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

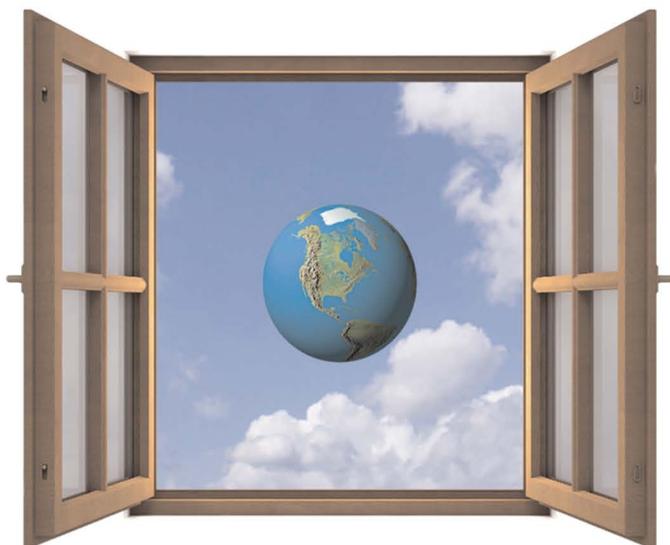foreword by John Seely Brown

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

1 SECTION INTRODUCTION

Open Educational Technology: Tempered Aspirations

Owen McGrath

The chapters in this section grew out of initial proposals and a culminating day-long meeting at which participants gathered to discuss issues of openness in educational technology, resources, and scholarship. These authors have led higher education projects, initiatives, or organizations involved in aspects of design, development, adoption, policy making, standards setting, or evaluation of open technologies used in higher education teaching and learning settings. For them, the term "open educational technology" has broad meaning that extends well beyond any lowest-common-denominator definition such as "open source software for education." While the terminology may be new, the sharing and cooperation it denotes are not. More novel, perhaps, is the broader scale of organization, development, and adoption attempted in these projects.

Across the variety of perspectives on open educational technology represented, these authors are all concerned with promoting and sustaining openly distributable information technologies that hold potential for improving and extending the reach of higher education. Their shared aspirations for this work go far beyond using technology to support the status quo. Along with design and adoption of open technologies in these projects are also open approaches to teaching and learning that look for cultural barriers to tear down and traditional instructional arrangements to reconfigure. The projects described here offer views of teaching and learning that are about much more than economical transmission of information on the Internet. The technologies discussed serve educational initiatives whose goals and scope of inquiry are not solely concerned with spreading more knowledge. Instead, broadened notions of

teaching and learning underlie these technology initiatives—some explicit, most implicit—that see, for instance, the learning situation of university-level students as being about the communities and activities in which they participate.

Major Issues/Questions

At the meeting that led to this book, the authors in this section agreed that initiatives such as theirs would not catch on widely if they could not show results. White papers and manifestos alone will not sustain an open education movement. But how to study and evaluate such projects? Here these authors were quick to agree that conventional approaches are often inadequate. Approaches using cost-benefit analyses and benchmark comparisons of impact, though admirable and sensible, often cannot tell the full story. Some of these projects, for instance, involve an impressive variety in implementation across sites, with the focus adjusted to local activity and communities of learners. In such cases, evaluation might have to look like rigorous descriptions concerned with learning as a local, socially constructed amalgam of shared meaning and community activity.

While emphasizing design and evaluation, these authors also identify institutional and cultural barriers to the advancement of open education. Especially in this first section of the book, there is an awareness of not only external barriers but also internal challenges to the processes of creating open educational technology. Several of these chapters point to issues posed by the scale and organizational processes involved in creating, maintaining, and extending open source technology. Observers of the open source software phenomena in general tend to agree on the importance of analyzing the organizational processes involved—not just the code produced. The same holds true in these chapters about open educational technologies, as we'll see.

In offering a brief description of the chapters, I will point out some of the ways they converge around the issues of design and evaluation, and also offer some background context for certain technological and organizational issues raised by the authors. Whether considering design, development, or implementation, the authors of these chapters share a focus on the problem of scale: the organizational and process challenges

common to large-scale, cross-institutional open education technology projects.

