Why Open Educational Resources Are Needed for Mobile Learning[1]

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Abstract

Open Educational Resources (OER) constitute an important resource with the potential to facilitate the expansion of quality education. The relevance of OER is augmented by the exponential growth in online accessibility afforded by the wide range of new mobile devices. Athabasca University has been supporting a transition to course delivery via mobile devices for the past ten years, optimising websites for use on different devices. Driven by the copyright owners desire to apply technological protection measures (TPM), the need for OER is becoming more apparent. The disabling of specific functions such as copying and highlighting, and the prohibitions on format shifting and other changes, make it very difficult or impossible to use the content in educational contexts. This is reinforced by restrictive legislation prohibiting many educational uses such as re-using, mixing or repurposing the content. As mobile devices evolve, the content needs to be open so that it can be freely used without the restrictions imposed on proprietary content.

Introduction

Wireless technologies through the use of the Internet on new and more powerful networks are providing expanded access to learning opportunities in remote regions and in poorer barrios that were never linked to the "wired" world. At the same time, the growth in the number of Open Educational Resources (OER) and their ubiquitous accessibility on the Internet using the latest mobile devices is opening up access to learning in a way that was never envisaged by the most optimistic futurists.

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[1] This chapter has been adapted from conference presentations at PEREL 2012, ICCGI 2012 and PCF4.

The diffusion and growing widespread availability of OER, combined with the extended reach of intelligent mobile phones, tablets and netbooks, have opened up new learning environments for previously isolated learners and for educational institutions that are innovative enough to break away from the traditional classroom mode of teaching. Time and space boundaries are no longer limiting factors, forcing scholars to congregate in one room or auditorium. The new affordances of the latest mobile technologies open up previously unimaginable prospects for access to learning, while at the same time giving educators new challenges in pedagogy and content delivery that maximise the value of this new open environment.

The latest mobile phones and tablets are becoming more affordable and available to anyone, anywhere. These ready-for-use mobile devices are removing existing barriers and are empowering citizens to connect to governments to access a wide range of information and services in a number of policy areas, including education. Furthermore, new-generation mobile phones, or "smartphones," on the latest 3G and 4G networks that support multimedia — what can be described as a glut in new and sophisticated applications — are providing learners with increased accessibility to OER, not just written content, but also multimedia lessons, simulations and tests.

Background

Higher education institutions worldwide continue to face significant challenges related to providing increased access to high-quality education while containing or reducing costs. New developments in higher education all speak to the efforts on the part of the traditional higher education community, as well as more flexible providers such as open universities, to address these challenges. Such developments have the potential to increase access and flexibility in higher education. Basic education for all continues to be a goal that challenges (and will continue to challenge) many countries. Furthermore, some countries with significantly disadvantaged indigenous or other populations have set specific national goals aimed at addressing their needs. The current economic situation is likely to make these social goals more difficult as countries are faced with reduced budgets, as are donors. New approaches and methods are needed to ensure that all children and adults have an opportunity to learn throughout their lives.

Open Educational Resources

OER constitute an important resource with the potential to facilitate the expansion of quality education and learning opportunities worldwide. The William and Flora Hewlett Foundation (2010), the primary donor in the OER movement, supports the use of OER "to equalize access to knowledge for teachers and students around the globe." OER is defined as "teaching, learning and research resources that reside in the public domain or have been released under an intellectual property licence that permits their free use or re-purposing by others" (Hylen, 2007). These resources include full courses, course materials, modules, textbooks, streaming videos, tests, software and any other tools, materials or techniques used to support access to knowledge. The free and open sharing of educational resources can serve to promote the building of knowledge societies and the reduction of the knowledge divide that separates nations, as well as the divide within societies themselves.

UNESCO supports the use of OER, stating that with the "goal of developing together a universal educational resource available for the whole of humanity ... [there is] hope that this open resource for the future mobilizes the whole of the worldwide community of educators" (UNESCO, 2002).

OER are important because, unlike closed proprietary content, OER can be re-used in many similar courses and even repurposed for use in different courses. For example, a psychology module can be re-used in a wide variety of psychology-related lessons or repurposed for use in an arts course. Localisation is also important: OER can be altered to suit the learners or teachers in their regional context.

