An Open Future for Higher Education

By Patrick McAndrew, Eileen Scanlon, and Doug Clow

- As the world becomes more open, universities have the opportunity to embrace openness in how they carry out their operations, teaching, and research.
- Open educational resources can provide the catalyst for different forms of learning, linking formal and informal aspects and splitting up the functions of content, support, assessment, and accreditation.
- Models from research suggest that an open approach is likely to encourage the crossing of boundaries between inside and outside the classroom, games and tools for learning, and the amateur and the expert.
- A new attitude toward research and scholarship is needed to work with the data of openness and to use it as an approach to gather evidence, share thoughts, and disseminate results.

Education, and in particular higher education, has seen rapid change as learning institutions have had to adapt to the opportunities provided by the Internet to move more of their teaching online[1] and to become more flexible in how they operate. It might be tempting to think that such a period of change would lead to a time of consolidation and agreement about approaches and models of operation that suit the 21st century. New technologies continue to appear,[2] however, and the changes in attitude indicated by the integration of online activities and social approaches within our lives are accelerating rather than slowing down.

How should institutions react to these changes? One part of the answer seems to be to embrace some of the philosophy of the Internet[3] and reevaluate how to approach the relationship between those providing education and those seeking to learn. Routes to self-improvement that have no financial links between those providing resources and those using them are becoming more common,[4] and the motivation for engaging with formal education as a way to gain recognition of learning is starting to seem less clear.[5] What is becoming clear across all business sectors is that maintaining a closed approach leads to missing out on ways to connect with people and locks organizations into less innovative approaches.[6] Higher education needs to prepare itself to exist in a more open future, either by accepting that current modes of operation will increasingly provide only one version of education or by embracing openness and the implications for change entailed.

In this article we look at what happens when a more open approach to learning is adopted at an institutional level. There has been a gradual increase in universities opening up the content that they provide to their learners. Drawing on the model of open-source software, where explicit permission to freely use and modify code has developed a software industry that rivals commercial approaches, a proposed "open content" license[7] was matched by parallel decisions that releasing content for the good of others better matched educational aims than extracting commercial gain.[8] The establishment of a funded program by The William and Flora Hewlett Foundation encouraged sharing educational content and helped establish a firm foundation for more open approaches. In 2002 the term *open educational resources* (OER) was proposed to mean:

> *The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non commercial purposes.*[9]

Content only provides a part of the educational experience, however, especially for those institutions that emphasize face-to-face experiences. By adopting the practice of using licenses such as Creative Commons,[10] such release of content is a key enabler for other activities, as permission is given for changes in use as well as for simple reuse. The Open University, a distance-learning provider, started its open content initiative in 2006.

Campus, Distance, and Open Learning

Traditional campus-based education brings learners and teachers together with face-to-face experiences, typically in lectures. Such a model has limitations in how it can scale, given the need for physical buildings and direct contact. The Open University (OU) was established by the British Government 40 years ago as one means of expanding access to higher education and offering a chance to those who might have missed out on university to continue their educations without necessarily suspending their careers. From the start the OU focused on an approach termed *supported open learning*, emphasizing the importance of the support offered as well as the value of the content provided.[11] This particular approach to distance education has served as a model across the world, strengthening university education in those countries that lacked a tradition of tertiary education.[12] The OU model of distance education has at its core high-quality learning materials linked to cohorts of students working through those materials and receiving feedback from tutors. The availability of online methods that offer both content and support has reduced the distinction between campus and distance models, leading to the idea that each university can provide a blend between online and onsite learning.[13] The next step may be to see if having truly open access implies a change in how we expect learning to take place.

The development of appropriate pedagogical models depends on understanding how people learn. An influential view of learning among educators for many years was the *transmission* metaphor of learning, where knowledge is seen as an object to be delivered to the mind of the student by the teacher (see, for example, work by Guy Claxton[14] and Jerry Andreissen and Jacobijn Sandberg[15]). The transmission model has obvious resonance with the idea of the lecture, where presenting the expert's knowledge supposes its transfer to the less knowledgeable student.

More recent perspectives on learning stress the idea of learning as identity creation. Etienne Wenger's 1998 book[16] further developed his social theory of learning involving community and identity. He focused on the construction of human identity as the key underlying purpose of learning, which has four components:

- Practice
- Meaning
- Community
- Identity

Practice he defined as learning as doing — developing a shared perspective on the world that allows us to engage in social activities. *Meaning* emerges from learning as experience — developing an ability to experience the world as meaningful. *Community* refers to "the social configurations in which our enterprises are defined as worth pursuing and our participation is recognizable as competence" (p. 5). This community perspective places learning as belonging, relating to the social configurations in which we participate in shared enterprise. The *identity* perspective considers learning as becoming — the process by which we define who we are and how learning changes who we are. Other commentators have made similar points, including John Seely Brown and Paul Duguid:

