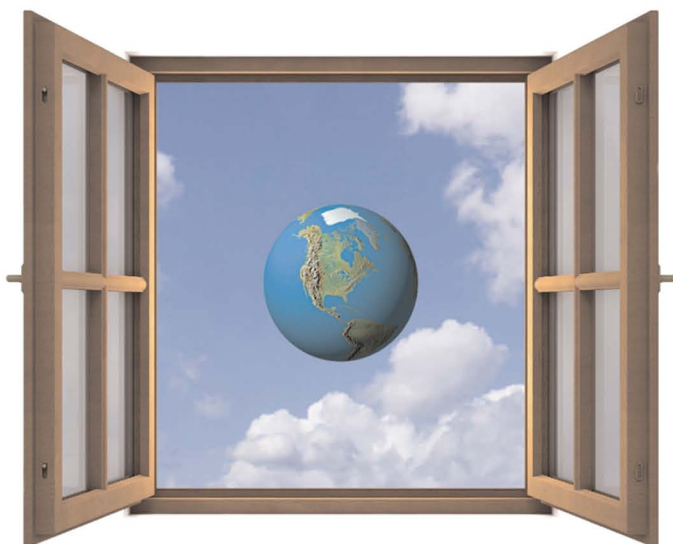


OPENING UP EDUCATION

The Collective Advancement
of Education through Open Technology,
Open Content, and Open Knowledge



edited by

Toru Iiyoshi and M.S. Vijay Kumar

foreword by John Seely Brown

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*To our wives and sons—
Hiromi, Rukmini, Ken, Suhas, and Taku
—whose support and encouragement makes this important work
possible.*

A Harvest Too Large? A Framework for Educational Abundance

Trent Batson, Neeru Paharia, and M. S. Vijay Kumar

The *plethora* of educational resources in digital form at the present time can seem overwhelming. 225,000 hits for a Google search, or 140 emails in your email queue in the morning, lead many of us to just walk away or shut our computers off. Our culture is at “glut stage” in all ways, and the same is true of higher education. But open education approaches, some tested over the decades before we reached flood stage, may offer ways to turn glut into plenty.

The term “open education”¹ has had many flavors over the years such as learning by doing, informal learning, a holistic approach, real-world learning (“authentic learning”) and many others. However, it has always meant that teachers and students should be open to varieties of teaching approaches, which turns out to be perhaps the most useful historical framework for understanding the current challenges of network learning and digital abundance. In the predominant lecture-classroom of past decades, open education has often seemed merely a counterculture alternative (remember the “open classroom”?). Now, however, as we move more fully into the age of digital knowledge, what was just an alternative is now an imperative. The Internet and the Web along with a host of available educational resources are making “open” the necessary default. Overnight, “open” is on steroids and has taken on new meanings:

- Teachers are becoming facilitators in a charged, multivocal, online, and onsite learning discussion that is multicentered and which they no longer control.
- Publishing is freed of many traditional gate-keepers and therefore disciplinary content is revised constantly.
- All educational design principles are giving way to the mandate: “be open to multiple possible users and uses.”

Exciting, yes, but also bewildering. The abundance of information and interaction opportunities can overwhelm and be underexploited by an educational system whose practices are cast in a framework of scarce resources. Higher Education, with a culture that has comfortably settled over the centuries on one dominant model of formal academic learning wedded to paper and print, as well as physical tools such as lab instruments, is highly situated (that is you learn where the tools are), reflecting this model of scarcity. Students pay tuition to have access to the scarce resources of faculty and learning tools located in one place. This scarcity is monetized through a seat-time measure.

The manifesting nature of learning via the Internet, open education, starts with abundance—abundance that will only multiply over time. Philip Slater, an anthropologist and author of *In Pursuit of Loneliness*, saw the post-war abundance in America as a root cause for the “revolution” of the 1960s, when baby-boomers, enjoying the wealth of their parents, who had grown up during the depression, could not understand their scarcity-based beliefs (1970). Their poverty assumptions—lie low, hide your wealth lest it be stolen, do not display emotions, life is full of danger—enraged their Dionysian offspring. “Let’s celebrate life, not suspiciously guard our riches” was translated into “don’t trust anyone over 30,” to paraphrase Slater. We now appear to be facing the same cultural fissure 40 years later: Open educational resources (OER) are so abundant that the scarcity-based assumptions of educators are challenged.