OER as learning objects have been compared to LEGO blocks that allow users to construct courses from independent blocks or modules. Others feel that the use of OER is more complex, with some modules not fitting with others. And still others feel that OER units are much more complex, likening the assembly to molecular and even biological systems.

The concept of granularity is also important. An OER can be a course, unit, lesson, image, webpage, exercise or multimedia clip, but it must have a specified pedagogical purpose/context. Content instances can be assembled into a lesson. Lessons can be assembled into modules. Modules can be assembled into courses and courses can even be assembled together and become a full programme. All of these at their various levels of granularity can be OER.

Mobile Learning

The relevance of OER is augmented by the exponential growth in online accessibility afforded by the wide range of new mobile devices. In 1999, I was driving through a small village in the Philippines, when I slammed on the brakes, staring in disbelief at what I saw. There was a farmer, up to his knees in the water of a rice paddy and standing behind a plough and two oxen, and he was digital-messaging using SMS (Short Message Service). At that time, very few if any people in some developed countries were digital messaging. I found out later that at that time, the Philippines led the world in digital messaging per capita. Even today, the country claims to be the "SMS capital of the world" (Wiki@SMU, 2011).

As I stared at the farmer, I realised that the mobile phone he had in his hand was a smart computer — a computer more powerful than the one I had on my desktop only three years earlier. It is then that I developed my interest in mobile learning (mLearning). How could we use these small, powerful, connected computers for learning in both formal and informal contexts?

Today, there are more than 6 billion mobile subscriptions accounting for nearly 90% of the world's population (7 billion). Significantly, more than 75% of these users are in developing countries, where there are more than 2 billion Internet connections. More than 90% of the world's population now has access to cellular networks. And, more than 33% of the world's population can now access the Internet — and that percentage is rising rapidly. Moreover, one-third of Internet users access the network only through mobile devices (International Telecommunication Union, 2012). The world is going mobile.

These mobile devices come in all shapes and sizes. Is it a computer in your phone or is it a phone in your computer? Tablets, e-books and netbooks are other

forms of mobile devices whose popularity is exploding. You can carry them anywhere; they are always available, always connected, and all are packed with auxiliary features. Even game players like the PlayStation and Nintendo are now available as mobile devices. The one laptop per child (and now one tablet per child) initiative of Negroponte's group based at MIT has opened up the market for cheap (less than $200) mobile devices that are now available (and getting cheaper), with models being produced in India, Taiwan and elsewhere (Ricciuti, 2005). This digital convergence of mobile technologies with computers has created an environment where computing is pervasive. Your mobile device can be used not just for Internet access, but also for email and SMS, and as a camera, e-book, radio, game player, clock and even a telephone! With more than half a million apps now available, the uses of a mobile device are limited mainly only by the imagination of its creators.

Moreover, this is happening at an increasingly rapid pace. Moore's Law tells us that the cost of computing is halved every 18 months. Gilder's Law tells us that the cost of bandwidth is being reduced even faster. Storage capacity is growing so fast that one can consider the actual cost to be approaching zero. With cloud computing, network storage has become a real option for many institutions and individuals. The cloud can support immediate deployment, scalability, reliability, security, privacy and consistency, all coupled with user control.

OER and the Intellectual Commons

This growing trend towards mobile computing using the power of networks has opened the door for learners and teachers to access the world's knowledge from almost anywhere, at anytime. The Internet houses the world's treasure of knowledge. In this context, the role of OER in providing learners and teachers with learning content, applications, games and more is becoming increasingly more relevant. The Internet is the world's intellectual commons and OER renders this knowledge accessible to all. The world's knowledge is a public good that should be made available to everyone.

The UNESCO Chair in OER initiative is led by me and Dr Fred Mulder of the Open University of the Netherlands, with partners on all continents. The goal of this initiative is to support the Millennium Development Goals of UNESCO by building an international network of OER users (United Nations, 2011). Specifically in support of these goals, the Chairs are mapping the organisations around the world that are using OER, initiating a call for OER Chairs on all continents, initiating an international PhD programme for studying OER, and creating a knowledge network online to house research, articles and other information about OER.

