed anywhere else except at that institution cannnot [sic] possibly be as good as what has been developed in house."[148] Overcoming this problem requires changes in culture and attitude, as well as institutions collaborating to develop materials in their areas of strength and using materials created by others. As Wiley, Green, and Soares argue, "The academic culture from elementary to higher education must change from "not invented here" to 'proudly borrowed from there.'"[149]
- *Difficulty finding appropriate OER.* Faculty often struggle to find available OER due to lack of content, poor search engines, and inadequate indexing.[150] Indeed, a JISC study determined that novice OER users were successful in finding appropriate content only about half of the time, and that they had more success with general sites such as Flickr and Google than at OER specific sites like MIT OCW (although resources discovered through general sites were less likely to be true OER).[151] Although the number of open textbooks is increasing, they are still "only available for a fraction of courses" and may not be matched well to the liberal arts curriculum.[152] Bryn Mawr has found that it takes substantial time to sort through the abundance of resources and find what works for a particular class, particularly if faculty are taking innovative, integrated approaches to teaching. Sometimes appropriate material isn't available, sometimes it is aimed more at high school than college students, and sometimes it is isn't sequenced in the way that instructors have designed their courses or uses examples that aren't consistent with their pedagogical approaches. OER directories such as OER Commons[153] can help identify resources, but these are not comprehensive and not targeted to the liberal arts curriculum.[154]
- *Preference for the physical*: Many students prefer print to electronic books because they want to annotate the text easily, prefer to read hard copy, or want to have a bound textbook to which they can refer.[155] Indeed, a 2010 survey by the Student

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[148] Paul Stacey, "Overcoming Not-Invented-Here Syndrome – An OER Call to Action," *Paul Stacey*, October 17, 2010, http://edtechfrontier.com/2010/10/17/overcoming-not-invented-here-syndrome-an-oer-call-to-action/.

[149] Wiley, Green, and Soares, *Dramatically Bringing Down the Cost of Education with OER*.

[150] Masterman and Wild, *OER Impact Study: Research Report*.

[151] Ibid.

[152] Allen, *A Cover to Cover Solution*, 14.

[153] http://www.oercommons.org/oer

[154] "OER Commons," January 3, 2012, http://www.oercommons.org/.

[155] Harley et al., *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes*.

PIRGs found that 75% of students preferred print,[156] although a more recent (2012) survey found that 6 in 10 students preferred digital textbooks.[157] In any case, as digital reading platforms improve, these concerns may recede. In addition, students can typically print or secure low-cost printed copies of open textbooks.

- *Digital divide.* Given the reliance of open education on networked technologies, learners' lack of access to appropriate technologies and sufficient bandwidth can pose a significant barrier. It is also important to ensure that open educational materials meet accessibility standards so that students with visual or other impairments can use them.
- *Open educational materials typically lack services provided by commercial publishers.* Whereas no technical support is required to use a print textbook, digital learning materials often do require support, whether that is in using interactive features or maintaining links. Most OER come without such support. Furthermore, faculty may be less willing to use open textbooks if supplemental materials are lacking.

Even more significant obstacles face colleges interested in the producing OER, including:

- *Recruiting faculty authors.* Much of the work advancing open education takes place at the grass roots, with faculty contributing hours of free labor to produce OER.[158] Although some authors are motivated by the opportunity to share their knowledge, it may be difficult to scale up the production of OER beyond this committed core without incentives.[159] For faculty, time is at a premium, so most would need release time, funding, and/or credit toward tenure and promotion to commit to writing an open textbook.[160]
- *Intellectual property concerns.* Even if courses, textbooks, or even learning modules are themselves open, they often rely upon copyrighted content, such as articles or figures. Universities can face significant expense in removing copyrighted materials from open courses or in securing permissions.[161] In addition, potential faculty contributors may resist giving away their intellectual property.
- *Cost/Developing Sustainable Business Models.* One of the key questions that higher education must face in considering open education is defining the business model.[162] Developing, improving and sustaining open educational resources and platforms require significant investments. Who is going to pay? While using OER

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[156] Allen, *A Cover to Cover Solution*.

[157] Nick Desantis, "Tablet Ownership Triples Among College Students," *Wired Campus (The Chronicle of Higher Education)*, March 14, 2012, http://chronicle.com/blogs/wiredcampus/tablet-ownership-triples-among-college-students/35764.

[158] Plotkin, *Free to Learn Guide*.

[159] U. M. Dholakia, W. J. King, and R. Baraniuk, *What Makes an Open Education Program Sustainable? The Case of Connexions*, CERI - Closed Expert Meeting on Open Educational Resources: Reports (OCED, 2006).

[160] Harley et al., *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes*.

[161] Atkins, D.E., J.S. Brown, A.L. Hammond, William and Flora Hewlett Foundation. A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities. Creative Commons, 2007.

[162] "Interview with Michael Roy," interview by Lisa Spiro, March 8, 2012.

may be free, producing them entails significant costs, including developing content, performing quality control, and supporting the underlying technical infrastructure. As Jennifer Spohrer remarked in her response to our survey, liberal arts colleges will likely face significant challenges in covering the costs of producing and maintaining OER, especially given the lack of long-term foundation support:

> OER have significant potential. However, it is worth remembering that while the intellectual content is made freely to users, there are still development, maintenance, upgrade, hosting and tech support costs associated with these materials. In a commercial model, the vendor generally covers much of these costs through the license fees or sales price. If in the case of OER these associated costs are simply pushed onto users, they may not be cost-effective for liberal arts colleges, which typically have small tech support staffs and budgets. Faculty generally won't spend time developing courses around technologies and resources that are unlikely to be usable or available over several years. So far I have seen foundation support for developing such materials, but not as much for maintaining, hosting and providing long-term support for users.

