The Challenge of Open Education

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Digital culture and the remix culture it has generated have changed the way in which knowledge and learning are constructed. The last decade since the Massachusetts Institute of Technology (MIT) launched the Open Courseware initiative (OCW) in 2002 has seen a significant increase in the number of initiatives related to Open Educational Resources (OER) and open education in general. New institutions, with different objectives and business models, are emerging rapidly outside traditional universities: start-ups that offer free Massive Open Online Courses (MOOC), consortia of universities from four continents that share teaching materials and infrastructure, and universities where classes are taught by the students themselves.

This paper seeks to provide a historical overview of developments in the world of open education[1] and a look at the key challenges that it faces.

1 This paper is based on the keynote speech delivered by Eleonora Pantò at the 'Learning through Sharing: Open Resources, Open Practices and Open Communication' event that took

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It considers how technology has altered the way in which information is obtained and shared and the consequences this has for the organization of education, from online learning to the flipped classroom. It also shows how roles and the balance of power between producers and consumers of content have become blurred leading to new possibilities for learning in different ways such as MOOCs, from peers and networks, etc. The new learning opportunities on offer can reach new groups of learners, a challenge that universities cannot ignore.

1 Introduction

The way in which we access knowledge has been completely transformed in the last twenty years. Changes in social relations and radical transformations in the production of goods and services require an innovative approach to the generation and sharing of knowledge (Tapscott & Williams, 2007), a process that is becoming increasingly collaborative. The internet and other forms of digital media enable new ways of communicating through social media, which in turn can promote new ways of learning.

One of the most important challenges in our knowledge-based society relates to education, understood as formal, informal and non-formal, and takes place inside and outside educational institutions. Universities, the institutions that have been in charge of generating and managing knowledge for the last five centuries, have not initiated nor do they control this change. Nowadays anybody, whether a layperson or a scientist, who needs to find out more about a concept or is curious about an event, will often turn first to search engines or Wikipedia, and only use a library maybe as a second choice. If the user is looking to acquire a skill, the answer will most likely be in a video available on YouTube (Burgess & Green, 2009) where millions of videos on the most diverse subjects are freely accessible at any time. The relationship between online video and education is at the basis of this learning revolution, a theme to which we will return later.

Having free access to a wealth of information and content online is now expected: being digitally literate today means being able to use appropriate tools to find useful, high quality information in an efficient manner, as "Web Kids" do (Czerski, 2012). The opportunities to learn are so numerous that one device at a time is not enough, users want to be always online and hyperconnected. In a recent study carried out at the University of Bristol, UK (Jago *et al.*, 2011), children between the ages of 10 and 11 were interviewed to find out how much time they spent in front of a screen. The survey found that children prefer to use multiple devices simultaneously, for example, use the iPad while watching TV. Three reasons for this behaviour were identified: to wait while the computer

place at the University of Bologna, 29-30 March 2012.

loads a program, to avoid content that is not interesting or commercial breaks, and to send messages or chat. The TV is treated as background entertainment, while game consoles and smart phones are given priority. The results of this apparent multitasking (Chabris & Simons, 2010) appear to be the inability to focus and to sustain attention for extended periods of time.

2 Networked media and 'prosumers'

This 'digital revolution' has enabled many people to contribute to the production of new or remixed digital content, changing their status from mere consumer to prosumer, a combination of producer and consumer (Ritzer & Jurgenson, 2010). From the end of the 90s a widespread copy and remix culture has emerged, a theme already addressed in 1939 by Borges in *Pierre Menard, Author of The Quixote*, a novel in which the main character, a translator, reproduces the novel Don Quixote word for word to better understand its meaning, thus touching on the issues of authorship, appropriation and interpretation.

Today we are immersed in a copy-and-paste culture with technologies that become cheaper and easier to use and give everyone the chance to remix and edit the work of others (see YouTube for some of the best and worse examples). Digital convergence has eliminated the boundaries between different types of media, and created the conditions under which the same digital content can be distributed, shared, and consumed through different networks. The so-called 'network media' reside on the web, are typically decentralized and require active involvement by the community of users and producers.

3 An enabling factor: Creative Commons Licenses

Lawrence Lessig is credited with the original idea for Creative Commons licenses, which modify the concept of 'all rights reserved' to 'some rights reserved'. Adopting a Creative Commons license, creators can define how their works can be used. Creative Commons licenses allow for combinations of four conditions: Attribution (BY), which requires that the author is always acknowledged; Share Alike (SA), which indicates that derivative works should be shared under the same type of license; Non Commercial (NC), which indicates that the work should not be used for commercial purposes; and No Derivatives (ND) which indicates the author's desire to prevent changes being made to the work. The various combinations of these conditions become six articulations of copyright law.