In reading the chapters, a few fundamental questions to keep in mind include:

1) How should open educational technology be built, extended, and maintained in the large cross-institutional and international efforts?
2) How can the teaching and learning activities supported by the technology be evaluated in an open way?
3) How do the perspectives of teachers and learners inform these projects?

A Principled Open Design

David Kahle (2008) provides some answers to the first two questions by setting forth design considerations for those who would build and extend open educational technologies. Based on his experience developing the Visual Understanding Environment (VUE) at Tufts, Kahle describes principles to consider when building or extending open education technologies. As Kahle points out, these guidelines are very general. In thinking through specific implications of Kahle's principles, we can appreciate how they point us to key areas where conventional design approaches need to be adapted in order to work for open educational technology.

The emphasis on ownership, which Kahle defines in terms of extendibility, entails one such breakaway from conventional software design approaches. Where open source applications are being developed, extended, and owned by large international consortia of institutions, new questions arise as to who the users and stakeholders are, how to gain their input in the design process, and how to balance local and community needs when they diverge. The design and development process becomes especially challenging when determining and reconciling the needs of one institution's users with those of the wider community. Also, the teachers and students who would use the technology are often not readily at hand. Instead, ideas, requirements, feature requests, bug reports, etcetera, often only find their way into the development process after percolating up from within remote member institutions. While the conventional approach to the requirements process has been to interact with users and stakeholders in the information-gathering phase, a

far-flung community like VUE's user base makes such direct interaction challenging or even impossible.

The temptation, then, is to rely heavily on one's access to users at the local institution. In the case of VUE, as Kahle mentions, such reliance would have led to a tool shaped to meet the specific needs of one institution at the expense of the needs of the wider community. Instead, Kahle's principled approach entailed developing VUE for interoperability with the OKI (Open Knowledge Initiative) digital library connections, for flexibility in how categories are added, and for customizability for interface layout. All are examples of generalized features for which more parochial design alternatives would have met one institution's needs while rendering the tool unserviceable for many others.

Opening Up Institutional Connections

Kahle's advocacy of design principles such as accessibility and ownership resonates in Stuart Lee's (2008) discussion of Oxford University's decision to adopt Bodington, an open source learning management system originally developed by Leeds University. Of the various open educational technologies mentioned in this section, one of the more recognizable is the learning management system. Across the many commercial and open source choices, these systems encompass a fairly similar suite of tools integrated into one package with a simple if familiar role hierarchy of instructor, teaching assistant, and student.

It is particularly this role hierarchy that troubles Lee, but his critique of role-based control structures goes beyond merely pointing out a mismatch with contemporary teaching and learning arrangements within Oxford. Adopting a hierarchy in which roles are organized primarily around the concept of instructor-led courses would also close many gates to the outside world, he argues. In an era in which institutional, national, and international initiatives herald technological opportunities to open up education on a whole new scale, something as seemingly minor as a role-based authorization system could preempt new possibilities for access.

Bodington imposes few limits. Rather than pre-assigned roles for users, it allows for hierarchies, groups, and access control to be added to individual sites as needed. Users do not have roles. Instead, the groups they

join have access permissions assigned for resources, thereby accommodating a flexible, multi-way dissemination of materials such as files and documents. With arrangements spanning across the teaching and learning continuum from personal spaces to whole "societies," most of Bodington's educational resources remain open to viewing by anyone on the Internet.

Lee's focus on overcoming potential sequestration and barriers, we see, applies not just to students but also to teachers. In the pilot study described at the end of the chapter, literature lecturers were surveyed about their attitudes on sharing lecture notes, slides, and reading lists. From the brief description of the survey responses, one gains a different conceptual angle—quite different from official accounts offered by institutional or national initiatives—on the *sense* of the lecturers' movement within their communities of teaching. The lecturers' candid perspectives reveal perceptions of conflict and autonomy that are important to hear in discussions of open education. Bodington's technical affordances for sharing teaching materials within and across institutions may open up possibilities for supporting this less-visible community of teaching—a topic relevant to the third section of this book. But the example also gives a strong hint that group interests and perspectives need careful accounting if open education initiatives are to generate change in the organizational lives of these institutions.

Tools, Tasks, and Time

Where Stuart Lee describes the propping open of electronic gates at Oxford, Phil Long and Steve Ehrmann (2008) recount a story of technological openings attempted within another privileged realm: undergraduate engineering education at MIT. To appreciate the iLabs project, it's useful to notice from the start that a hoped-for goal was to let students "try out the identity of being a professional." This conception of learning as identity-building guided the project in ways that might urge us to consider which theoretical perspectives on learning can provide a full account of these lab activities coordinated around research equipment. The chapter also invites us to reconsider the taken-for-granted "chalk and talk" arrangements so familiar in traditional higher education math and science settings. In iLabs, instruments and equipment—

though big and expensive resources used by researchers—are made available to students for extended periods of time. Since instrument time is costly and demand for research access a priority, there might have been little reason or incentive for giving access to undergraduates without the clever economizing made possible by the Web services broker. As the project matured, iLabs activities involved new participation structures and access to partly structured, open-ended inquiry for students. When connected to electronic laboratory tools, the suite of iLabs programs enabled students to encounter problems similar to those typically encountered by expert researchers.

According to the evaluation report conducted by the TLT Group (referenced in the chapter), the analyses were often of the kind researchers typically grapple with: Things just don't behave as one would expect. Framed in terms of whether access to the tools enabled students to experience authentic engineering practice, the initial phase of iLabs might be classified as offering simply some changes in the what and how, such as the instrumental conditions and handling aspects of the students' lab activities. Merely giving the students access to these instruments did not represent much of an overall change in their access to joint participation in real laboratory activity, as the disappointing results of the early pendulum labs would seem to confirm.

In fact, a variety of lab procedures were attempted. A tacit model of learning as joint participation seems to have evolved during this project. Assessing the students' results in these labs was no longer to be considered a separate and final phase. Opportunities for teachers and students to participate together in redesigning and refining the lab experiments would seem to constitute a new kind of activity system, especially where taking on the improvements together may have offered students a new perspective on their instructors' understandings of how to practice science.

Evaluating Open Educational Technology

The kind of detailed retrospective evaluation seen in the iLabs project is exemplary in both depth and methodology. Ed Walker (2008) yearns for a day when open technology projects rise or fall based on this kind of evaluation. For open education technology to succeed, argues Walker,

initiatives cannot be about just making more source code open, but must also concern opening up the evidence of learning progress in the activities the software supports.

A cynic might ask why open educational technology should be held to such lofty standards when for so many years equivalent commercial systems have seemingly not. Though somewhat true, the cynic's complaint misses more subtle implications in Walker's entreaty. Walker's chapter touches on areas where open educational technology initiatives need extra care: especially around issues of data collection, or "tactical gathering of data" as he calls it. Here lurks a potential problem in many open technology projects due in part to the way these large-scale, cross-institutional open source development projects are often organized. Many open educational technology projects risk falling short in providing functionality for capturing and monitoring user activity— information that is key to Walker's metric and method components.

A corollary evaluation problem touched on in Walker's chapter deserves consideration here. As if all the data-gathering issues were not enough, evaluation of technology innovation in higher education has always faced two other lethal foes: span and scope. Unlike areas of educational research where longitudinal studies are feasible, technology-related evaluation efforts often suffer from acutely small time spans within which to deliver results that will be deemed relevant. Fast development cycles and short adoption curves make a mockery of many well-intentioned technology investigations. Even when attaining scientific rigor and careful deliberation, investigators deliver their results often to find that the particular technologies under study have already become widely adopted or supplanted by something new.

Pursuing a line of inquiry that involves asking what general "effects" a technology has on students' learning turns out not to be fruitful. A major reason involves the often wildly dramatic differences in study findings across settings. Some researchers will conclude that a given technology has a significant positive effect on learning; others quickly follow with a conclusion exactly opposite. And in between these two shores usually flows a river of studies exhibiting what is known as the "no significant difference" phenomenon. As one seasoned evaluator observed, what vexes evaluation efforts usually turns out to be not the technology being studied, but the questions being asked. The kinds of

evaluations that do end up making a useful difference are rarely about universal impacts, but often are about how different adaptations of a technology idea might work in different ways across settings (Ehrmann, 1998).