Research universities and community college systems seem to have taken the lead in producing open educational materials, in part because of the costs entailed. As Candice Thille argues, "Small colleges face enormous budget pressures in the face of increasing competition, dwindling enrollments and increased costs. Technology development is costly and they cannot compete."[163] At MIT, converting a course to OCW cost approximately $25,000 per course, not counting maintenance and improvement.[164] Operating MIT OCW costs about $3.5 million each year.[165] Yale spent between $30,000 and $40,000 on each of its Open Yale courses, which includes paying videographers, making transcripts, and performing quality assurance.[166] Creating OLI courses is even more expensive—about $250,000 per course.[167] Producing high quality open textbooks involves not only writing the text, but also creating (or securing licenses for) figures and images, overseeing peer review, copyediting, marketing, and so forth. Given that publishers typically invest significant resources to publish a textbook, how can colleges

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[163] Margulies, Sinou, and Thille, *Models of Open Educational Resources: OpenCourseWare, Sofia, and the Open Learning Initiative*, 10.

[164] Atkins, Brown, and Hammond, *A Review of the Open Educational Resources (OER) Movement*.

[165] "Why Donate?," *MIT OpenCourseWare*, http://ocw.mit.edu/donate/why-donate/index.htm.

[166] Hafner, "Higher Education Reimagined With Online Courseware - Education Life."

[167] Ibid.

create an inexpensive alternative without sacrificing quality, especially since they lack publishers' expertise in textbook production?[168]

Institutionalizing innovative projects poses a major challenge at many colleges. Often open education projects are driven by just a few people, and turnover or a shift in the participants' priorities can mean the end of the project.[169] Furthermore, as universities facing an increasingly competitive environment look to new revenue streams, they may decide that they cannot afford to give away intellectual property. Middlebury College, for instance, recently launched Middlebury Interactive Learning as a separate entity with the company K12 as partner. In order for development to continue, it needs to be profitable. Yet institutions that see strategic value in open education may determine that the indirect rewards merit institutional investment, or they may find inventive business models that enable them to generate direct revenue from open education.

Colleges need to find appropriate models to integrate such projects into their mission and sustain them. Economic models to support open education vary. Funding for many has come from private foundations, notably the William and Flora Hewlett, Gates, and Mellon Foundations. While foundations and grants may help to launch open education projects, they typically do not provide long-term support to sustain these projects. Taylor Walsh warns that open courseware initiatives, which often were started in a better economic environment and supported by grant funding, "now risk being seen as luxuries that are no longer affordable in an era of spending cuts."[170] Utah State University, for example, closed its open courseware site in 2009 after its grant funding ran out.[171] The Hewlett Foundation cut back funding major OER projects in 2010, although it continues to provide some support for open education.[172] However, federal government support has recently increased, most visibly with the Department of Education's deeply funded Trade Adjustment Assistance Community College and Career Training Grant Program.[173] Several OER programs now solicit personal contributions and corporate donations. Individual campuses have also contributed resources to launch and maintain OER programs, beyond the intellectual capital of instructors and their courses: financial support (subvention) and in-kind work (media capture and

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[168] Keith Hampson, "The Search for Sustainable OER," *Higher Education Management*, December 19, 2011, http://highereducationmanagement.wordpress.com/tag/open-educational-resources/.

[169] Spiro, "Interview with Pat Schoknecht."

[170] Taylor Walsh, "Open Courseware Initiatives and the Challenge of Sustainability," *EDUCAUSE Review*, August 2011, http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume46/OpenCoursewareInitiativesandth/231834.

[171] Marc Parry, "Utah State U.'s OpenCourseWare Closes Because of Budget Woes," The Chronicle of Higher Education, *The Wired Campus*, September 3, 2009, http://chronicle.com/blogs/wiredcampus/utah-state-us-opencourseware-closes-because-of-budget-woes/7913.

[172] Walsh, *Unlocking the Gates*, 145, 148, 233–243.

[173] http://www.grants.gov/search/search.do?mode=VIEW&oppId=65773 . See http://www.whitehouse.gov/blog/2011/01/20/new-job-training-and-education-grants-program-launched for the announcement.

editing, archiving, Web hosting, etc). Some, like MIT, internalize production and maintenance costs, seeing on- and off-campus benefits beyond financial return. In any case, ongoing economic pressures may lead some OER producers to seek new external supports, such as the Internet Archive.[174] At worst, they may scale back their work.

10. Recommendations

The growth of open education has led to larger questions about the future of higher education. If students can now freely access the best lectures online, what value do they gain from lectures at their own institutions? Of course, colleges and universities provide much value, including mentoring, the structure and motivation for learning, a community of learners, and certification via course credits and, ultimately, a college degree. Indeed, in the face of open content, colleges and universities may be shifting away from lecture towards active learning practices commonly practiced at liberal arts colleges: student research, collaborative work, peer instruction, etc. Open content probably will not supplant proprietary content for a while, given the lack of critical mass. However, liberal arts colleges may still find that adopting an open education strategy will enable them to advance goals such as increasing the quality of learning, providing greater access to education, or raising their visibility. As open education matures, inter-campus collaboration can facilitate reducing the duplication of effort, bringing down costs, and sharing expertise.