Creative Commons licenses are becoming increasingly popular and there

are many opportunities to make one's work available under one of these licenses, thus facilitating its dissemination. Still, many authors, while using these licenses, are choosing options which limit the reusability of their content, such as licenses that do not allow derivative works or the clause Non Commercial, which severely restricts the distribution of materials (for example, a video or a song cannot be broadcasted by commercial television channels).

4 Definitions and history of OER

The open education movement drew inspiration from three main factors: the open source software movement, the introduction of open licenses and the idea that teaching materials can be broken down into self-contained units of instruction, the so-called learning objects (Wiley, 2000). The learning object concept was instrumental in the early part of the history of OER, because it embodied the idea of teaching materials designed to be reused and combined in various educational contexts: standardisation was therefore seen as necessary so that it would be possible to retrieve learning objects from multiple repositories and make them interoperable with different educational platforms.

For teachers interested in sharing teaching materials the Merlot project, initiated in 1996 at California State University, was the first freely available website where content could be hosted, searched, commented on and evaluated. In 1998 David Wyley, applying to the production of learning content the same logic of open source software, introduced the concept of Open Content. The early 2000s saw the start of other important initiatives to provide space for the free sharing of educational content: Connexions by Rice University, eduCommons and OpenCourseWare Consortium, born in 2001, which includes over 100 academic institutions around the world. It was in 2001 that the OER movement became known around the world after MIT announced that it would publish online the learning materials of all its courses. This decision meant primarily a great opportunity for MIT to increase its visibility.

At UNESCO's 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries the term OER was officially adopted and the following definition agreed upon: "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." (UNESCO, 2002). UNESCO launched in 2005 a community of experts and researchers on the topic of OER called Virtual University and various aspects related to the deployment of OER are debated in this forum: on the topic of "Global Balance for OER," for example, the risks of "cultural imperialism"

and the resulting need to translate and localize learning content is addressed. In the same year, the Centre for Educational Research and Innovation (CERI) of the Organisation for Economic Co-operation and Development (OECD) started its own research on the topic of OER leading to the publication in 2007 of the 'Giving knowledge for free' report.

Between 2005 and 2008, the OER movement continued to grow, with an increasing number of organizations engaging in projects to make teaching materials freely available: notable among these were the launch in 2006 of WikiEducator and in 2008 of the Wikiversity. The debate around OER created the foundations for the 2008 Cape Town declaration which introduced the concept of "open education" as a new approach to evaluation for accreditation and collaborative learning, and governments were urged to fund initiatives that make learning materials freely available online.

With the spread of Creative Commons licenses, the debate about what it means to actually "open" educational materials was put firmly on the agenda in a 2009 post by Wiley in which he proposed the 4 Rs Framework (Wiley, 2009): for learning materials to be considered open they must be licensed to allow Reuse, Redistribution, Revision and Remix.

The year 2011 was one of great turmoil for OER, with the proliferation of projects, information campaigns and the rise of institutions that embrace the philosophy of open education: Open Courseware Consortium, with funding from the Hewlett Foundation, has released to date more than 4000 courses. The definition of OER is revisited and, although not sanctioned by any organization, Stephen Downes' definition (Downes, 2011) is one of the most widely used and accepted: "Open educational resources are materials used to support education that may be freely accessed, reused, modified and shared by anyone." where 'free' is taken in the broadest sense of the word, including without payment[2].

Ten years after the first conference, in which the term OER was defined, UNESCO published the 2012 Paris OER Declaration comprising ten points and encouraging institutions to create platforms for the dissemination of OER.

4.1 Other initiatives in Europe and beyond

In Europe many OER initiatives have come from the UK and Spain, although there is also considerable OER activity in the Netherlands and Scandinavian countries, and one significant effort more recently in Italy.

[2] for the 'gratis' vs 'libre' debate, see this early post by Peter Suber or this more recent post by Peter Reed.

In the UK, the Joint Information Systems Committee (JISC) and the Higher Education Academy (HEA) have funded many OER projects to make learning resources freely available and develop the technology to support their creation, sharing, location and reuse. The Open University has been at the forefront in terms of release of open content (Openlearn, TESSA) and research and promotion of OER (OLNet, SCORE, OER Research Hub) while in Ireland the NDLR has taken a small-scale approach, activating communities around the creation of disciplinary resources.

In the Spanish-speaking world, OER has benefitted enormously from funding that promotes cooperation across the Atlantic, as is the case of Universia. Other important Latin-American initiatives are the OER portal Temoa maintained by the Technological Institute of Monterrey, Mexico, and strong advocacy efforts in Brasil to achieve advancements at the policy level. In Italy, the Federica project at the University of Naples Federico II is the only open access web-learning platform to release open courseware within the framework of the Italian university system.