Another Chair-supported initiative is that of the OER university (OERu), which aims to widen access and reduce the cost of tertiary study for learners who are excluded from the formal education sector. The initiative is an international innovation partnership of accredited universities, colleges and polytechnics co-ordinated by the OER Foundation, an independent educational charity. It does not confer degrees, but works in partnership with accredited educational institutions that provide assessment and credentialisation services on a fee-for-service basis. The OERu will provide pathways for students to achieve credible credentials for

approved courses based solely on OER. Students choose what is of interest to them and what meets their professional development needs from the "smorgasbord" of available open courses (OER Foundation, 2011).

OER at Athabasca University

Athabasca University (AU) has been supporting a transition to course delivery via mobile devices for the past ten years. As an open distance education university, AU delivers courses to more than 38,000 students across Canada and internationally. AU students can study, conduct research and acquire credit and degrees without ever having to be physically present at a university campus. This highlights the importance of unconventional but effective and efficient media for providing education and services to students. With the widespread availability of Internet technology, AU is now dependent on the use of the Internet to deliver course materials, to enable students to interact, to provide students with online library access, and to facilitate students in performing administrative tasks such as enrolling in or withdrawing from courses, and even writing exams, remotely. In line with the world trends, a growing number of students are accessing the Internet using their mobile phones, netbooks, tablets and other "smart" mobile devices.

AU online courses were first developed with desktop computers in mind. They were traditionally designed with the assumption that the user accessing the website had a large, wide, colourful screen and adequate bandwidth for downloading multimedia-rich pages from wired LANs. This assumption cannot be relied on anymore, given the pervasive use of small-screen, low-bandwidth mobile devices, as well as the latest 3G and 4G phones and tablets using wireless networks

AU has optimised its websites and some external sites that are linked from AU sites (specifically journal databases). These websites have been tested for visual integrity and functionality retention using some of the least capable mobile devices in order to ensure that these second-generation phones could still be used by those few students who have not yet upgraded to the more powerful 3G and 4G phones and tablets because those advanced devices can (for the most part) display the contents adequately (if not better in some cases) than many larger computer screens (McGreal, Cheung, Tin, & Schafer, 2005).

An early mLearning project at AU was the M-library. It was implemented in an attempt to build a platform for AU to develop an effective mobile-friendly library (Cao, Tin, McGreal, Ally, & Coffey, 2006). The Digital Reading Room (DRR), Digital Thesis and Project Room (DTPR), Digital Reference Centre (DRC), and AirPAC are some of the outcomes of the project. These projects formed part of a research focus on mLearning using style sheets and proxies (McGreal et al., 2005) and the development of a demonstration course specifically for use on mobile phones (Ally, McGreal, Schafer, Tin, & Cheung, 2007).

The Need for OER in Mobile Learning

OER are not just a good thing. One can argue that for mLearning applications, OER are essential. This need for OER is driven by the copyright controllers applying "technological protection measures" (TPM), meaning restrictive licensing as well as geographical and other restrictions.

Vendors can technically control how, when, where and with what specific brands of technological assistance users are able to access content and applications. For example, some e-book publishers abridge the content and ensure that it is so difficult if not impossible to read that it is "worthless" (Richard the Lionhearted, 2011). Moreover, they also deliberately cripple their devices to ensure that only their "approved" uses are possible. This is often problematic for disabled users. The visually impaired, for example, are denied use of a text-to-speech function, and in many cases cannot even increase the text size. Moreover, many proprietary systems still disable highlighting, annotating, hyperlinking and even using dictionary access — all features important for educational uses and essential for mLearning.

Different formats are nearly always problematic when mixing and mashing materials. OER can be changed and altered for use in different formats without permission. Chunking of information is fundamental to learning. Small pieces of text or even chapters are often all that people need. This chunking is not normally possible with vendor-controlled proprietary content (Bissell, 2011). Even simple printouts are not possible in many cases through removing the printing capability (or by prohibitory licensing or both) (Elibra & Starpath, n.d.) Hyperlinking is a normal learning activity that is often disabled. The devices are often purposely crippled, so that content and applications cannot be ported to other devices. Permissions of all kinds also need to be resought for tampering with the material for re-use, repurposing or mixing, even if fair use allows for it. This can become an impractical burden, putting a real damper on mLearning, which relies on the existence of large collections of open and accessible resources.