Visions of a New Learning Ecology

Counterpoised to Walker's entreaty for rigorous evaluation based on careful assessment is the chapter by Batson, Paharia, and Kumar (2008), who proclaim that the advancement of open education is, if not inevitable, so compelling that what is needed now is not more evidence but raised awareness of the "enablers" that can help overcome key remaining institutional "barriers" to progress. Open educational technology's distinguishing features cluster around aspects of visibility, social interaction, shared meaning-making, and unfettered access to resources. Educational activities made possible in open educational environments are characterized by the opportunities for collaborative participation and creative exchange. Freed technologically from resource scarcity around which higher educational institutions have traditionally organized, according to Batson, Paharia, and Kumar, the new era of information abundance requires transformed approaches to teaching and learning.

For Batson, Paharia, and Kumar, a key conceptual shift necessary in realizing the possibilities of open educational technologies is to see how they restore the "social" character of learning that has so often been suppressed in the past. The chapter traces the beginning of this restoration back to the rise decades ago of the ability to link students by networked computers. Those early conversations and dialogues over networks, the authors point out, offered a variety of new communicative situations that fell in between speaking and writing—a kind of public "persistent conversation" made possible by a communication medium not readily available in traditional composition classrooms (Bruce, Peyton, and Batson, 1993). As simple as the technology appears to us today, the kinds of visible conversations made possible by these early real-time conferencing programs led to some of the first educational experimentation with open arrangements and collaborative technologies that are commonplace today.

Going further, Batson, Paharia, and Kumar point to another new area of abundance: increased technological connectedness outside the classroom. From these authors' open learning perspective, paying attention to students' extracurricular digital practices is not simply about spanning a generation gap. It's about leaving behind many traditional teaching arrangements in favor of something better. Barriers to teaching and learning innovation can be seen in the traditional assumptions that students must operate within solitary instructional performances. In other parts of their lives, students participate in networks that promote "remix," such as imitation, sharing, and collaboration. That issues of authorship and ownership are organized and handled so differently in those many other online settings creates a provocative challenge to conventional institutional wisdom, the authors suggest.

Unbound Books vs. Unbound People

This oscillating interest—shifting from how students participate in activities to how pedagogically to structure activities—emerges as a key analytical issue for the authors in this section, as they consider how to promote open educational technologies (and plan, design, build, and adopt the information technologies that will support them). Another dimension of the relational character of learning comes into relief in Clifford Lynch's (2008) critical analysis of the popular proposition about open education: a sort of universal education for all made possible by connecting more and more information resources with more and more people. The views offered in Lee's, Long and Ehrmann's, and Kumar's chapters—of learning being characteristic of a person's participation in ongoing activity—are brought further into relief by Lynch's argument that to equate access to information resources and access to education is to miss the fundamentally social character of education.

Echoing the previous chapter's message that it would be premature to start closing down traditional institutions of higher education just yet, Lynch's chapter reminds us that teaching and learning are not simply about the transmission of information and acquisition of knowledge. His chapter makes this point in several ways: by emphasizing the social nature of education and by warning against a superficial notion of what "social" entails, especially in the context of digital libraries. This chapter

offsets simplistic views of networked information technology as an irresistible change agent in education. Even careful analyses of emerging decentralized social production offer expansive views on the potential transformation of economic and political relations but tend to focus solely on higher education's role in publishing (Benkler, 2006). As Lynch points out, well-intended plans to expand the reach of university education often overestimate the value of open Internet technologies in supporting "communities" around resources such as digital libraries. While Lynch speculates on how communities might be successfully organized around content-based practice, he also perceives profound changes in education that would need to attend the advent of truly open higher education online.

As with the other chapters in this book, Lynch's arguments point to the need for more critical understanding of how digital content actually gets taken up and used by people (Brown and Duguid, 2000). What should also be clear by now is that Lynch's argument is not a call for evaluative studies to measure the impact or general learning outcomes brought about by digital libraries. Thankfully, the literature on educational uses of digital library resources is not strongly characterized by a concern with identifying and measuring general effects produced by the technology. Any such attempt would confront even greater obstacles than those of other open educational technology realms: not only the difficulty of interpreting across a variety of research designs but also an endless variation in the technologies used.

Productive Consumption

Where other authors write from their particular positions on the open learning stage, Christopher Mackie (2008) offers insights from his perspective behind the scenes as a grant officer for the Mellon Foundation, a major funder of open educational initiatives. Like the others, Mackie wants to see profound change in the traditional institutional culture of higher education. Obviously not willing to settle for piecemeal engineering of teaching and learning settings, he wants wholesale changes in the way digital technologies and media are produced and consumed in higher education. His alternative and much more ambitious approach to improvement entails a sort of new political economy of open learning.

In Mackie's view, the culture of universities needs to change fundamentally to allow for the kinds of open technology development and resource sharing described by authors in this book.

While the pathways to such change might not be clear, the outcomes of its progress are easier to imagine, as Mackie considers what the changed nature of institutional engagement with making and sharing open educational opportunities could look like. The shift in the locus of software development away from proprietary commercial companies and into loosely organized consortia of higher education institutions, as Mackie sees it, has led to noticeably different processes and results in the production of community source software. Indeed, most of the software projects featured in this book are more like cathedrals than bazaars, to use Eric Raymond's metaphor (1999). Unlike the larger open source movement described by Weber, programming here is carried out predominantly by paid staff who work within fairly traditional organizational structures (2004). Behind the community source projects are evolving organizations still experimenting with management structures that might allow them to better coordinate distributed software development.

However, as Mackie points out, many of the same simplicity principles—loose coupling, lightweight data standards, shared code repositories—that make community source projects successful do not apply conveniently when it comes to making and sharing open educational content. How best to cultivate and sustain the production and consumption of educational resources on a broad scale has become a major focus of open education advocates, as the chapters in the second section of the book reveal.

Implications

My final purpose in this overview is to suggest some criteria for choosing among theoretical traditions that might help in allowing us to account for the range of design and evaluation issues raised in these chapters. To end by prescribing one particular theory of teaching and learning would, it seems, be contrary to this book's general theme of openness. So I offer at least two.

In reading these chapters, it is worthwhile to notice how these projects question conventional notions about learning and instruction. From a

comparative point of view, learning to become an engineer or a writer of compositions is not considered here simply as being an effect of, response to, or outcome of instruction per se—whether in a lab, class-room, or online. In these chapters, the units of analysis for teaching and learning extend well beyond instruction of individual students. Instead, the institutional organization of teachers and students coordinated around technology-mediated activity in communities seems to be the preferred norm here.

Two allied viewpoints, social practice theory (Lave and Wenger, 1991) and cultural historical activity theory (Cole, 1996), offer approaches to describing and accounting for many of the interesting observations and questions found in these chapters. By treating teaching and learning as sociocultural processes, both theoretical positions take an interest in learning as being about changing participation in socially situated prac-tices and activities. Being able to account for how and why it is that some formal educational situations can be organized in ways that, oddly enough, appear at times even to militate against learning is another strength of both viewpoints. Both also offer interesting ways of talking about key observations made in several of these chapters: the prevalence of conflict, problems of access and sequestration, and the formation of learners' identities (Lave, 1996). And as many chapters in this book indicate, overcoming institutional and cultural barriers requires much more than technology solutions; it requires an approach to understand-ing how barriers get socially organized in the first place (Goldman, Chaiklin, and McDermott, 1994).

Our choice of theories to use for the design, study, and evaluation of open education will, as always, make available certain kinds of questions for the asking and certain stories for the telling (Shulman, 2007). For the authors in this section and the book as a whole, the narratives worth telling often unfold from variations on questions like "Who is doing what?" instead of simply "Who knows what?" As raised in several chapters, questions about the long-term trajectory of learners and of the production of their identities open up a line of inquiry that is central to social practice theory and cultural historical activity, as well. And where several chapters turn a critical focus on traditions of resource scarcity—educational haves and have-nots—both theoretical perspectives offer ways of examining institutional policies and arrangements, especially the

extent to which they limit access. Finally, both perspectives see learning as an inseparable feature of the shared understandings that people generate together when engaged in culturally meaningful practices—technology-mediated or otherwise.

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