In learning to be, in becoming a member of a community of practice, an individual is developing a social identity. In turn, the identity under development shapes what that person comes to know, how he or she assimilates knowledge and information.[17]

The idea that learning is less about transmission, or indeed less about knowledge, and rather about how to operate at personal and society levels has resonances in the current striking change in learning environments. In these emerging more-open environments the user gains the ability to personalize educational resources in the widest sense. When this personalization is combined with social networking enabled by technology, the learner can start to set a customized learning agenda. While some commentators see a tension between this and the requirements for formal accreditation of learning, it offers a potential form of "open learning" that may be the next stage both for distance education institutions and for campus-based institutions. The more open format implies a disaggregation of the content, support, assessment, and accreditation functions integrated into most education systems. As the technology emerges to support this form of learning, it is hard to know how to best apply it or combine it with existing methods and structures. There is therefore an imperative to experiment with the ways in which it might work. In the next section we look at a major initiative undertaken to explore what happens in providing free access to resources and then consider other research-led projects that provide pieces of evidence for the impact that might come with more open approaches.

OpenLearn: Opening Content at The Open University

For the OU, content plays a direct teaching role, explaining tasks and incorporating ways to assess progress.[18] This means that the value the OU has placed on its content differs from that of more conventional universities; indeed, it has had some success in developing a commercial market for its books, videos, and online material, and a less formal online market for used course materials is also active. Thus for the OU to move toward open educational resources in its OpenLearn initiative risks its existing market while also offering a greater chance of reuse. The OU had several motivations to work openly,[19] with a key one being to experiment and engage with open provision rather than ignore it.

In practice a range of organizational benefits were identified[20] including:

- Enhancing the OU's reputation
- Extending the university's reach to new users and communities
- Recruitment of students from those who come to see OpenLearn
- Supporting widening participation
- Providing an experimental base of material for use within the university
- Accelerating uptake and use of new technologies
- Acting as a catalyst for less formal collaborations and partnerships

Beyond these immediate benefits is the almost irreversible move toward a wider learner group than the existing group of paying students.

Studies carried out across all OpenLearn users included analysis of user behavior, then questionnaires targeting those who used the site more heavily, supported by follow-up interviews and monitoring of activities taking place with the open content. The results from one of these studies ($n = 2,011$) highlighted two distinct clusters of learners: "volunteer" students and "social" learners.[21]

- The volunteer students sought the content they wanted to learn from, and they expected to work through it. These learners were most interested in more content, tools for self-assessment, and ways to reflect on their individual learning. Because OpenLearn provides a learning environment (see Figure 1) with many of these tools, some learners showed these traits in practice, even completing essays and indicating that they met word length conditions, either in the public forums or in the more private learning journals.
- The social learners were less motivated to work through the content. Rather, they seem to see learning as a way to meet people with shared interests. This cluster of learners ranked communication tools more highly and were more interested in advanced features on the website.

Although content-driven learners were more numerous in the survey data than social learners, it nevertheless seems that offering open content supports both models for learning, with users interpreting the site as designed to meet their needs. These two categories of OpenLearn visitors are not entirely distinct, of course. More than 8 million unique visitors have used OpenLearn since its launch in October 2006, and it is difficult to be sure of the motivation for learning across such a large group. A third category is thus the casual users from among the many who find OpenLearn just as they find anything else on the Internet, through search. Casual users may find their answers quickly rather than through engaging with the material in detail, though it is notable that around 10 percent choose to view the content in its complete "print version."

Figure 1. The OpenLearn Home Page

In order to avoid imposing barriers to self-directed learning for both individuals and informal communities, those who make open content available should not prejudge motivation. The open approach allows universities to support learners at an additional marginal cost over providing access to students registered at each institution, although those costs are not insignificant. The total investment for initiating the OpenLearn service exceeded $11 million, of which nearly $9 million came from The William and Flora Hewlett Foundation, which is clearly not repeatable across all institutions. Initiative-based funding

completed in May 2008; since then the continuation of OpenLearn has depended on mainstreaming the approach[22] so that production of open content happens alongside other production of content. Recent figures from MIT also reflect reduced reliance on outside funding as the institutional priority was recognized.[23] On the other hand, it is worrying that Utah State University chose to cancel its open courseware program in reducing its costs to meet the financial downturn in 2009.[24]

John Seely Brown and Richard Adler[25] identified the social aspect to learning as a key change in how we might think about the process of learning, a move from "'I think, therefore I am" to "We participate, therefore we are." We believe this social aspect is a part of the way in which people learn, a part that is becoming both more obvious and more easily supported within online spaces. The view of individuals learning in their own time and at their own pace continues to have a clear role and fits with other aspects of "learning to be," in which mastery of an area needs to combine access to individual knowledge sources with interaction and practice in the field. The power of working openly is addressing these needs in parallel by empowering the learner to either engage quietly with content or to gather around the content as an attractor that brings together a sufficient mass of learners for social support and exchange to occur, related to but not dependent on the specific content.