Now, instead of scarcity of educational resources, in this new technology age we are faced with open content, open resources, open learning, open architecture in design of physical and virtual spaces, open source, and open knowledge, all of which have blossomed in the last ten years. Academia is responding. “Charged” open academic discussion spaces are leading to better understanding and accommodation for social aspects of learning. The flood of new academic content is being directed into new communities of “remix.” Designers of physical and virtual learning spaces—including the basic architectural concepts of software design—are learning to accommodate the ongoing volume, variation and innovations.

In short, we are moving toward a knowledge ecology characterized by unfettered access to educational resources, choice, and change in the

Table 6.1
Analysis of trends toward open learning in higher education

Scarcity-based/ Inertial frameworks	Trend Indicators	Abundance-based/ Enabling frameworks
Individual learning	Collaborative learning, whole student development, internships, service learning, experiential learning, field work, recognition of “real-world” work	Open learning: embracing the social aspects of learning
Conveying knowledge; content is a thing	Reconsidering legal definitions of knowledge	Open learning: codeveloping knowledge with students; and students with students; content is a process
Design must support predictable processes	Open architectures in software design, learning spaces, and organizational structure	Design supports unintended innovation

context and clientele of higher education. Table 6.1 shows how higher education is already moving toward open learning:

The “trend indicators” in the second column are positive trends toward a more varied approach to teaching and learning. Yet, we wonder if these positive trends can become robust enough to truly engage the learning opportunities now presented by network learning. Can higher education fully exploit the abundance of open education opportunities available?

Open Learning as Visible Work in Process

It is a challenge for educators to understand what is happening inside students’ heads while they are learning. Without that understanding, it is hard to assess the value of the teaching approach. Open learning makes the processes of teaching and learning visible, more apparent as work in progress.

Consider a familiar scenario, the writing classroom. You might recall the typical college composition course: Following directions from the teacher, the students would write papers, hand them in, and then get them back a few days later with red marks. To guide them in their

writing, the students would look at models of good writing and try to remember various principles that the teacher provided. But writing is thinking, a process of discovery, invention, and drafting. How can writing teachers participate in and guide that process? How can they coach students during the process instead of only at the beginning and the end? How can they make the process open?

One approach is to adopt a studio-writing approach. Each student, using a computer, engages in “social writing,” via chat or other real-time and asynchronous social software, with the teacher also present in the group discovery (brainstorming) phase of writing. The studio writing approach is a natural outgrowth of this new abundance of student content. With technology’s ability to handle multiple simultaneous inputs and arrange them into a readable dialogue, writing students need no longer write alone during the first stages of the writing process.

For example, a teaching approach called Electronic Networks For Interaction (ENFI), (See <http://endora.wide.msu.edu/1.2/coverweb/cmcmday.html>) has been widely adopted in composition programs around the country. Teachers can see ideas develop in the dialogue, can get to know their students’ writing better, and can guide the discovery phase of writing in a new way. This is a valuable aspect of open education abundance: learning through practice in a social setting with guidance from a teacher, with the whole process visible and open to scrutiny. Writing by hand on paper is often a slow process and hard to share; writing on a computer is fast and highly sharable.

Now consider a student’s learning over time: how might that be captured and shared? We find a similar example in the Open Source Portfolio (OSP), a tool within the Sakai collaborative learning environment (See www.sakaiproject.org). Portfolios allow completed student drafts of work (visual, textual, symbolic and the like) to stay with the student over a course, a series of courses, a full certificate or degree program, or over a lifetime of lifelong and “life-wide” learning.

Electronic portfolios of any stripe are at the heart of open education. If students’ work (their “assets”), their reflections on it, and faculty members’ comments on it are Web-accessible for those with permission to view, student learning in response to a syllabus is visible and open to scrutiny. The conversation around this student-generated content can then be extended electronically in space and time. In fact, this

conversational remixing of content and comments can be as valuable as the original content creation itself.

These two approaches, ENFI and the use of portfolios, suggest how digital abundance offers new views that can lead to increased learning and better-informed assessment of learning.