Even if a format becomes obsolete, users have no recourse when they cannot technically move their content to other devices and applications. Audio readers, for example, are becoming popular, especially among people with visual disabilities and with commuters on long trips (Elibra & Starpath, n.d.). Proprietors, however, can disable the ability of audio readers to access the content. Because of these digital locks, even the process of legally downloading proprietary content can prove to be onerous (Tony [eBookAnoid], 2010).

Mobile learning becomes problematic when mixing and mashing is not permitted. Proprietors wish to control and restrict the formats, devices and other circumstances that users may want to use the material in. The proprietors wish to lock in and control their customers. For example, the Amazon Kindle and Microsoft Reader use DRM (Digital Rights Management) restricted formats (AZW and LIT, respectively). On the other hand, Adobe's PDF format allows for free use, but many older PDF documents cannot be reflowed to mobile devices easily. The open EPUB format is used by many publishers for production purposes, but then they convert it to their proprietary formats for public release.

Digital Rights Management (DRM)

DRM software enables copyright owners to control, limit and restrict what users can do with their content (Subramanya & Yi, 2006). Sometimes referred to as TPM (technological protection measures), it is also used as a tool to turn different uses of the content or application into a separate business deal, with restrictions and permissions. Because of this, some critics refer to DRM as Digital Restrictions Management (Brown, n.d.) These restrictions extend to both the hardware and the software. DRM can limit the devices that you are able to employ in accessing an application or content. It can restrict you to using the proprietor's website and purchasing the proprietor's materials under strict licensing conditions, determining how, when and where you can use the application or content, and with what devices. It is considered to be a necessary evil by proprietors to protect their content from pirates and viruses. DRM can (and has) been used to prevent lawful licensees from accessing their own purchased content. The DRM used in e-books and audiobooks blocks legitimate users from porting their content to other devices. In many cases, DRM has been used to delete legally purchased products from legitimate devices. Amazon, at one point, entered customers' computers and deleted their version of George Orwell's book *1984* (Fried, 2009). The Sony RootKit scandal was one example of a company deliberately using its DRM to surreptitiously insert a virus into licensees' computers without their knowledge or permission, causing significant disruption (Marson, 2005). Even so, DRM continues to prevent market competitors from participating and effectively stifles much innovation. Because of this, DRM can be seen as a barrier to mLearning.

Mobile learning demands flexibility and cannot live with proprietary restrictions that limit the capabilities of digital media. Digital books are no longer "books." In fact, Kroszer (2008), in commenting on the high price of e-books, points out that printed books now "offer a higher degree of flexibility, portability, and readability" than proprietary e-books. Mobile learning is also based on trust among the participating students and instructors. As they share resources, the participants must have confidence that their personal information is not used for purposes other than those of learning and sharing with other students and the teacher. Companies using DRM have a history of open-ended and indiscriminate collection of private information for unauthorised purposes, using DRM to disclose personal information for inappropriate purposes (Canadian Internet Policy and Public Interest Clinic, 2007). In many, if not most jurisdictions, companies have the right to invade your computers and networks without notice and without your permission, and to disable software for any real or imagined licence infraction.

Licensing

These proprietary licences (that users must accept in order to access the content or applications) are also a major impediment to mLearning. Never mind that some users inadvertently sold their immortal souls by agreeing to Gamestation's licence in an April Fool's Day prank (Matyszczyk, 2010). Licensing restrictions can add needless complications to downloading the content, sometimes making it so difficult that users simply give up. Fortunately this practice is not endemic.

Format shifting, as has been noted, is made technically difficult, and this is reinforced with restrictive licensing that prohibits the practice. Even if one wants to retain the same format, proprietary content is licensed to only one computer "for use solely on this device" (eBooks.com, n.d.), so learners who switch computers even with the same operating system are often restricted from doing so or, at a minimum, they must contact the owners and request special permissions and/or register with a company.