Other Research as Motivation

Openness is not the only component in moving toward new ways to work with learners. In this section we highlight other key activities as examples of the changes to teaching, learning, and research needed to address how people are starting to think about their learning and how we should then act to research it.

Personal Inquiry

The first of these research efforts, a three-year project funded by the Technology Enhanced Learning Program on Personal Inquiry: Designing for Evidence-Based Inquiry Learning across Formal and Informal Settings (PI), is jointly conducted by the OU and the University of Nottingham.[26] This project looks at schools and the way in which the classroom environment is changing to blend in technology, blurring the distinction between formal lessons and more informal leisure time activities. Our focus is on how to help students learn the skills of evidence-based inquiry supported by technology across formal and informal settings (see Figure 2). Technology, and mobile technology in particular, offers interesting ways of supporting the transitions made by learners across settings, for example between classrooms and after-school clubs, or between in-school working and working in the field.

Figure 2. Students Doing Fieldwork with PI Project
This photo is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 license.

Transitions across settings are not the only boundary-crossing aspects of the PI project, which ties in with a growing recognition in education that it is sometimes difficult to draw distinct boundaries between types of learning on a spectrum from formal to informal.[27] While operating openly is not essential to adopting an evidence-based approach to inquiry, it does help introduce the flexibility needed to recognize the value in informal learning.

Other work recognizes the way in which these boundaries are eroding. For example, Gill Clough[28] conducted a study of a geo-caching community whose members used social networking tools and online and offline community resources to learn about the geology, geography, and history of their local and other areas. Don Tapscott warned education to prepare for a Net Generation[29] tuned in to the capabilities of technology in a way that earlier generations might find hard to appreciate. More recent research[30] has tempered this view to focus less on the age-related generational aspect while finding real evidence of "net behaviors" occurring in all student groups, changing the way some people relate to their educational experience. Without judging if these new ways to learn are better or worse, some see increasing dissonance between formal approaches to learning and the informal tools students use in other aspects of their lives. Our studies indicate that the merging of these two worlds can bring benefits in connectedness, willingness to learn, and engagement.

Serious Games

Games also show potential for learning. Research on "serious games"[31] looks at how to bring some of the fun and intensity that occurs in games to learning. The approaches can be characterized as turning educational experiences into games, for example games that add a fun element to solving mathematical puzzles, or turning games into learning experiences, such as identifying the group-building and management capabilities that form part of the teamwork in World of Warcraft.[32] Both approaches have value. One difficulty has been the disjunction between the play experience and the need for demonstrable learning feedback. With the increase in ways to interact with systems, exemplified by such games technologies as the Nintendo Wii, the scope to bring games across to learning increases. A European project called eXcellence in Decision-making through Enhanced Learning in Immersive Applications (xDelia) aims to use wearable sensors (see Figure 3) and serious games to identify and address the effects of emotional regulation in financial decision making in three fields: professional trading, private investment, and personal finance. The proposed solution mixes games technology and feedback but also careful evaluation to address the learning concerns and fit the needs of industry. Again, this challenges conventional routes to education, as it is unclear that accreditation and assessment are the drivers; instead, motivation comes from more authentic experiences and links to others facing the

same problems. While the banking world retains many closed aspects that mean open solutions do not suit all, the approaches draw on similar principles, and the pressure to scale up the connections through open exchanges is being addressed within the project.
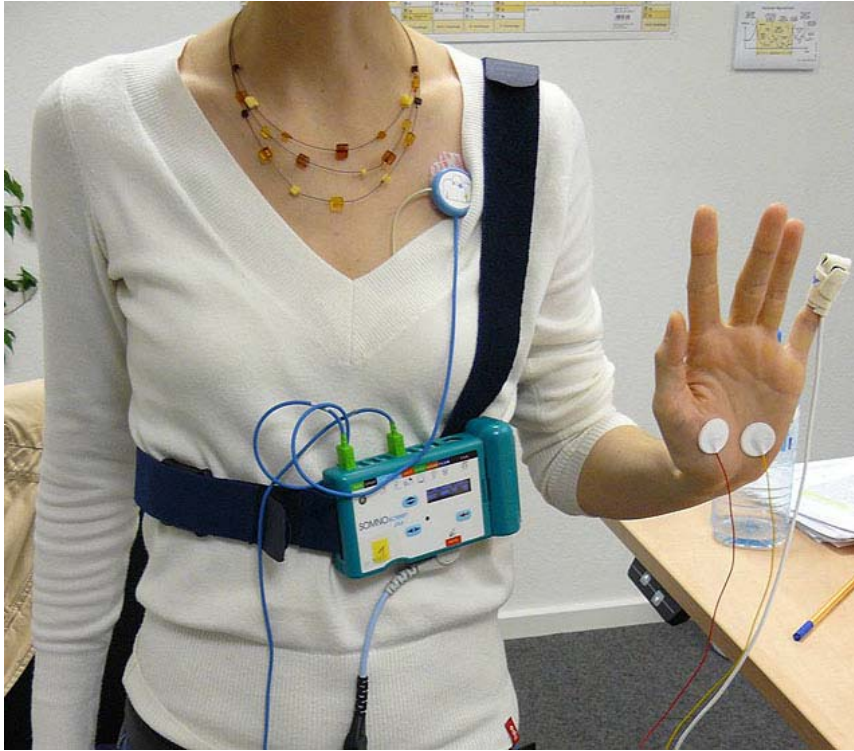