Open Learning: Learning from Peers

As the examples would suggest, student-generated content is now easier to include as part of the “text” of the course. As students comment on each other’s work in process, guided and influenced by teacher comments, they and the teacher are bringing to life a vital new kind of social learning: conversation (part oral and part sharing of work done on computers) with each other, which, in itself, is the work of the course. The conversation can (and does) continue between classes.

This new kind of interaction engages students and faculty in ways that demand a new set of skills. However, faculty think of “net-gen” students and may not know how to work with net-gen social-learning capabilities—of the technology or of the students. It might be helpful to think, instead, of the “selves” open education can bring together. Darren Cambridge, a faculty member at George Mason University, describes a “network self” that has a strong social aspect in his forthcoming book (2008). Cambridge’s network self is comfortable with abundance and finds ways to use digital abundance. Social use of the network in turn engages the “entrepreneurial self,” the open, playful self. This self loves to collect (aggregate) and create new connections. It lives in the infinite space of the (social) mind and learns through relationships.

The network self and entrepreneurial self open a much larger social context for teaching and learning. This is the self who revels in abundance and who is open to learning how to be a smart, life-long consumer of abundant open education resources. Higher education needs to learn how to best use social-learning opportunities.

Content, Community, Creativity, and the Commons

As we see that abundance of student-generated course work can lead to new ways to leverage the social aspects of learning, we then wonder how faculty and researchers can similarly use the new digital abundance in

support of traditional academic values. They, too, find themselves in a swirl of new ways to search and create disciplinary content. As a result, higher education leaders are grappling with issues of who owns the content, how to certify which content has been vetted within the disciplines, how to use the abundance of content in the classroom, and how to sustain a coherent community of learning. Creative Commons (See <http://creativecommons.org/>) has addressed these concerns in imaginative and powerful ways.

Creative Commons

After releasing its open-copyright licenses in late 2002, Creative Commons began a massive effort to gain adoption of the licenses and build a vibrant sharing economy between creators on the Internet. The potential and the vision for a robust sharing system were clear. Under a sharing paradigm, a musician could easily remix a song that she found online and then share her creation; a math teacher in Vietnam could easily download, translate, and redistribute a lesson plan that someone in India posted online long before, and a scholar in Nigeria could access findings of cutting-edge research found online and apply them to her local setting. Without open licenses, these uses and others like them would be difficult, even if the original authors wanted to share their work, all because copyright got in the way.

Creative Commons designed a three-step framework that supported its vision: (1) grow licensed content, (2) make that content searchable, and (3) enable communities of remix and collaboration. This framework was followed, and continues to be followed, in order to build and evolve the commons. This framework created a vital feedback loop for society via the Internet—create, aggregate, help users find items of interest, encourage retribution, and the original creation lives on. This process has worked for centuries but at a much slower pace, and with far fewer potential participants. Creative Commons reimaged how the creative force within society could work in a digital age.

The last step of the Creative Commons framework, building communities of collaboration and remix, offers an unprecedented opportunity to leverage this growing abundance of resources to educational advantage. By focusing on this step, open educational resources can be used to their maximum potential, both improving the quality of these resources, and

increasing the reach of who can access knowledge. Much more is possible, both across projects, and in deeper ways.

Consider the example of ccMixer, a “community music site featuring remixes licensed under Creative Commons where you can listen to, sample, mash-up, or interact with music in whatever way you want” (See <http://ccmixter.org>). Here, musicians engage in a musical conversation to better each other’s content. ccMixer is much more than a site that hosts music: It is a community of musicians who post their songs, remix other people’s songs, and give feedback and commentary to each other.

When a remix of a song is made, the system creates an automatic link between the two songs. If one song has twelve remixes, all of those remixes are linked from the original song, making it possible to explore different expressions and evolution of the original song. The overall “composition” of music is constantly evolving as it includes the participation of more and more distributed people through remixes, and comments. Contests are held on the site periodically, where the whole community both comes together, and competes, to make the best mixes from the tracks available on the site. Authors of winning mixes are chosen to be put on special CDs, or are given recording contracts so they could receive more exposure and social credit for their efforts. The site is licensed under Creative Commons, so musicians are able to remix without having to worry about copyright.