What are some effective ways for liberal arts colleges to engage strategically in open education? We outline a range of approaches, including providing incentives to faculty to integrate open education into the curriculum, collaborating with other colleges to curate or produce OER, and drawing on the expertise of faculty and staff across the campus. All of these approaches depend upon the college defining its strategic vision with regard to open education.

Define the strategic rationale. What does the college wants to get out of its engagement with open education? Particular goals should drive the college's open education initiative. For Empire State, providing unfettered access to education stands at its core, so promoting open education extends from this mission. MIT takes as its mission "to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century."[175] Hence MIT's mission underlies its own commitment to open education, as it aims to benefit the nation and the world through access to knowledge and education.[176] For liberal arts colleges, adopting an open education policy may enable them to promote educational innovation, lower costs, foster collaborations, and raise their profile. Colleges may even want to formalize their strategy

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[174] http://archive.org/details/education

[175] "MIT - Mission," http://web.mit.edu/mission.html.

[176] Tom Caswell et al., "Open Content and Open Educational Resources: Enabling Universal Education," *The International Review of Research in Open and Distance Learning* 9, no. 1 (February 26, 2008): Article 9.1.1.

by adopting an open education policy that could, for example, encourage faculty to produce and use OER. [177]

Provide high-level administrative support. According to Hal Plotkin, enlarging the benefits that open education provides to schools and students depends upon "more active support and leadership from higher education governance officials."[178] Factors contributing to the lack of administrative support for open education include cultural barriers, such the tendency to stick with traditional practices; "chronological" barriers, such as leaders' lack of familiarity with digital learning and culture; and systemic barriers, such as the initial failure of OER to meet federal requirements that resources be accessible to the disabled, a barrier that is fading.[179] Chief academic officers play a major role in building interest in technology, generally, and OER use follows this pattern. Deans and provosts can allocate resources, encourage department chairs and committees, and generally generate a climate friendly to open education. As non-technologists (usually), their support is perceived as part of the academic mission, rather than being associated with developing information technology. At its core, open education focuses on learning, not on technologies.

Raise awareness of current developments in open education. Tracking developments in open education can be challenging, given rapid developments in areas such as business models, supporting technologies, certification strategies, and pedagogical approaches.[180] Colleges can raise awareness of open education through faculty advocates and professional development programs.[181] (To keep up with ongoing developments, consider following open education bloggers such as David Wiley, Paul Stacey, and Tom Caswell.[182]) Libraries such as those at Empire State and the University of Massachusetts-Amherst are compiling guides to resources on open education.[183] As part of NITLE's focus on new learning resources, the authors of this working paper track open education through a Diigo group "OER and the Liberal Arts,"[184] a Zotero collection on New Learning Resources,[185] and a blog dedicated to the topic.[186]

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[177] For guidance on developing such a policy, see Plotkin, *Free to Learn Guide*.

[178] Ibid., 1.

[179] Plotkin, *Free to Learn Guide*.

[180] Joseph Hardin and Cheryl Hodgkinson-Williams, "OCWC Global 2011: Celebrating 10 Years of OpenCourseWare" (presented at the OCWC Global 2011: Celebrating 10 years of OpenCourseWare, Cambridge MA, May 4, 2011).

[181] Masterman and Wild, *OER Impact Study: Research Report*.

[182] David Wiley's *iterating towards openness, http://opencontent.org/blog/;* Paul Stacey's *Musings on the Ed Tech Frontier,* http://edtechfrontier.com/; Tom Caswell's *Tom's Two Cents*, http://tomcaswell.com/

[183] See, for example, the University of Massachusetts-Amherst library's guide to OER http://guides.library.umass.edu/content.php?pid=87648&sid=652168 and Empire State College Library's guide, http://subjectguides.esc.edu/openlearning

[184] http://groups.diigo.com/group/oer_and_the_liberal_arts

[185] http://www.zotero.org/groups/newlearningresources

[186] http://newlearningresources.wordpress.com/

Build up use cases. Colleges can begin their exploration of open education with small pilot projects. If faculty run a successful class using OER content, that is a powerful inducement to others. NITLE is also working to foster cross-campus awareness of open education through its work on new learning resources.

Offer incentives. If an institution wants to pursue open education, it should provide incentives to faculty to use and/or produce open resources, since they typically drive success.[187] These incentives include credit for tenure and promotion, release time, and monetary support. Institutions should also clear away obstacles, such as prohibitive intellectual property policies or outmoded tenure policies.

Both Temple University and the University of Massachusetts-Amherst recently launched successful experiments to encourage faculty to adopt OER, resulting not only in savings to students but also, it seems, in innovative approaches to learning. Through its alt-textbook project, Temple University awarded $1000 to 11 faculty to get rid of their textbooks and create their own multimedia course resources.[188] Not only did students save money, but they also seem to have learned more, working with archival resources, primary source materials, and/or more current sources; one class even wrote their own textbook. Likewise, the University of Massachusetts Amherst recently saved 700 students over $72,000 through a $10,000 grant program that supported 10 faculty in replacing expensive textbooks with freely available digital content.[189]

Recognize that the successful use of OER materials in class draws on several aspects of established pedagogical practice. To begin with, instructors already select and aggregate materials in designing their classes. Open resources can simply be considered part of the range of available materials, along with articles, print books, DVDs, and so on. In addition, many OER support assessment, whether through built-in tutors and learning dashboards (as in the case of OLI) or quizzes. Seeing OER use in terms of assessment might not create faculty enthusiasm, but it does align with a major current in academic work.