Figure 3. Biofeedback Sensors in xDelia Games

Authentic Activities

Games provide one way to simulate experience. A further area of research examines the learner as a peer participant in authentic activities, working alongside other users who would traditionally be considered experts or teachers. Open resources do not, in themselves, force learners into this role, or indeed require teachers to make such opportunities available. However, the implicit and explicit rules, structures, and practices of the OER world, and the experience of related open movements (including open-source software), strongly suggest this is a powerful and fruitful line of inquiry. The discernable division already identified in the work on OpenLearn between those adopting the resource as if they were conventional students (driven by content, seeking assessment, and individual in their approach) and those who identified with social aspects of learning (communication tools, sharing with peers, and producing persistent products) encourages us to explore how working in authentic situations can also blend support for both groups.

This approach is exemplified in *citizen science*, where members of the public contribute to scientific projects without needing significant specialist training or expertise. Such activities require careful design, and only a small number of scientific activities prove suitable. There are significant potential benefits, however: expert scientists can gain access to resources well beyond the scope of conventional research activities (such as widely dispersed and extensive data collection), and participants gain insight into the research process as well as the related science.

iSpot

One example of particular interest comes from iSpot, launched in summer 2009. The iSpot website (see Figure 4) allows anyone interested in wildlife, from the casual viewer of wildlife programs on television to the knowledgeable amateur naturalist, to share their observations and get help with identification. It is part of a larger project called OPAL (Open Air Laboratories[33]), which aims to create and inspire a new generation of nature lovers by getting people to explore, study, enjoy, and protect their local environment.
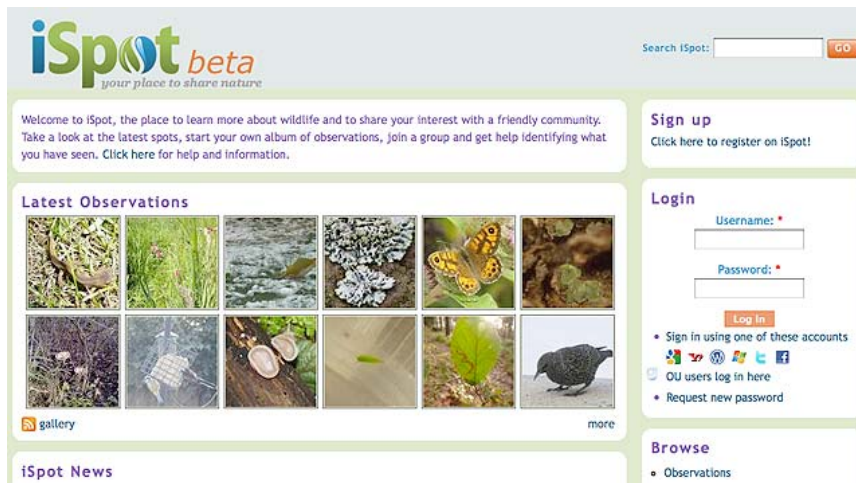
Figure 4. The iSpot Nature Observation Site

A strong pedagogical principle of participation lies behind iSpot. Tens of millions of people enjoy watching nature programs on the television in the U.K. alone. How can they be encouraged to participate and learn more? The thrill of observing nature and the satisfaction of identifying species can be a powerful motivator, but identification of species can be very difficult. The iSpot site aims to lower this barrier by providing support for identification and verification through a social network and a wealth of freely available online resources to support learning about that species, related species, the habitat, and so on. These preexisting resources range from basic introductory field guides, through species information on Wikipedia and the Encyclopedia of Life, to final-year undergraduate-level OER. The aim of iSpot is not, therefore, to duplicate these resources or add to this vast wealth of information (though it does provide some aids to identification), but to help motivate learners to engage with existing resources and a community of like-minded learners and support them in doing so.

At the core of the iSpot design concept is the user as active contributor rather than passive consumer: all users can upload their own observations, as well as observing and commenting on those of others. A sophisticated but simple-to-use reputation management system helps recognize expertise on the site, whether from expert naturalists (the project is working closely with many different groups of such experts to help seed and support the site) or from users who have demonstrated expertise through their extensive use of the site.