5 Open Education and Open Access

To overcome the high cost of subscriptions to scientific journals and the growing number of these publications on this type, which restrict the dissemination of research results, Open Access (OA) promotes free access to scientific publications, whether these are articles, monographs or book chapters. OA and OER share the principles of openness and sharing, although one of the main differences is that usually the documents that OA refers to cannot be edited. Equally, the concept of using metadata to facilitate content harvesting has not become widespread in the world of OER. The Directory of Open Access Journals (DOAJ), maintained by Lund University, gathers information on thousands of openly accessible online journals. In Italy, the Conference of Italian University Rectors is working with archivists and librarians to produce guidelines for universities to implement Open Access policies.

Besides scientific publications, textbook prices are also becoming unaffordable, excluding some students from accessing learning and otherwise making it difficult to update obsolete texts, and this has prompted some universities to start their own publishing activities. Digital technology offers new opportunities for publishers, enabling new business and use models for the publication of textbooks. Until November 2012, Flatworld Knowledge made available digital textbooks for free, a service that it discontinued amidst claims that it was an unsustainable business model. However, there are still other providers of free

textbooks like Open Stax at Rice University and Bookbon.

In the area of science research, Open Science or Science 2.0 aims to make data and information accessible to all levels of the research community, including amateur and professional researchers. It supports practices such as open publication of research, advocacy for open access, encouraging researchers to adopt an "open notebook science" approach, and more generally everything that promotes the dissemination of scientific knowledge. The European Commission has funded a project "OpenAIRE - Open Access Infrastructure for Research in Europe" which has the specific goal of providing open access to all publications and results of the EU Framework Programme 7 and the Horizon 2020 initiative. As a result of all these initiatives, growing public opinion is increasingly putting pressure on mainstream publishers to move towards open access and reduce costs for individuals and institutions, particularly those funded from the public purse[3].

6 New approaches to education: from do-it-yourself to the flipped classroom

During a public lecture at the 2012 Open Education Week, the former president of OCW declared that the basic functions of universities - teaching, evaluating and accrediting as well as providing a dedicated space for educational interactions - are changing for the benefit of students and teachers.

Most universities are aware of the challenge posed by the online revolution. Today, online education is worth $60 billion a year[4] and it has been estimated that by 2019 more than 50% of courses will be provided online (Christensen *et al.*, 2008), many of them for free. Online education allows for greater flexibility and lower costs, but these are not the only reasons that drive this disruptive innovation. For example, DIY - University takes a self-guided learning approach to encourage active participation and student empowerment and is also a reaction to expensive institutional educational platforms. E-learning platforms incorporate a pedagogical model so the battle that many teachers are leading through blogging instead of proprietary learning management systems is related to pedagogical as well as ideological choices. When Philips Schmidt, founder of the P2P University, was faced with the impossible task of promoting OER at his university, he decided to start with the students. The P2P University is based on a community of volunteers: the courses are not recognized by any government, so the participation certificates it issues have no value. These

[3] See 'Open Access: 'we no longer need expensive publishing networks'', 8 November 2012

[4] See 'Online Education Represents a $60 Billion Industry Actually Helped by the Recession', press release, 19 August 2011

are examples that demonstrate how the need for a new model of university is becoming apparent, one which envisages new roles for students and teachers in the future, even with regard to certification and educational content.

Athabasca University has recently published a study on OER and new accreditation models (Mckintosh *et al.*, 2011). It identified five significant trends in online education: the existence of an unmet global demand for post-secondary education - the number of university students is expected to double within a decade; the growing availability of online learning materials in open access; the rise in the number of institutions providing access to free lessons; the possibility of significant changes in the cost structure for the design, development and delivery of learning asynchronously; and the possibility of redefining procedures for the assessment and accreditation of open learning.

It takes a leap of faith for teachers to understand that sharing their educational content benefits the entire education system: appropriate training on legal and technical-operational issues is still necessary. Institutions should encourage and reward those who share their own materials and those who reuse other people's content, and also support publishers that produce quality learning content and promote widespread sharing and dissemination. Around 20,000 courses are now available openly together with an estimated 500 million OER: the need for tools that enable us to discover what we are looking for is obvious and pressing.