These licences also include clauses limiting downloads of content to one time on one computer for one user — and it is non-transferable, "for your use only." Because the ubiquitous environment, as well as online classes (and classrooms), is considered public places under copyright law, you cannot distribute or broadcast such licensed content among students or even lend a device to them. Licences prohibit not only copying and printing, but also modifying, removing, deleting and augmenting (improving) or "in any way exploiting any of the eBook's content." This stipulation, along with the "sole device" stipulation, effectively negates any attempts at mLearning using such software, even if institutions are prepared to pay, pay again and keep paying, for the same licences until they expire. And, if institutions don't keep paying, they may no longer be able to access data or records linked to that product. Licences also prohibit the transfer of content to other students when teachers wish to use mobile devices with a different group of students in later semesters.

Moreover, software licensing exempts software publishers from *all* liability under consumer protection law. There is no "product" to purchase. Not only does the "purchaser" have no rights, but no requirements are placed on the publisher nor is there any requirement that a programme even work. And the publisher has no liability when it turns off the content or software for whatever reason, legitimate or otherwise. A publisher can also change these and other clauses of the contract at any time. In fact, whenever software is upgraded, the contract can be changed and often is, but never for the benefit of the user (Brown, n.d.).

For those educators who wish to avail themselves of their fair dealing (or fair use) rights, these licences effectively negate them along with the right of first sale that normally allows buyers to resell their purchases (EBIA, 2010). The licence represents a contract agreed to by the licensees to not avail themselves of their fair dealing rights or first sale rights. Contract law trumps fair dealing (Horava, 2009):

> "If a library and a publisher agree in a contract that fair dealing will not apply to activities that are specified in the contract, then the contract's provisions prevail regardless of what the Copyright Act provides."

Contracts can even be used to extend the copyright extension from 70 years after an author's death to an eternity (Brown, n.d.). One U.S. Congressperson noted a preference for copyright as lasting "forever less a day" (U.S. Congress, 1998).

Geographical Restrictions

The predicament of an iPad owner in Luxembourg puts the matter of geographical restrictions in a clear light. Even though he would like to legally purchase content, he cannot because it is not available in his country. He can find material on pirate sites, but he wants to buy legally and cannot. Another commentator talks about

user "anger," noting that geographical restrictions using DRM are "the most pressing issue" (Americaneditor, 2010). Google's "Geographical Constraint" error message, along with YouTube's "This video is not available in your country," are notorious examples of this, when users get an error message, when they attempt to download books or videos that are not licensed in their country. For instructors, of course, a legal purchase is mandatory, so in many countries they are effectively excluded from using vast amounts of relevant content (Wolf, 2011). For borderless online courses from institutions that deliver lessons to many different countries, the restrictions effectively prevent them from using this content. The copyright owners are encouraging piracy through these geographical controls that prohibit legitimate uses.

Conclusion

The copyright controllers have declared war on technology, using lawsuits, legislatures and clever public relations to restrict the ability to sell and use new technologies. Even "homeland security" is trumped by copyright protections, and the $40 billion entertainment industry is imposing its views on the $500 billion technology industry (Gary Shapiro, cited in Borland, 2002).

Copyright controllers are trying to entrench their monopoly. They want to control "in infinite detail all use and duplication of material, monitor that use, and possibly charge for it on a transactional basis if they don't block it out of hand" (Lynch, 2001). The copyright controllers have waged a continuous war, aiming to extend their rights at the expense of education and the general public. Barlow (1996, p. 15) warned, "The greatest constraint on your future liberties may come not from government but from corporate legal departments labouring to protect by force what can no longer be protected by practical efficiency or general social consent."

So, rather than fighting head-on these rich and powerful interests, educators can bypass them by using OER. Publicly financed content creations should remain open to all and rendered accessible to the public over the Internet. Rather than remain trapped behind the overly restrictive proprietary environments that publishers are creating, educators can make use of OER to localise and mix and match the materials on whichever device, application or operating system they choose, wherever they live. As mobile devices evolve, the content needs to be open so that it can be freely used without the restrictions imposed on proprietary content.

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