A key component of the iSpot design is support and encouragement of learners on a range of learning journeys taking them beyond the limits of the project itself. As already mentioned, learners are guided to OER relevant to their particular observations as part of the central activity of the site. The site also provides two specifically designed routes out to more structured, formal learning:

- The first route is through conventional higher education: the OU course, Neighbourhood Nature, is a short distance-learning course introducing learners to basic natural history, ecology, biodiversity, and so on, tied closely to use of iSpot to build scientific and observational skills. Learners can then progress to other accredited higher education courses.
- The second route is to the U.K.'s network of natural history societies and biodiversity recording and monitoring schemes, which overwhelmingly rely on voluntary effort. The project has close ties with many of these expert groups and collaborates to support interested iSpot participants in working with them. Depending on the group, this might require extensive training and fieldwork, or simply a willingness to get involved.

iSpot brings together people with similar interests and provides an environment in which the beginning participant can learn from the expert without barriers, through active participation.

New Research Methods: Researcher 2.0

Openness of education implies new approaches to how we research as well as how we educate. The Open Learning Network (OLnet) initiative (see Figure 5), funded by The William and Flora Hewlett Foundation, builds on the basis of work on OER initiatives at Carnegie Mellon University (the Open Learning Initiative), together with OpenLearn at the OU. Each university found that determining the impact of open actions involved extra challenges, as there is no formal relationship between the users of the site and the providers. CMU found that adding metrics to the content itself increased its efficacy for learners by giving them feedback; it also enabled researchers to understand how the online content was being used.[34] A mix of methods were applied in OpenLearn to build a picture of activity, combining conventional questionnaires and interviews with monitoring of blogs and analytics. In OLnet we are addressing the challenges of building a research base for evidence of OER's value and sharing of ideas to move from providing OER to using them for participatory learning. To do this, we are carrying out targeted research projects, building capacity through fellowships, and identifying and sharing results.
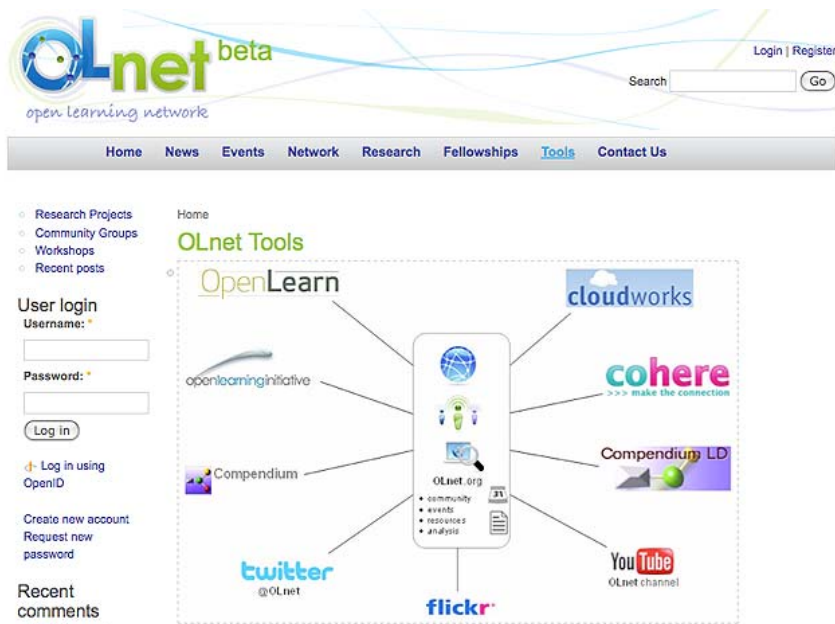
Figure 5. The OLnet Site

Results from research into the open world are of necessity often tentative and based on partial data, which conflicts with some of the norms of academic research — it seems that some Web2.0 principles allowing rapid software development also tolerate the idea of a "permanent beta."[35] The slow rate of publication and the demands of review are at odds with busy practitioners' desire to contribute their observations and opinions for rapid reflection. OLnet adopts a model of collective intelligence supported by appropriate tools[36] where ideas can be challenged or agreed with rather than proved and assessed. A combination of blogs, questions, ideas, and novel spaces[37] alongside more conventional conferences and publication of papers gives visibility and persistence to ideas that need to be shared and discussed. Examples of investigations in OLnet include:

- Reviewing the way in which social sites are organized by observing the trajectories of those who use the sites
- Interviewing innovators in open access to see how those who perceive themselves as educators and those who don't are helping users support their learning

Open research also raises ethical and practical issues. One of OLnet's research subprojects investigates how participatory learning takes place across socially driven sites. As a part of this, a researcher categorized over 3,000 sites, reviewed their structure and content, and then studied user journeys on the sites. Such research considers information that users have provided publicly but not necessarily in the expectation that it will be analyzed or linked to models of behavior. The ethical and pragmatic view is that such research activity is appropriate because no harm can be foreseen; realistically, it is not possible to obtain the informed consent we seek in other cases when we gather user data. The next stage in open research is to make the data as well as the conclusions public, and we are taking steps to build this practice into OLnet by providing less formal reports[38] as we progress and organizing data in tools for others to access. These methods are still in development, but represent part of the movement toward a new understanding of the role of research and scholarship when information sharing and connections can be made very rapidly.