In his famous book *The Cathedral and the Bazaar* (Raymond, 1999) Raymond argues that the open source movement has undermined the model of software development, which was based on a hierarchy in which a limited number of experts worked in isolation (the cathedral), and instead proposed an open model, where the software is freely available, users interact with the developers, and these have the ability to modify and integrate the software without centralized coordination (the bazaar). Even within the open education model two trends are emerging which are in some way comparable: a model that predicts that a limited number of academics provide their own teaching materials (usually as part of an initiative by one or a group of universities) and a model in which volunteers can share teaching materials that can then be reassembled in a course. One of the most famous examples of this second trend is the Khan Academy, a rapidly growing initiative in which people can share their video lessons or contribute to building exercises. The Khan approach is based on the flipped classroom model, in which the theory (and any necessary repetitions) is delivered through recorded video, watched by students at home, while the tasks are done in class with the help of other peers and instructors.

The latest development around new modes of delivery is the Massive Online Open Course or MOOC, famously pioneered by George Siemens and Stephen Downes in 2007. MOOCs range from very structured, content-led courses like the Udacity model, very similar to traditional university offerings except in that they are free and open to anybody who wants to take them, to the connectivist MOOC, one that is based on a wide range of aggregated content offered through a variety of channels, and which focuses on learners creating networks and constructing meaning through interaction with others. MOOCs are emblematic of a new relationship between teacher and learner, and the fact that they are being offered by many universities around the world indicates that they are being explored as a serious alternative for the advancement of open education.

7 Assessment, accreditation and sustainability: other possible models

One of the more interesting aspects of this educational revolution is the possibility of offering open, free and large-scale assessment and accreditation. Certification is the prime motivation for many tertiary education learners, as 'learning for the sake of learning is a luxury that few can afford'[5].

Automatic evaluation methods such as multiple choice tests or quizzes are in great demand, and the Khan Academy has an open call for developers who want to collaborate in the creation of systems of evaluation that are suitable for large numbers of students. Wiley (2011) suggests that Open Accreditation Resources (OAR) should be available in large numbers so that learners could always find a suitable OAR through which to evidence the learning they had achieved through studying with OER.

Several private and public institutions, such as the Saylor Foundation, are already providing some certification on completion of courses made up of OER. Courses are not necessarily offered by Saylor, but can be from anywhere. Students put together a personal portfolio and upon completion receive some certification, although these badges or certificates have no academic value. Another initiative along these lines is EdX from MIT and Harvard University, which aims to develop an open-source platform to deliver interactive online courses. Again, although students who complete a course can earn a certificate of completion, this will not be issued by MIT or Harvard.

The OER University, led from Australia, is an open network including post-

[5] See 'Certification / Accreditation' at http://sharing-nicely.net/p2pu/

secondary institutions, the private sector, non-profits, government and international agencies, a so-called "OER ecosystem" which aims to serve both formal and informal education, and is based on a coopetition[6] model where they retain autonomy over accreditation whilst sharing and cooperating in the creation of educational content.

Finally, the Open Badge Initiative from Mozilla is an open framework to support the conferring of badges to show competencies achieved. Everyone can create a "badge backpack"; badges are represented with a small icon and are a collection of metadata describing and identifying the issuer, the issue data, the expiration, etc. The granularity of this system seems to have great potential, but its success will be defined by the rate of adoption by large organizations.

In terms of sustainability, public and private funding has played a significant role in the promotion of OER. From 2001 to 2006 the William and Flora Hewlett Foundation provided over $45 million to investigate, develop, and advance Open Educational Resources (OER). The Khan Academy is supported by the Bill & Melinda Gates Foundation and the African Virtual University gets considerable backing from the African Development Bank. Udacity, a start-up by Sebastian Thrun, a professor at Stanford University whose first free online course on Artificial Intelligence attracted over 160,000 registrations, has recently teamed up with Pearson VUE to offer examination and accreditation opportunities to its students. And Coursera, backed with $16 million from two of Silicon Valley's largest venture capital firms, uses content produced by a consortium of universities but asks students for a small fee to cover the cost of certification. After the first decade of OER, the business model that seems to be emerging is one where the course is for free but certification is for fee.

Conclusion

Online deliver of content and the possibilities afforded by the Web 2.0 are revolutionizing the way in which people learn, and promoting a grassroots movement towards new collaborative, peer-led and low cost forms of learning that undermine the traditional model of higher education. The current business model is also disrupted, as new forms of assessment and accreditation are being developed and offered for free or at a small cost in comparison with traditional options.

Universities are only just waking up to the challenge and realizing the pres-

[6] A model where companies work together for selected parts of their business where they do not believe they have competitive advantage, and so agree to collaborate in areas where they can share common costs.

sing need to provide innovative approaches to content delivery and certification if they are to retain their role as main providers of higher education and accreditation. The coopetition model among universities could be a big opportunity to optimize costs and maximize effectiveness.

In the future, cathedrals and bazaars of education will evolve, both for content production and accreditation: open education needs to play a big role in this process if opportunities to learn are to be made available to the many.

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