Web and education, a successful open entanglement

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Introduction

E-learning, understood as the intensive use of Information and Communication Technologies in (mainly but not only) distance education, has radically changed the meaning of the latter. E-learning is an overused term which has been applied to any use of technology in education. Today, the most widely accepted meaning of e-learning coincides with the fourth generation described by Taylor (1999), where there is an asynchronous process that allows students and teachers to interact in an educational process expressly designed in accordance with these principles. We prefer to speak of Internet-Based Learning or, better still, Web-Based Learning, for example, to explain the fact that distance education is carried out using the Internet, with the appearance of the virtual learning environment concept, a web space where the teaching and learning process is generated and supported (Sangrà, 2002). This entails overcoming the barriers of space and time of brick and mortar education (although we prefer the term face-to-face) or of classical distance education using broadcasting and adopting a completely asynchronous model that allows access to education by many more users, at any level (including secondary education, but primarily higher education and lifelong learning).

E-learning is about content, services and users. Any e-learning platform is a virtual space where these three elements coincide, not in time or in space, but virtually. E-learning provides learners with a ideal scenario, expressed as "learn anytime, anywhere", which is just another version of "what I need, when I need it". At the same time, e-learning is about technological, methodological and organizational issues (Hermans et al., 2004), so modeling any learning scenario should take into account all these three dimensions. Adopting any change in one of the three dimensions needs also to consider the impact on the other two or it will be condemned. In the case of distance education, the adoption of Internet as the underlying infrastructure for supporting the teaching and learning process completely changes (or needs to change) its meaning, hence the learning process in itself and its organization need also to be rethought under this new perspective.

Distance education has been historically the only option for those learners out of the traditional educational system, and it has gained a reputation of a secondary lower quality option. With the appearance of the World Wide Web, distance education has been able to overcome the typical distance learner barrier, namely isolation, and it has become a true competitor for face-to-face educational institutions. Distance education is no longer an individual process but a social one, through the use of virtual learning environments which promote a higher degree of interaction between learners, teachers, resources and the environment in itself. In fact, most classical universities are also adopting the use of virtual learning environments as part of their educational offer, showing the increasing attention that e-learning has deserved in recent years (Curran, 2001). Universities such as the Open University of the United Kingdom (OUUK), the Open Universiteit Nederland (OUNL) or the Universidad Nacional de Educación a Distancia in Spain (UNED) are trying to massively adopt the use of virtual learning environments, in order to reduce the gap with other pure virtual universities such as the Universitat Oberta de Catalunya (UOC), for example.

But traditional universities are not adopting such technologies at the same pace, mainly because of the inertia of their previous organizational and methodological structures. A simple search in Google for "online universities" returns more than one million hits. Nevertheless, a more detailed search reveals that those one million hits correspond to only five hundred relevant links, most of them are just listings, and only a few of the rest correspond to large universities such as those aforementioned. Therefore, although most large universities incorporate these new technologies in their teaching

process, in some cases they are seen as content management systems rather than true virtual learning environments. The main reason is, probably, a combination of human factors (teachers reluctant to perform "additional" activities at no cost) and organizational (institutions provide the technology with limited technical support or formation). Adaptation to this new scenario is a question of size, and it is worth to recall that large dinosaurs got extinct. In fact, small private universities are working in a large but narrowly focused niche market trying to draw the attention of potential learners (or maybe clients), specially adult ones. This democratization (but also trivialization) has been caused by the possibilities raised by the use of Internet in educational scenarios. Any educational institution, regardless its size, can reach now a large number of online students. Nevertheless, organizational issues become critical in order to provide learners with the appropriate support. As we will describe, technology leads this change but is not the only key issue.

Technological driven change

These new possibilities in education are real because of the incredible changes in the underlying technology. No other technology has evolved so fast in such a short period of time (the Personal Computer is not 30 years old yet). From portable computers to netbooks; from 300/1200 baud modems to DSL to 3G mobile devices; from RAM and disk capacity measured in MB to GB or even TB; from processors clocking in MHz to GHz; from single processor CPUs to multiple cores to cloud computing; from 16 colors to 16M; from VGA to HD; etc., the technological scenario has changed radically. In fact, once a new technology has been widely adopted it is almost obsolete and it will be probably replaced by its new version, in a continuous (and somehow crazy) race. Computers are faster, cheaper and, with the apparition of new mobile devices with wireless capabilities, truly personal and ubiquitous.