In related work at the OU we are aiming to develop an understanding of the changes in the teaching, communication, and publication practices of academics in higher education due to the impact of the information age.[39] Because access to OER is a significant feature of this changed landscape, we are exploring the links between these practices to provide a model of digital scholarship.[40]

Conclusion

We have described a view of openness that sees it as an enabler for sharing and communication that then impacts on both the ways we learn and the ways we research (see Figure 6). More tentatively, we are also drawing attention to the power openness might have as an agent for change. The opportunity to embrace open approaches in education is starting to be more widely recognized, as indicated for example through the growth in membership of the OpenCourseWare Consortium[41] and national initiatives such as the Joint Information Systems Committee (JISC) and Higher Education Academy program on OER. However, the move to being more open also raises challenges across each of the core functions of a university: business, teaching, and research.
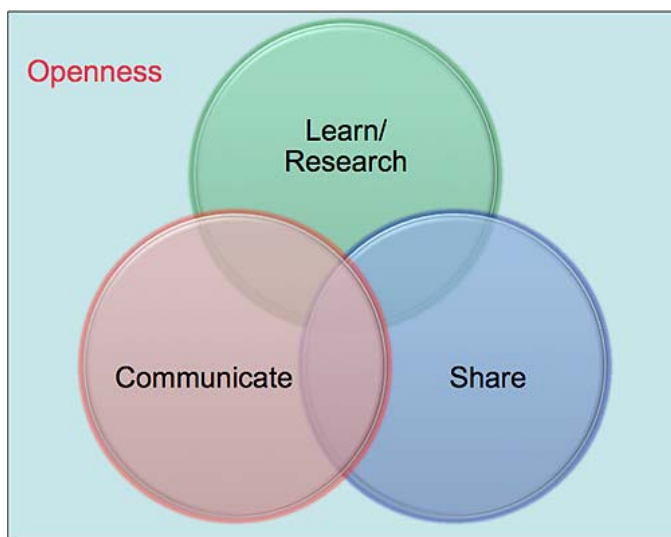
Figure 6. Openness Underpinning Communication, Sharing, and Learning/Researching

Business

For the business model of education it appears that we now need to question some bases of tertiary education (at least). The classic idea that people will move to a place of learning, dedicate a fixed amount of time to learning, and come out with a specialized qualification shaped by local expertise is certainly no longer the only option. Tremendous growth in universities marks the late 20th and the beginning of the 21st centuries,[42] while at the same time Internet connections have facilitated a move toward distance learning. Even more significant changes are happening in the world of information, however. Internet systems are causing us to question the value of personal knowledge and to establish new measures of shared and self-published information that has not been judged by conventional academic systems. One element in the change is a switch from "content is king" to freer availability of established academic content as OER.

There is no easy answer as to how to operate in this new world, though it seems unlikely that a face-to-face fixed location model can respond as effectively as other models. Our experience tells us it is time to start a debate to rethink the future of the university system. There might also be a chance for start-ups and expanding education in the developing world to jump a generation and build more efficient and useful ways to support those for whom lifelong learning will be a necessity.

Teaching

The model of teaching in this more open world means that in producing educational material, it is important to look beyond the immediate audience to target a potentially wider group of learners. The sharing of teaching material is not part of usual practice, and while it is possible to imagine a peer approval process to identify and validate teaching materials analogous to the more familiar route to disseminating research through publication,[43] teaching material seems to have a different basis — such sharing has not proved easy to bring about.

Open approaches are rather different, as content can come from many sources; the main opportunity may lie not in being a producer of content but rather in being an effective user and supporter of learners using such content. Once a significant amount of material is available, then skills in bringing together good patterns or designs for learning[44] and connecting them with assessment and accreditation will be extremely valuable. OpenLearn offers activity-based printable certificates that provide an indication of a vistor's engagement with the material on the site, and initial experiments in ways to accredit open and free courses are now taking place.[45]

Research

For research, an altered view of what it means to be a digital scholar is not unique to the area of open learning but also applies more generally. Christine Borgman[46] examined the roles that information technology plays at every stage in the life cycle of a research project and contrasts these new capabilities with the relatively stable system of scholarly communication, which remains based to some degree on publishing in journals, books, and conference proceedings.