Community for Educators

Imagine how features on ccMixer might be applied to create an OER “mixter” for teachers. Educators could post their lesson plans to a Web space, the OER Mixer, in a transformable text, audio or video format. Other educators could build upon or alter these works to add content, tailor it to meet the needs of their local community, or add pedagogical material. They can repost their new versions, and the software would create a visible connection between the original work and the new work. Thus, if I wanted to add a video component to John’s lesson plan in geometry, I could connect my video to John’s original lesson plan.

Building communities for educators means building “mixters” where educators can remix an abundant amount of content created by their peers to produce better, and more collaborative open educational resources.

Community for Researchers: AcaWiki

One of the primary functions of higher educational institutions is to research cutting-edge social, scientific, and cultural issues in order to progress society forward. But, because of copyright law and academic culture, most findings from academic research are published in proprietary journals that require costly subscriptions in order to gain access. Oftentimes it is only those affiliated with a well-funded university who can gain access. Though there is an abundant amount of existing scholarly research, unfortunately, most of it is not accessible.

Forthcoming efforts like AcaWiki (See <http://icommons.org/node/acawiki>) use open licensing, community, and the Internet specifically to more widely disseminate research findings for the public. AcaWiki leverages the power of social software to produce Creative Commons-licensed, summaries of academic papers in language accessible for the lay reader, for the education and use of the general population. The project aims to get a community of graduate students and academics to write short (two- to three-paragraph) magazine-like summaries of academic papers and contribute them to the AcaWiki pool. Because copyright applies only to the written work, and not the ideas or data behind it, summaries of academic papers can be written and licensed under a Creative Commons BY (Attribution) license and freely distributed on the Internet and in hard copy throughout the world.

To add more value to the information, other contributors will be able to annotate, discuss, or append information to the original entry, perhaps adding analogies, pictures, videos or other devices to make the information more easily understandable. Community members can also add value by creating “playlists” of summaries by stringing them together with segues to show how a particular stream of research has evolved over time so they can more quickly understand the “big picture.” Researchers, experts in the field, graduate students, and the public will be able to link through to a discussion section for each of the articles where they can debate or post supplementary materials. Beyond these primary features, summaries of academic works can be translated into other languages so that people around the world can have access to them. Further, summaries can be marked up with machine-readable metadata so that machines can derive understanding from the content. With such a resource available, individuals, educators, and society benefit from increased access to scholarly research.

Design: Open Design Provides Flexibility and Choices

How do we apply these “mixing” principles to design of new learning environments, both real-world and virtual? And will this mixing—achieved through open source or open standards communities or through enlightened design of physical learning spaces—result in designs that themselves invite free exchange and social learning?

In a typical lecture hall, the teacher is up front and the students sit in chairs that are fixed to the floor. Such physical inflexibility restricts how the teacher can interact with students and students can interact with each other. Software design has followed a similar pattern, favoring tools that support faculty, rather than student, management in digital space. A traditional course management system, for example, reinforces the segmented learning experience of students, where their work (“learning assets”) is rarely used in a subsequent semester or across a series of courses.

The design and development of educational applications, even if they are open source, often lead to limited educational value and fragile viability. Technical design aspects have often limited the portability and interoperability of learning resources and consequently inhibit the kind of flexibility that leads to support of diverse pedagogy and sharing of learning materials. For example, the tight coupling of the user interface to learning components (as in a monolithic learning management system) constrains the use of learning objects in different contexts or to address different learning goals.

An open architecture project such as MIT’s Open Knowledge Initiative (O.K.I) (See <http://www.okiproject.org/>) addresses two critical attributes for technology tools and platforms to be educationally productive: choice and sustainability. Enabling and supporting choice is an essential goal in light of some “givens” of the nature of technology and educational environments:

- Educational value is derived through multiple modes and diverse tools. For example, an instructor might want to support a class with a sophisticated simulation engine and a rather ordinary discussion list while administering tests on paper. The platform must support easy transition from one to the other.
- The technologies on which we build our infrastructure will necessarily change. In the near term, educational software frameworks must foster

a “marketspace” of tools and content, both proprietary and open source, so that educators and learners can pick and choose the functionality that best meets their needs.