Nevertheless, all these new elements will be nothing without the web, the supporting infrastructure for creating and sharing knowledge (in a wide sense) collaboratively. The web has been one of the most important technological artifacts with a large impact on society and, at the same time, the way society uses the web constantly forces it to evolve (Castells, 2000). It is fair to think that the web has been the first technological artifact that has really changed society in a strong sense. It has modified the way we work, the way we buy, the way we communicate, the way we interact with each other and, last but not least, the way we learn.

Initially, the web was a virtual space for providing access to static content, following a limited producer-consumer model, while nowadays it is possible to create and share content collaboratively. At the same time, not only content but also web services are also available in form of APIs which can be used and aggregated, allowing users to create virtual spaces from scratch according to their preferences. Examples of this are Netvibes and PageFlakes, among others. This evolution is reshaping the concept of virtual learning environment, as learners are at the same time users of multiple social networks such as myspace or Facebook or have accounts in user generated content repositories such as Flickr or Youtube, among others. At the same time, new devices are changing the way learners access to content, not only as consumers but also as editors or even authors. "Learning anytime, anywhere" is now (or should be, at least) easier than it used to be.

In fact, it is possible to foresee that even virtual learning scenarios will become obsolete, as learners will not have the need to go to specific places for having a true learning experience. On the contrary, as devices (netbooks / smartphones) will become more and more powerful, learners will carry with them their own personal learning environment, selecting only those contents and services of their interest. This will enable one of the main goals of the new European Higher Education Area (EHEA) paradigm[1] (Ade et al., 1999), the adoption of learner centered models. In fact, the fifth generation of e-learning systems, as predicted by Taylor (1999), will be based on transferring control to the learner, which will be the responsible for creating and executing his or her own learning process, completely centered on the learner. Once again, we already have the necessary technology for providing learners with such ideal scenario, but we need to rethink both methodological (i.e. assessment) and organizational issues

1 Also known as the Bologna process.

(i.e. academic semesters).

Learner centered models

Nowadays learning is more than just providing contents, as these have become basic infrastructure for supporting the learning process (Wiley, 2007). Because of Internet, we live in a period of content abundance, so content cannot be the only asset in the learning process. Learning in virtual environments is more than just accessing PDF or PPT files with content, the whole learning process must be transformed, not just translated, as stated by Thomas et al. (1998). Content is still necessary as part of the learning process but by no means can be used as the main force to shape it.

Historically, universities have been the educational institutions in charge of creating, transmitting and certificating knowledge. But this scenario has changed, as knowledge is everywhere, just a few clicks away from where the learner is. Nowadays it is possible to find open educational resources from top universities in the world, as the most prestigious universities are making their most precious resources open and available to all users through experiences such as OpenCourseWare[2] or other similar open repositories. This has been possible because of a combination of bottom-up efforts (teachers posting their learning resources using their own means) and top-down (institutional positioning). Therefore, one of the pillars of universities, knowledge creation, is almost already lost, in the sense that there is not a unique content provider. Learners can easily find learning resources better than those provided by their teachers. The other pillar, certification, will be in peril if learners lose their confidence in the traditional educational system, which is too complex and fragmented when compared to the global scenario offered by the web. What if tomorrow Google from its predominating position announces the Google University under the lemma "learn what you really want to learn when you really want to do it"? Or maybe "learning is out there"?

New learning theories such as connectivism (Siemens, 2005) establish that learning is produced during the process of establishing new relationships between contents and concepts, rather than in the already acquired knowledge. Connectivism is a direct consequence of the use of Internet for teaching and learning, specially the later, as it gathers several significant trends in learning, such as lifelong learning, mixing formal, non-formal and informal learning, transference of competences among contexts (personal, academic and professional) and, last but not least, the fact that knowing how and knowing what become less important than knowing where and establishing the appropriate relationships which can be shared with other learners. In fact, connectivism is aligned with some of the general competences promoted by the new EHEA supposed to be part of any professional profile in the information society, such as evaluating the diversity of several opinions, connecting information sources, nurturing and maintaining such connections, ability to see new connections between fields, ideas and concepts, and decision making, among others.

Among many other goals related to quality and homogenization, the guidelines set by the new EHEA promote a competence-based student-centered learning that is more homogeneous among universities, which allows students to study and work in any country (in terms of the European sphere). This leads to greater competition between universities as, through quality distance education, the students will not be tied to an option that limits them due to geographical reasons, for example. Distance universities not only aim at a small number of adult students, but at their whole lifecycle, from when they enter the university to continuous professional development, which is known as lifelong learning. This is one of the main missions of open universities, providing citizens with quality learning along their lives. In fact, the EHEA promotes a continuous transition from the academic context (universities) and the professional one. But lifelong learners have also a personal context, so the barriers between formal, non-formal and informal learning will eventually disappear as the learning process is driven by the learner according to his or her necessities, particularities and preferences.