We are particularly interested to see whether the open practices developed in relation to the use of OER for teaching have any impact on the extent to which researchers value the open access movement for scholarly publishing or vice versa. A literature is starting to develop on informal learning communities forming around open educational resources.[47] Thinking through how we can build evidence of the value of open learning to organizations, educators, and learners is a key aim of the research work being conducted in OLnet.

The Future

In this article we have described some of the ways in which open approaches to learning, teaching, and research have already changed education. This is a time of rapid change, and predictions about the future are always problematic, but we believe and hope that more widespread and deeper engagement with open possibilities will influence how we provide higher education for the better service of learners and for our working practices.

Acknowledgments

Endnotes

1. Kyong-Jee Kim and Curtis J. Bonk, (2006) "The Future of Online Teaching and Learning in Higher Education: The Survey Says…," *EDUCAUSE Quarterly*, vol. 29, no. 4 (2006), pp. 22–30.
2. Larry Johnson, Alan Levine, Rachel S. Smith, and S. Stone, "The 2010 Horizon Report," New Media Consortium and EDUCAUSE Learning Initiative (2010).
3. Chris Anderson, "Free! Why $0.00 Is the Future of Business, Wired.com, vol. 16, no. 3 (2008).
4. There are now many sites, such as Answers.com and Stack Overflow, that build on people's enthusiasm to answer each other's questions.
5. There has been discussion between educational thinkers such as Stephen Downes and David Wiley about the way that organizations can embrace Education 2.0. See, for example, Martin Weller's blog The Ed Techie, "Downes vs. Wiley — Cato and Cicero Revisited," 2008.
6. Thomas Friedman, *The World is Flat — A Brief History of the Globalized World in the 21st Century* (London: Penguin, 2005).
7. David Wiley proposed an "open publication license" June 8, 1999.
8. Charles Vest, "Why MIT Decided to Give Away All Its Course Materials via the Internet," *Chronicle of Higher Education*, January 30, 2004, p. 20.
9. Definition derived from a UNESCO workshop in 2002 and cited on page 7 of Susan D'Antoni, "Open Educational Resources — The Way Forward: Deliberations of an International Community of Interest," UNESCO International Institute of Educational Planning, 2008.
10. Laurence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World* (New York: Random House, 2001).
11. Susan Ross and Eileen Scanlon, *Open Science: The Distance Teaching and Open Learning of Science Subjects* (London: Paul Chapman, 1995), provide an overview of the successful development of distance teaching at The Open University, particularly with reference to science subjects.
12. Open universities around the world follow a similar model, including some of the largest educational institutions. For example, The Open University in the UK has more than 200,000 students, and the Indira Ghandi National Open University in India has over 2.5 millon.
13. Allison Littlejohn and Chris Pegler, *Planning for Blended Learning* (London: Routledge, 2007).
14. Guy Claxton, *Teaching to Learn: A Direction for Education*, (London: Cassell, 1995).
15. Jerry Andriessen and Jacobijn Sandberg, "Where Is Education Heading and How About AI?" *International Journal of Artificial Intelligence in Education*, vol. 10, no. 2 (1999), pp. 130–150.
16. Etienne Wenger, *Communities of Practice: Learning, Meaning, and Identity* (Cambridge: Cambridge University Press, 1998).
17. John Seely Brown and Paul Duguid, *The Social Life of Information* (Boston: Harvard Business School Press, 2000), p. 138.
18. Derek Rowntree, *Making Materials-based Learning Work* (London: Routledge Falmer, 1997).
19. Patrick McAndrew, "Motivations for OpenLearn: the Open University's Open Content Initiative," commissioned report for OECD, October 2006.
20. Patrick McAndrew, Andreia Santos, Andy Lane, Steve Godwin, Alexandra Okada, Tina Wilson, Teresa Connolly, Giselle Ferreira, Simon Buckingham Shum, Jerard Bretts, and Rose Webb, "OpenLearn Research Report 2006–2008," The Open University, Milton Keynes, England, 2009.
21. Steve Godwin and Patrick McAndrew, "Exploring User Types and What Users Seek in an Open Content Based Educational Resource," *Proceedings of World Conference on Educational Multimedia, Hypermedia, and Telecommunications 2008*, (Chesapeake, VA: AACE 2008), pp. 3711–3718.
22. David Wiley, "On the Sustainability of Open Educational Resource Initiatives in Higher Education," OECD, Paris, 2006.
23. Cecilia d'Oliveira and Steve Lerman, "OpenCourseWare: Working Through Financial Challenges," *MIT Faculty Newsletter*, vol. XXII, no. 1 (September/October 2009).