Involve multiple campus populations. Supporting open education requires cross-campus efforts among faculty and staff. From print collections to e-reserves, librarians have worked closely with faculty members to support the classroom experience. The library can help faculty members find the most appropriate materials for their pedagogical approaches and curricular needs. Librarians can also consult on producing, providing access to, and preserving open content, drawing on their expertise in metadata, data management,

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[187] D. Wiley, *On the Sustainability of Open Educational Resource Initiatives in Higher Education* (OECD's Centre for Educational Research and Innovation (CERI), 2007).

[188] Eryn Jelesiewicz, "Temple Faculty Experiment with Alt-textbooks," *Temple University News*, January 27, 2012, http://news.temple.edu/news/temple-faculty-experiment-alt-textbooks.

[189] UMass Amherst Library, "Taking a Bite Out of Textbook Costs", December 1, 2011, http://www.library.umass.edu/about-the-libraries/news/press-releases-2011/taking-a-bite-out-of-textbook-costs/.

digitization, digital publishing, and copyright.[190] In addition, academic computing and instructional design specialists typically have a wealth of knowledge concerning integrating digital content into courses and supporting open systems. Within the faculty, cross-disciplinary and cross-campus conversations can facilitate sharing of experiences and practices.

Emphasize practical benefits. As part of their open education initiatives, colleges should build in assessments to measure practical benefits. These benefits could include lowered costs to students, new opportunities for professional development through OER-inspired course redesign, and improvements to student learning. How much can students save by using OER materials instead of textbooks?[191] How much faculty professional development is done by OER-based course redesign? Do student scores improve with OLI tutors? These questions can lead to quantifiable, shareable, and perhaps persuasive answers.

Foster collaborations around evaluating and curating OER. To make it easier for faculty to find relevant, high quality resources, liberal arts colleges could work together to identify, evaluate, and recommend OER appropriate to the liberal arts curriculum. A sector-wide effort to curate OER could save time, build community and identify gaps in available resources that could inform efforts to develop OER. If faculty were convinced that there were high quality, trustworthy open textbooks available in their field, they would be more willing to use them.[192] Indeed, 95% of faculty respondents to a survey by Harley et al. said they would consider assigning an open textbook if its only difference from their traditional textbook was the mode of access.[193] Likewise, according to a study of open textbooks at community colleges, factors leading instructors to adopt them included reduced costs, good quality, and ease of use.[194]

In curating OER, liberal arts colleges could partner with existing repositories and build upon prior work. For example, a coalition of liberal arts colleges could collaborate with OER Commons or another repository to identify and add OER relevant to the curriculum at liberal arts colleges. These resources could be filtered through a liberal education lens. Such a collection could build on existing curation efforts, such as a database of OER compiled by Jennifer Spohrer to support Bryn Mawr's Next Generation Learning project.[195] As the open education community works on the challenges of making resources easier to find and evaluate, colleges could push for better filtering mechanisms to help faculty find

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[190] Pieter Kleymeer, Molly Kleinman, and Ted Hanss, "Reaching the Heart of the University: Libraries and the Future of OER," Preprint, September 20, 2010, http://deepblue.lib.umich.edu/handle/2027.42/78006.

[191] Several calculators that determine the benefits of adopting open textbooks are available, including Open Stax College's (http://openstaxcollege.org/calculator) and David Wiley's (http://opencontent.org/calculator/).

[192] Harley et al. *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes.*

[193] Harley et al., *Affordable and Open Textbooks: An Exploratory Study of Faculty Attitudes*.

[194] Petrides et al., "Open Textbook Adoption and Use."

[195] Jennifer Spohrer, "Database of Open Educational Resources (OER)," *Next Generation Learning Challenge Project*, https://moodle.brynmawr.edu/mod/data/view.php?id=6557. To access the Moodle site, log in as guest.

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relevant material, including peer review and search engines that enable more granular searches. A user rating system could help users sift material,[196] but academics would need to develop trust in such a system.

Launch a pilot project to produce OER in a few key liberal arts disciplines. As noted above, quality concerns and lack of appropriate content prevent many faculty at liberal arts colleges from adopting OER. However, if liberal arts colleges collaborated to produce a series of open textbooks and supplemental resources appropriate to the liberal arts curriculum, then such concerns should likely be allayed. Although producing OER may seem like a daunting task, colleges can reduce effort and increase the impact by building upon existing content, collaborating to divide labor among faculty experts, and partnering with groups that can offer the necessary infrastructure to develop and disseminate these resources. Some faculty already have course resources, even textbooks, that could be shared more broadly. Likewise, some faculty (such as classics professors profiled in the above case study) are already working together to create common course resources, but their efforts could be scaled and sustained with cross-institutional support. Many colleges teach similar courses, so partnering to create common resources can help to reduce duplication of effort, bring greater transparency to teaching and share innovations. A group of contributors could put together an outline and each contribute a small chunk of the overall textbook, thus minimizing their time commitment.[197] Connexions, for example, provides a platform for a modular approach to textbook production, so that an engineering professor can write about his or her specific area of expertise but not be responsible for producing the entire textbook.[198] Adopting a model from the open source community, academics could come together in a book sprint to produce a textbook in a short amount of time.[199]

A pilot project could focus on a particular discipline such as media studies or physics, providing faculty with funding or release time to collaborate in developing a modular course resource.[200] The program could even pair senior and postdoctoral scholars, enabling postdocs to focus on designing effective instructional resources with input (and reputational capital) from more senior colleagues.[201] In producing open resources, colleges should keep in mind principles of effective instructional design, with careful attention to learning objectives and outcomes, interactivity, support for the learner, and evaluation.[202] Indeed, perhaps what will drive a shift to open textbooks will be the ability to "improve the learning experience," such as by incorporating rich media or supporting modularity.[203] To

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[196] OECD, *Giving Knowledge for Free: The Emergence of Open Educational Resources*.

[197] "Interview with Michael Roy."

[198] Dholakia, King, and Baraniuk, *What Makes an Open Education Program Sustainable?*

[199] Scott Leslie, "Open Textbook Authoring Tools Part 3 – Book Sprints," *EdTechPost*, February 14, 2012, http://www.edtechpost.ca/wordpress/2012/02/14/open-textbook-authoring-tools-part-3-book-sprints/.

[200] "Interview with Bob Kieft," interview by Lisa Spiro, February 14, 2012.

[201] Ibid.

[202] Tony Bates, "OERs: The Good, the Bad and the Ugly," *Online Learning and Distance Education Resources*, February 6, 2011, http://www.tonybates.ca/2011/02/06/oers-the-good-the-bad-and-the-ugly/.

[203] "Interview with Michael Roy."

create and publish OER, colleges could use an existing publishing framework (such as WordPress or an institutional repository), partner with an organization such as the Saylor Foundation[204] or Connexions, or encourage faculty to contribute to open repositories.[205]

Just as the higher education community has come together to develop and maintain open source software such as Moodle, Sakai, and Kuali, so colleges could take a community source approach to open education, enabling them to pool resources and reduce duplication of effort. With community source, colleges and universities agree to contribute resources in order to build open systems and content, taking a directed approach.[206] As Brad Wheeler suggests, the community source model upholds academia's mission to share knowledge, enables adaptation and re-use, and serves colleges' own self-interest. For a community source model to work, colleges need to determine an appropriate model for collaboration, build an active community, and ensure institutional support.[207] CLAMP provides an instructive model for how the liberal arts college community can come together to make an open education solution work for them.

Experiment with new models for education. To promote innovation and devise strategies to cope with ongoing changes, liberal arts colleges can experiment with open educational models. For instance, they could work together to offer a liberal arts-focused MOOC (most to date have focused on technology), thus reaching out to a larger constituency (including a global audience) and experimenting with new, technology-supported teaching methods. To expand their course offerings, they could award credit for open courses that meet quality standards. They could explore how interactive, assessment-driven educational materials such as OLI can enhance learning. How colleges approach open education will depend on their institutional profile and goals.

Devise appropriate sustainability plans. Strategies for sustaining open education include minimizing costs, pursuing partnerships, engaging the community, and developing new business models. Lowering costs can be an important element of sustaining projects. As Jim Groom suggests, rather than investing in expensive infrastructure and systems, colleges can use freely available open tools and content and focus to create "simple, affordable micro-cultures for teaching and learning."[208] In the case of the University of Mary Washington, that means using WordPress Multi-User to build learning communities at a cost of about $6000 per year, enabling the user to publish their ideas to the open web.[209] Colleges can also lower costs by using student or volunteer labor to build and maintain OER, distributing costs across consortium members, or integrating OER into the regular

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[204] http://www.saylor.org/

[205] Kanwar, Uvalić-Trumbić, and Butcher, *A Basic Guide to Open Educational Resources (OER)*.

[206] Brad Wheeler, "Open Source 2010: Reflections on 2007," *EDUCAUSE Review* 42, no. 1 (February 2007), http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume42/OpenSource2010Reflectionson200/158109.

[207] Ibid.

[208] Groom, "Open Education: How Do We Build Relevance?"

[209] Ibid.

systems for educating enrolled students.[210] Although open educational initiatives do cost money, resources are wasted in the current closed system, where efforts are duplicated and faculty cannot benefit from innovative work done by others. Ultimately an open initiative is more likely to succeed and be sustained if it advances a clear value proposition and builds up an active, supportive user community.[211]

Although selecting the appropriate sustainability strategy may be challenging, some compelling models are emerging. Indeed, open education may spark the development of new business models.[212] Stephen Downes identified several models for funding open education projects[213]:

- endowment model, such as that used by the Stanford Encyclopedia of Philosophy
- membership model, such as Sakai or Kuali
- donations model, such as Wikipedia
- conversion model, where an organization provides something for free in order to convert users into paying customers, such as Udemy,[214] which offers both free courses and courses ranging from $5 to $250 [215]
- contributor-pay model, such as Public Library of Science's author payments
- sponsorship model, such as iTunes U
- institutional model, such as MIT OCW
- governmental model, such as JISC's Jorum[216]
- partnerships model, such as Connexions' partnership with the government of Vietnam to provide a platform for its educational content[217]

Additional models have emerged, including:

- substitution model, whereby an institution replaces proprietary with open technology and takes advantage of the resulting savings, such as using Moodle instead of paying Blackboard licensing fees[218]
- recruitment model (a form of partnership/indirect sponsorship), such as Hacker School,[219] which partners with recruiting agencies to identify qualified software developers, collecting a recruiting fee.

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[210] Atkins, Brown, and Hammond, *A Review of the Open Educational Resources (OER) Movement*.

[211] Dholakia, King, and Baraniuk, *What Makes an Open Education Program Sustainable?*

[212] Paul Stacey, "The Economics of Open," *Paul Stacey*, March 4, 2012, http://edtechfrontier.com/2012/03/04/the-economics-of-open/.

[213] S. Downes, "Models for Sustainable Open Educational Resources," *Interdisciplinary Journal of Knowledge and Learning Objects* 3 (2007): 29–44.

[214] http://www.udemy.com/

[215] Harvard Extension School uses its free open courses to promote its for-credit online and evening courses: http://www.extension.harvard.edu/open-learning-initiative.

[216] http://www.jorum.ac.uk/

[217] Dholakia, King, and Baraniuk, *What Makes an Open Education Program Sustainable?*

[218] Ibid.

[219] Joe Moon, "What Hacker Apprenticeships Tell Us About the Future of Education," *The Atlantic*, January 9, 2012, http://www.theatlantic.com/technology/archive/2012/01/what-hacker-apprenticeships-tell-us-about-the-future-of-education/251039/.

- advertising models, such as YouTube[220]
- subscription model, such as the GoodSemester course platform[221]
- freemium/segmentation model: offering some content for free, while also providing value-added services. For example, MITx plans to offer courses for free, but charge for the credential,[222] as does OERu. See also Flat World Knowledge, below.
- student fees: the Student PIRGs found that 76% of students surveyed would be willing to pay "a small fee each semester that would subsidize authors to write open textbooks."[223]

Let's delve into two of the most compelling models, the segmentation and conversion models. Adopting a segmentation model, Flat World Knowledge (FWK) makes available a free online version of a textbook and charges for other formats (e.g. print, PDF, and audio) as well as supplemental material.[224] FWK bases its business model on developing quality textbooks with top editors and careful editing, adopting Creative Commons licenses to enable instructors to customize textbooks, and employing a "digital first" publishing infrastructure that makes it easy for instructors to rearrange, delete, annotate, and augment content and for the company to generate different formats of the textbook. [225] This model has attracted investments from Random House and Bertelsmann Digital Media Investments. In the fall of 2011, over 300,000 students at more than 2,000 colleges were expected to use FWK textbooks.[226] Around 56% of users purchase something, while the rest read for free online; given FWK's ability to produce and sell books at a low cost, these numbers lead to a "healthy-looking balance sheet."[227] Likewise, other open initiatives are pursuing what Paul Stacey calls "Content for free, Teaching & Credentialing for a fee," including MITx and Udacity.[228]

With the conversion model, a college or university may offer some content openly as a way of recruiting new paid registrants to its online learning or other educational programs,

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[220] See "The Cost of Free," http://cost-of-free.wikispaces.com/Examples+of+Free+with+Advertising

[221] Paul Stacey, "The Economics of Open," *Paul Stacey*, March 4, 2012, http://edtechfrontier.com/2012/03/04/the-economics-of-open/.

[222] Lewin, "M.I.T. Expands Free Online Courses, Offering Certificates."

[223] Allen, *A Cover to Cover Solution*, 13.

[224] J. L Hilton III and D. A Wiley, "A Sustainable Future for Open Textbooks? The Flat World Knowledge Story," *First Monday* 15, no. 8-2 (2010).

[225] Yvette M. Chin, "Flat World Knowledge's Disruptive Business Model: Q&A with Co-Founder Eric Frank, Part 1," *Digital Book World*, June 21, 2011, http://www.digitalbookworld.com/2011/flat-world-knowledges-disruptive-business-model-qa-with-co-founder-eric-frank-part-1/.

[226] "Flatworld Knowledge Reports Growth, Adds 'All-Access' Digital Pass," *PublishersWeekly.com*, August 24, 2011, http://www.publishersweekly.com/pw/by-topic/digital/content-and-e-books/article/48446-flatworld-knowledge-reports-growth-adds-all-access-digital-pass.html.

[227] Chin, "Flat World Knowledge's Disruptive Business Model: Q&A with Co-Founder Eric Frank, Part 1."

[228] Stacey, "The Economics of Open."

typically for credit.[229] A limited pilot study at BYU by Justin Johansen found that providing open access to some courses can help recruit people to sign up for paid courses, suggesting that this model may enable open education programs to sustain themselves. BYU converted three existing college-level and three high-school online courses to OCW; after investing about $3500 to develop the basic technical workflow for converting the first college-level course, transforming additional college courses would cost around $284 per course. Over a six-month period, the six OCW courses garnered 20,148 visits and generated 512 paid registrations, yielding a conversion rate of 2.54% (more people signed up for the high school than college courses).[230] Likewise, England's Open University's lectures have been downloaded millions of times from iTunes U, and 6,000 students signed up for a paid course after taking a free online course.[231]

Unfortunately, experiments with economic models such as "freemium" have not yet brought much income for many open education initiatives.[232] The long-term sustainability of many open education programs may ultimately depend upon institutions committing internal funding. To make the case for developing and sustaining an open education initiative, Walsh suggests that colleges and universities pursue a mix of these strategies: engage campus leaders to champion the program, link it to the university's strategic goals, provide benefits for registered students, demonstrate a concrete impact in areas such as student recruiting or alumni donations, offer public value, lower costs, and enhance learning.[233] With content increasingly available for free online, higher education institutions may find that their value comes not in providing content, but services: "educational institutions that succeed economically are likely to do so predominantly by understanding that their real potential educational value lies in their ability to provide effective support to students (whether that be in practical sessions, tutorials, individual counselling sessions, or online) and in their ability to provide intelligent assessment and critical feedback to students on their performance (ultimately leading to some form of accreditation)."[234] As Paul Stacey argues, open education may not directly increase revenue, but it can have indirect financial benefits "because something is open it leads to a revenue opportunity that wouldn't have existed otherwise," such as reaching new markets, gaining market share, fostering new paid enrollments, enhancing the college's visibility, accelerating and improving learning, or facilitating new partnerships.[235] For example, as a result of Open University's OpenLearn initiative, it gained 3 million new "users," recruited 7700 "sign ups," developed 10 funded projects, fostered 30 collaborations, and transformed

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[229] Justin Johansen and David Wiley, "A Sustainable Model for OpenCourseWare Development (preprint)," *Educational Technology Research and Development* (May 2010), http://contentdm.lib.byu.edu/cdm/singleitem/collection/IR/id/1021.

[230] Ibid.

[231] Hafner, "Higher Education Reimagined With Online Courseware - Education Life."

[232] Walsh, "Open Courseware Initiatives and the Challenge of Sustainability."

[233] Walsh, "Open Courseware Initiatives and the Challenge of Sustainability."

[234] Kanwar, Uvalić-Trumbić, and Butcher, *A Basic Guide to Open Educational Resources (OER)*, 36.

[235] Stacey, "The Economics of Open."

its image.[236] If colleges can advance their goals through participating in an open education initiative, then they can justify investing institutional funds.

11. Conclusion

Higher education in 2012 seems to be on the brink of disruption, given rising costs, emerging technologies, competition from for-profits, global education, and other often-cited forces. Leaders of elite liberal arts colleges express concern that their business model, which typically involves high costs to deliver small, intimate face-to-face classes, may not be sustainable.[237] Open education ranks among those disruptive forces confronting colleges. For example, as Jon Breitenbucher (College of Wooster) argues, MOOCs may threaten liberal arts colleges by offering "extremely low cost options for obtaining skills" and replacing grades with more flexible, open means of assessment.[238] However, Breintenbucher also suggests that liberal arts institutions may be able to adapt to this challenge by adopting a "symbiotic relationship with open education resources," so that faculty focus more on guiding learning than on delivering content.

The key challenge, Breitenbucher argues, is for liberal arts colleges to evolve while remaining true to their core values. In some ways, the values of liberal education correspond with the values of open education: lifelong learning, an integrated approach to learning, a sense of civic responsibility, and the belief that education is important to global citizenship.[239] Yet there is also a fear that open education may lead to an instrumental approach to education, a focus on gaining specific skills and attaining badges or other credentials rather than taking a broad-based approach to learning. Liberal arts colleges can address these concerns by infusing open education resources and courses with best practices such as collaborative projects, civic learning, learning communities, and undergraduate research.[240] In formulating strategies for open education, institutions must take into account "the risk of doing nothing," given pressures to face increasing competition, reach global audiences, determine the role of technology in the curriculum, reduce costs to students, and design and implement environments that improve learning.[241] As Barry Mills argues about the larger implications of the information technology revolution, liberal arts colleges "cannot responsibly ignore the changing dynamics in the way that information is stored and delivered, because these changing dynamics will undoubtedly change our role as educators."[242] If colleges don't begin to confront disruptive forces, they may be flattened by them.

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[236] Ibid.

[237] Kiley, "Starting to Worry."

[238] Jon Breitenbucher, "MOOCs and the Future of the Liberal Arts," *Playing with Technology*, March 12, 2012, http://jon.breitenbucher.net/moocs-and-the-future-of-the-liberal-arts/.

[239] "What Is Liberal Education?" *Association of American Colleges and Universities (AAC&U)*, http://www.aacu.org/leap/What_is_liberal_education.cfm.

[240] George D. Kuh, "High-Impact Practices," *AAC& U*, 2008, http://www.aacu.org/leap/hip.cfm.

[241] OECD, *Giving Knowledge for Free: The Emergence of Open Educational Resources*, 124.

[242] Mills, "Convocation 2011: President Mills' Opening of the College Address."

Open education can be part of a college's strategy for expanding access, experimenting with online learning, or shaping pedagogies for the information age. In his book on the future of higher education, Richard DeMillo advances 10 "Rules for the Twenty-First Century," among them "Be open."[243] DeMillo emphasizes that universities should embrace the broadest possible community, expand access to education, use as well as produce open educational materials, and practice democratic values. Openness could also mean adopting open technologies, offering courses open to a wide community, and collaborating with peers to advance common goals. Likewise, Judy Baker, Dean of Foothill College Global Access, emphasizes that colleges can lower costs, stimulate innovation, and avoid obsolescence by supporting open education: "In a cost-conscious and rapidly changing educational environment, failing to embrace low-cost open content and support innovative teaching is the surest path to obsolescence."[244] No matter what strategy institutions pursue, they will need to articulate a position with regard to open education, one that engages with ongoing transformations.

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[243] DeMillo, *Abelard to Apple*, 275.

[244] Plotkin, *Free to Learn Guide*, 19.

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Appendix: NITLE Survey on Open Education in the Liberal Arts Context

1. [Consent statement] The purpose of this research project is to understand the strategic implications of open education for liberal arts colleges. This is a research project being conducted by Lisa Spiro and Bryan Alexander at NITLE. You are invited to participate in this research project because you are a senior administrator at a small liberal arts college.

Your participation in this research study is voluntary and you may withdraw at any time without penalty.

We anticipate that this survey will take approximately 10-20 minutes to complete.

Your responses will remain confidential, unless you prefer to identify yourself.

If you have any questions about the research study, please contact Lisa Spiro at lspiro@nitle.org or Bryan Alexander at balexander@nitle.org

ELECTRONIC CONSENT: Please select your choice below.

I agree to participate in this survey.

2. How many undergraduate students are at your college?

3. Speaking generally, how would you characterize the attitude of faculty at your college toward open educational resources and approaches?
Not aware of open education
Not convinced that quality open educational resources are available
Interested but not committed
Committed to open education
Other (please specify)

4. What impact do you think the following aspects of open education will have on liberal arts colleges in the next 5-7 years?
I don't know -No impact - Slight impact - Some impact - Significant impact - High impact
Open textbooks
Open learning objects such as exercises and animations
Interactive open learning platforms such as Carnegie Mellon's Open Learning Initiative
Engaging students in producing open content, e.g. Wikipedia entries or digital collections
Open courseware such as MIT's Open Courseware
Open source Learning Management Systems such as Moodle or Sakai
Using open source blogging platforms such as WordPress
Open courses such as Stanford's open courses
Open courses + certification, such as MITx
Other (please specify)

5. How would you describe your institution's engagement with open education?
Nothing at present [directs to question19]
Studying potential approaches
Internal pilot (departmental)
Campus pilot
Campuswide program or service

6. Using and consuming open education resources: to what extent is your institution doing the following?
I don't know - Not pursuing - Considering pursuing - Some faculty are engaged - Piloting in a few departments/program - Implementing across campus
Using open textbooks

Using open learning objects such as exercises and animations
Using interactive open learning platforms such as Carnegie Mellon's Open Learning Initiative
Using open curriculum such as MIT's Open Courseware
Using open source Learning Management Systems such as Moodle or Sakai
Using open source blogging platforms such as WordPress
Providing credit for open courses such as MITx
Engaging students in producing open content, e.g. Wikipedia entries or digital collections
Other (please specify)

7. Creating open education resources: to what extent is your institution *producing* the following?
I don't know - Not producing - Considering producing - Piloting in a few departments/ program - Producing in a piecemeal way - Implementing across campus
Open textbooks
Open learning objects such as exercises and animations
Open source tools for teaching and learning
Open curriculum such as MIT's Open Courseware

8. Why did your college decide to pursue open educational approaches?
Not at all important - Slightly important - Somewhat important - Important - Very important
To lower costs
To foster pedagogical innovation
To provide greater access to education
To provide more learning opportunities for students
To strengthen the campus community
To reach a larger community beyond the campus
To meet ethical obligations
To meet student demand
To meet faculty demand
Other (please specify)

9. What groups are involved in your college's open education efforts?
Academic dean or provost
Academic departments (please list in "other")
Individual faculty
Library
Teaching and Learning Center
Academic Computing/IT
Student Services/ Student Affairs
Academic Advising
Registrar
Financial Aid
Students

None of the above
Other (please specify)

10. How did your college launch its open education program(s)?

11. What off-campus collaborators have been helpful in implementing open educational approaches, if any?
Peer campus institution
Nonpeer campus institution
Professional organization
Nonprofit group
Foundation
Government agency
None
Other (please specify)

12. How is your college supporting open education?
Providing funding
Providing technical support to faculty
Providing technical support to students
Helping faculty to identify relevant open resources
Providing highlevel administrative support
Developing open tools and resources locally
Collaborating with other colleges to produce open resources
Sending representatives to meetings about open education
Joining organizations such as the Open Courseware Consortium
Instituting an open access mandate
None of the above

13. What percentage of faculty are using open educational materials (rough estimate)?
None
1-10%
11-25%
26-50%
51-75%
76-100%

14. What percentage of faculty are producing open educational materials (rough estimate)?
None
1-10%
11-25%
26-50%
51-75%
76-100%

15. What are the biggest obstacles to promoting open educational resources and software at your college?
Not a factor - A minor factor - Somewhat of a factor - A factor - A key factor
Lack of funding
Lack of time
Low awareness of open education
Perceived lack of quality of open educational resources
Not in the college's strategic interest
Lack of faculty support
Lack of student support
Lack of administrative support
Too complex technically
Binding contracts with vendors
Lack of appropriate institutional policy
Other (please specify)

16. What's been the campus impact of open education so far?

17. What do you think could be the potential impact of open educational resources, software and courses at your college?

18. How are you assessing the impact of open education on campus? [skips to question 21]

19. Why is your institution not pursuing open education at this time?
Not pursuing open education currently
My institution lacks awareness of open education
My institution does not see open education as being in its strategic interest
Open education is best pursued at the faculty level, not the institution-level
My institution lacks the resources to pursue open education
My institutional policies do not allow or support open education
Other (please specify)

20. What might shift your college's approach to open education?
An authoritative source of information about open education
Collaboration with other campuses to identify high quality open educational resources
Collaboration with other campuses to produce high quality open educational resources
Grant funding in support of open education
Demand from faculty
Demand from students
Demand from the public

21. What impact do you think open initiatives such as MITx will have on liberal arts colleges?
They will have little impact

They will extend educational opportunities to those outside the traditional education system
They will directly compete with liberal arts colleges
They will allow liberal arts colleges to expand their course offerings
They will enable liberal arts colleges to develop new business models

22. How can an organization like NITLE provide support to liberal arts colleges in exploring open education?
Help develop viable business models
Raise awareness of open education
Help coordinate the production of open educational resources
Help coordinate the production of open source software
Help secure funding for open education initiatives
Connect campuses to thought leaders in open education
Support interinstitutional collaboration
Help colleges find and evaluate open educational resources
Provide strategic guidance on how liberal arts colleges should approach open education

23. What is the significance of open education for liberal arts colleges?

24. Any other thoughts?

25. What is your institutional role on campus?
CIO, merged organization
CIO, nonmerged organization
Library director
Academic computing leader
IT manager
Faculty member
Other (please specify)

26. Can we follow up with you in an interview?