2 http://www.ocwconsortium.org/

It is not clear that the EHEA paradigm will promote mobility among learners, but the use of virtual learning scenarios might change their habits, as the concept of mobility changes completely, shifting from physical mobility to virtual. If the European Transfer Credit Transfer System is effective, learners should be able to choose their courses among all the European universities, as long as they provide online access to them and other organizational issues are addressed. Although language is still a barrier (at an European level), more institutional educations will be tempted to localize and adapt content generated by other institutions in order to provide their learners with high quality learning resources, instead of trying to reinvent the wheel once again. This will definitely break the knowledge pillar and it could be the first giant step towards a true global learning scenario based on open educational resources.

Open educational resources

As stated above, the new EHEA paradigm is pushing universities towards providing learners with more control on their own learning process, thus breaking the classical producer-consumer model where a teacher produces and transmits knowledge unidirectionally to the students which consume it. Education has always been teachers creating knowledge, publishing it and then transmitting it to learners. This is a model driven by content, i.e. the knowledge to be learned. On the contrary, the new EHEA paradigm focuses on the concept of competence, which is acquired and developed through activities which engage learners into the learning process. These activities involve the use and/or the creation of learning resources. Therefore, such learning resources become the last element in the educational chain and, in fact, they can be replaced depending on the proposed activity. In fact, learners are encouraged to develop informational competences by searching for their own contents and being able to evaluate them and select those more appropriated for the activity they are performing. Therefore, a huge repository of high quality contents is still necessary. This repository will be used for creating learning itineraries (that is, sequences of activities) which will guide learners through their personalized learning process. By personalized we mean adapted to learner's particularities: preferences, learning style, accessibility issues, access device and so on, following the directions of the new EHEA, that is, a learner centered model.

But, on the other hand, the web has also provided its users with new opportunities to overcome the producer-consumer model barriers. With the apparition of web 2.0 technologies, all users are capable to create, publish and share their own contents. This new model, named create-mix-share-reuse (Geser, 2007), has enabled a new movement which has a great impact in the future of education, namely the Open Educational Resources movement. The web has become a huge global repository for finding learning resources, but unfortunately most of them lack of the basic characteristics which make them to be truly "open": use of technological standards, licensing, metadata, etc. All these issues are absolutely necessary to ensure and promote content reusability, one of the main goals of any repository. Nevertheless, in the last years several projects such as OLCOS[3] and OER: the way forward[4], promoted by the UNESCO, have shown the possibilities of the OER movement, which is yet to explode.

Conclusions

All these changes can be analyzed from the perspective proposed by what is named "Web Science", a multidisciplinary field which addresses all the technological, organizational and social aspects of the web (Berners-Lee et al, 2006). Today we are at the point where the necessary conditions have arisen to take a step forward in the concept of e-learning, as described by Web Science. A combination of key factors at micro and macro levels have come together to make what was known as distance education evolve (Minguillón, 2008). E-learning has replaced the concept of distance education through a technology, the web, and has also changed the perception that users have of it, obliging every educational institution to adopt it in order not to be left behind in the race towards quality lifelong education. E-learning as the evolution of distance education is (or should be), therefore, a clear

3 http://www.olcos.org/

4 http://oerwiki.iiep-unesco.org/index.php?title=OER:_the_way_forward

example of a Web Science case study, in which all of these changing aspects occur.

But web science is not only able to explain why distance education has changed since the adoption of the web as the global learning scenario, it might be also useful for identifying potential opportunities and perils of web-based education. The former are perfectly described in two visionary papers by Downes (2005, 2008). Among the later, the web has created what is known as "the digital divide", directly related with the concept of open access in a wide sense.

On the other hand, as learning becomes an activity carried out outside the walls of the traditional educational institutions, it will be more necessary to ensure the quality of the learning process by changing the certification process, which will need to be more based on establishing a network of trustees combined with a portfolio (a particular view of the personal learning environment) used for keeping track of all the learning activities and evidences performed during the acquisition and development of the desired competences, personal, professional or academic.

Current and future research in this subject should include the identification of the key factors in successful cases of web-based learning scenarios. According to the spirit of web science, we need to understand what web-based learning is, to engineer its future and to ensure its social benefit. Access to education is one of the basic human rights and the web can be part of a future where all individuals have equal opportunities for developing themselves as complete citizens of the information society.

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