The distinction between proprietary, open source, or “let’s-build-our-own” applications have become blurred as OKI-inspired ideas and technologies are changing how applications are created and maintained. Increasingly, open applications that embrace open standards that enable prudent combinations of open source and proprietary solutions are being seen as the norm.

Open application architecture and design are crucial enablers for an environment rich with remix opportunities and where higher education, industry, and standards groups bring different contributions further accelerating education technology innovations and diffusions. The technical and legal framework of these systems should allow the participation and contribution of different actors based on their specific strengths, to be leveraged. For instance, the Sakai and OSP initiatives have embraced the community source approach to leverage both the creative values of academia and the ongoing maintenance and marketing abilities of industry through the engagement of community corporate partners, such as rSmart (See <http://www.rsmart.com>) among others.

A sustainable educational ecology requires this diversity of participants and a sense of safety to innovate. If a code contribution can lead to a timely improvement in application functionality, then it seems safe to continue to contribute. If the community is organized to preserve the contribution process over time and support the application, then it seems safe to use.

Flexibility in design of tools and spaces, both virtual and “real” life, helps both faculty and students take advantage of the greater number of choices they now have for communication and collaboration, visualization, access to resources, archiving and searching, blended classes, and rethinking course design. The open technical and organizational frameworks that support such flexibility are in a sense a natural extension of the open learning and research architecture that higher education has attempted to present over time, albeit with mixed results, in order to allow the integration and interoperation of new and diverse ideas and research.

Rethinking Education for the Open Learner

The initiatives referred to so far illustrate that the functionality of open educational resources can be extended: Content can be altered and improved upon, pedagogical methods can be shared, along with the possibility of learning gains, and new communities can collaborate constructively through open design and practices. They suggest that the silos we all know about in higher education are under assault in the new world of remixing. When allied around a common goal of producing the best application for academic use, trust and familiarity develop and a common discourse emerges. People learn to talk to each other and the silos start to dissolve. Open source communities such as Sakai or Apache or Quali, and open knowledge communities such as OCW or OKI, are prime examples of how the interests of ownership and of social creativity are being rebalanced within the open world.

We can see that new affiliations are developing around the core knowledge-creation process in higher education and that technology applications on the Internet are literally creating academic culture and space in the virtual.

Can we then also imagine an educational model that productively leverages this abundance to offer structured learning opportunities to the networked learner beyond, or even instead of enrollment in a higher education institution?

Before leaping enthusiastically into constructing the possibilities, it is instructive to remind ourselves that existing academic institutions do help to navigate through the human sea of knowledge. They organize it into majors and requirements to make the decision process much easier and more goal oriented. They provide a teacher and classmates to both guide and motivate. They provide a structure and a social context to help bridge students from beginning stages of learning toward maturity. They help students address issues of finalizing work by providing a schedule of “deliverables” (assignment sets), of matching the learner with the job market, of certifying the value of students’ learning, and the general issues of being a young person away from home.

Though an online structure could not offer the full array of brick-and-mortar institution services, we might be able to define online communities that offer some of them.

Community for Student: P2PU

Let us imagine a vibrant Web community of learners at something called Peer-To-Peer University, or “P2PU.” P2PU would not be a “real” university, but rather, a group of self-learners and tutors who work together to emulate some of the functions an academic institution would carry out, in a peer-to-peer fashion. Providing degree tracks would help self-learners navigate the vast terrain of OER resources in a goal-oriented way. P2PU would define “degrees” by assembling OER materials from different repositories that, together, would suffice as a “degree” in that subject. For example, P2PU might specify 15 physics courses, available across the various OER project sites, which one would have to complete in order to get a P2PU physics degree. Since many OER resources contain components that are not free and open, such as textbooks and academic papers, P2PU would only use courses that either have all the components available, or will find alternatives. Thus students might take Physics 101 from MIT OCW, and Physics 202 from Tufts OCW.

Beyond specifying degree tracks, P2PU would organize scheduled “courses” where groups of learners would come together and learn the material for a course. Participants could also have profile pages that detail their interests, occupations, and show which courses they have completed. Posting the names of students and the OER courses somewhere on the site could provide an additional incentive for having students complete classes at P2PU. It may be that one day an employer would recognize a “Net Degree” from P2PU to be as valuable, or even more valuable, than a traditional university degree. Inherent in the system, P2PU students—who are comfortable with their “network selves”—would be recognized as resourceful self-starters and group learners. A “Net Degree” from P2PU would be valuable in its own right, and soon begin to take on its own meaning of accreditation.

Barriers to Realizing OER’s Potential

Though such possibilities are inspiring, does the current architecture of higher education allow for opportunities such as P2PU? Or is the inertia of passive learning perpetuating a disinclination, on the part of students as well as faculty, to enter a “discomfort zone” of remixing? Do students even like decentralized authority? Between faculty and students, which group is really risk-averse when it comes to imaginative use of technology and open education?

We could easily believe that faculty who themselves are exploring new means of participating in remixing communities in their own fields would naturally apply this experience in the classroom. Even then, while some faculty members may boldly go where open education leads them, some students, despite their expertise in some uses of the Internet and IT tools, can be very conservative in their expectations in the classroom. They may come to college expecting that regardless of the IT toys on campus, in the classroom itself, their teachers will still tell them what to know and then test them on what they have been told.

This technology-conservative view, of course, is not the popular view about the “net-gen.” (See, for example, <http://www.centerdigitaled.com/story.php?id = 103831>.) However, we wonder if current generalizations about the net-gen really play out in the classroom. Chatting on your smart phone in class does not necessarily mean you, as a young student, are ready to be immersed in energy-demanding, non-directed collaborative work. Facility with technology and focused intellectual work are still very different cognitively. And, perhaps the students’ high schools have been held to national standards that run counter to the new culture of abundance. Students may “have the hippie in them,” but they do not really expect it to be in their teachers. Have we created a mental mold called “the classroom” that has us in thrall?

Perhaps part of the current puzzle about open education lies in this question: if the remixing process is speeded up and a million eyes replace “gatekeepers,” then is knowledge enriched or watered down? How do we certify this accelerated process of learning and creating knowledge? Faculty members have served for centuries as a knowledge filter, providing interpretations of disciplinary knowledge, guiding students toward important ideas and methods of inquiry so they themselves can gain expertise. Rather than defining a rigid course, are faculty ready to become more like facilitators, guiding students through the “raw” disciplinary remixing?

Poised for Change?

We are at the very beginning of a millennial shift in higher education. How do all the parties involved—faculty, students, designers, institutional and corporate leaders, and others—best adapt to network learning and accept learning as a work in constant progress? How do faculty

best include the now-available, just-in-time student work in the open-education academic conversation? How can their own classrooms become as vital as the remixing sites described here?

Formalizing and certifying network learning will take time, as we are learning through work with electronic portfolios. Electronic portfolios formalize the process of in-class remixing, but to use them well, faculty must reexamine the often-implicit learning goals underlying their courses and see how these goals play out in the new “student-work-in-progress” portfolio world that is a microcosm of the larger open-education world. How can their students progress toward those learning goals in a way that includes the vast learning opportunities opening before them like a bright dawn? How can students engage in disciplinary content creation and remixing using new digital tools under the guidance of their teachers? And how can their curriculum, learning spaces, and tools be designed to seamlessly incorporate ever-new learning opportunities? How can they join the dance of digital abundance?

Perhaps we are leaving behind the time when change in higher education can continue to be incremental and are instead entering a period of disrupted equilibrium.

Note

1. See W. Huitt (2001), Humanism and open education, *Educational Psychology Interactive* (Valdosta, GA: Valdosta State University). Retrieved Jan 8, 2008, from <http://chiron.valdosta.edu/whuitt/col/affsys/humed.html>. This study summarizes other studies to support the claim that “open education” approaches in the 1990s resulted in only mixed results, and that “facilitative teaching”—used as a direct instruction method—produced better results. Aspects of facilitative teaching:

- response to student feeling;
- use of student ideas in ongoing instructional interactions;
- discussion with students (dialogue);
- praise of students;
- congruent teacher talk (less ritualistic);
- tailoring of contents to the individual student’s frame of reference (explanations created to fit the immediate needs of the learners);
- and smiling with students.

Using technology tools now allows instructors to achieve all of these—except the last—to be more “facilitative” without having to use a direct instruction

method if they adopt traditional open education approaches. Still, the cautions from this study of seven years ago are important.

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