24. Marc Parry, "Utah State U.'s OpenCourseWare Closes Because of Budget Woes," *Chronicle of Higher Education*, Wired Campus, September 3, 2009.
25. John Seely Brown and Richard P. Adler, "Minds on Fire: Open Education, the Long Tail, and Learning 2.0," *EDUCAUSE Review*, vol. 43, no. 1 (January/February 2008), pp. 16–32.
26. Eileen Scanlon, Gráinne Conole, Karen Littleton, Cindy Kerawalla, Mark Gaved, Alison Twiner, Trevor Collins, and Paul Mulholland, "Personal Inquiry (PI): Innovations in Participatory Design and Models for Inquiry Learning," paper presented at AERA 09, American Educational Research Association, San Diego, April 13–17, 2009.
27. Wenger, *Communities of Practice*.
28. Gill Clough "Geolearners: Location-Based Informal Learning with Mobile and Social Technologies," *IEEE Transactions on Learning Technologies*, preprint, September 11, 2009.
29. Don Tapscott, *Growing Up Digital: The Rise of the Net Generation* (New York: McGraw-Hill, 1996).
30. Chris Jones, Ruslan Ramanau, Simon Cross, and Graham Healing, "Net Generation or Digital Natives: Is There a Distinct New Generation Entering University?" *Computers and Education*, to be published in vol. 54, no. 3 (April 2010), pp. 722–732.
31. Sara de Freitas and Steve Jarvis, "Serious Games — Engaging Training Solutions: A Research and Development Project for Supporting Training Needs," *British Journal of Educational Technology*, vol. 38, no. 3 (May 2007), pp. 523–525.
32. John Seely Brown and Douglas Thomas, (2006). "You Play World of Warcraft? You're Hired!" *Wired* (April 2006).
33. The OPAL project is funded by the Big Lottery Fund for England, so at present targets its support within England, although the scope to operate internationally is recognized.
34. Marsha Lovett, Oded Meyer, and Candace Thille, (2008). "The Open Learning Initiative: Measuring the Effectiveness of the OLI Statistics Course in Accelerating Student Learning," *Journal of Interactive Media in Education*, vol. 14 (May 5, 2008).
35. Tim O'Reilly, "The Architecture of Participation," June 2004.
36. Simon Buckingham Shum, "Cohere: Towards Web 2.0 Argumentation," in *Computational Models of Argument: Proceedings of COMMA 2008,* Ph. Besnard et al., eds. (Amsterdam: IOS Press, 2008), pp. 97–108.
37. A flexible system for supporting conference and discussion has been produced called Cloudworks.
38. An early report of this work by Elpida Makriyannis, "Why Content Is Still King," can be found on the OLnet site (October 7, 2009).
39. Nick Pearce, Martin Weller, Eileen Scanlon, and Sam Kinsley, "Digital Scholarship Considered: How New Technologies Can Transform Academic Work," submitted to *In Education* (February 16, 2010).
40. Eileen Scanlon, Martin Weller, and Katerina Avramides, "Exploring the Links Between Digital Scholarship and Open Educational Communities," *Proceedings of the OER 10 Conference*, Cambridge, England, March 2010.
41. Stephen Carson, "The OpenCourseWare Model: High-Impact Open Educational Content," *Educational Technology*, vol. 47, no. 6 (November/December 2007), pp. 23–25.
42. Consider these examples of university expansion: in the U.K., targets were established that 50 percent of school leavers should enter tertiary education, and the number of places increased, while in Turkey, the number of universities has almost doubled during the past five years.
43. Diana Laurillard and Patrick McAndrew, "Reusable Educational Software: A Basis for Generic E-Learning Tasks," in *Resources for Networked Learning*, Allison Littlejohn, ed. (London: Kogan-Page, 2003).
44. Yannis Dimitriadis, Patrick McAndrew, Gráinne Conole, and Elpida Makriyannis, "New Design Approaches to Repurposing Open Educational Resources for Collaborative Learning Using Mediating Artefacts," *Proceedings of ascilite 2009*, Auckland, New Zealand, December 6–9, 2009, pp. 200–207.
45. The Free Technology Academy offers open courses that anyone can access. Visitors can also choose to pay for tutoring and assessment. The resulting certificate can then be converted to credit recognized by partner universities in three European countries.
46. Christine Borgman, *Scholarship in the Digital Age: Information, Infrastructure, and the Internet* (Cambridge, MA: MIT Press, 2007).
47. Nicholas C. Burbules, "Self-Educating Communities: Collaboration and Learning Throughout the Internet," in *Learning in Places: The Informal Education Reader*, Zvi Bekerman, Nicholas C. Burbules, and Diana Silberman-Keller, eds. (New York: Peter Lang, 2006), pp. 273–284.

Doug Clow
Lecturer, Interactive Media Development
The Open University

Patrick McAndrew
Associate Director (Learning and Teaching)
The Open University

Eileen Scanlon
Professor of Educational Technology
The Open University

Future of Higher Education | IT Integration | open education | Open Educational Resources

Bookmark/Search this page with: