PROM-OPEN: PROMOTING OPEN SCIENCE IN AN ON-LINE E-LEARNING ENVIRONMENT

Alexandre López-Borrull

Estudis Informació I Comunicació, Universitat Oberta de Catalunya, Barcelona (SPAIN)

Abstract

Science has changed due to the arising of the Internet and Information and Communication Technologies. These changes includes the Open movement, regarding all the aspects in methodology and diffusion on Information and Knowledge, like Open Access and Open Science. Considering Education, efforts should be done for taking into account how these new ideas and skills are transferred to Bachelor students. Experiences in the University Oberta de Catalunya, an on-line e-learning environment, are described.

Keywords: Open Access, Open Educational Resources, e-learning, competences, UOC, Open Science.

1 INTRODUCTION

Information and Communication Technologies (ICT) have strongly changed the way we behave in our day-to-day. Concerning Science, it could be said that ICT have been the main driving force for the two main changes that has happened from the beginning of the Internet. On the one hand, Science has been able to introduce Collaboration in a better way in his methodology [1-5]. Thus, all the steps that can be regarded, such as the design, the data gathering and the later processing can be done from a collaborative point of view for creating knowledge in a new and easier process. Science has changed and it could be assumed that it will change in the next few years [6].

On the other hand, the Open Movement has to be understood as a whole. Probably, Open Access is the most known, debated and promoted of the different visions that could be considered of this movement [7-10]. It was the first one, and it has had a great impact in the way scientific knowledge is diffused. It has changed, with both ways gold and green, how scientists publish their results. New journals and publishers, fully Open Access, new possibilities for traditional journals and publishers. But there will be, as we support, many more changes related to Open Science, as it can concern even many other steps of the scientific methodology, including Open Source Software, Open Notebook, Open Data, or Open Peer Review.

So, considering Open Science as a new paradigm, how can Open Science be promoted in a learning stage? In this new paradigm, it could be considered from different approaches: as a Content, related to Open Educational Resources, but also as a methodology, as an attitude or as a skill, being able to be cross-curricular or specific, being more focused in degrees more related with the use of information.

Taking into account these different perspectives, it is worthwhile thinking about the promotion of this new paradigm. Open Science should be incorporated not only in the research stage, but it should be embedded as part of academic careers and degrees. But, are we really training appropriately our students for this new methodology? In our case, it has been taken as a frame of reference the learning model used in our university, the Universitat Oberta de Catalunya (UOC), as it is an online university and considered al the improvements and aspects where Open Science could be introduced. In this sense, some reflections will be presented from a global and learning point of view.

2 APPROACHES TO OPEN SCIENCE

As it has been stated, Open Movement could be considered from a dual view, each one of them including a different approach and, from an educational point of view, implying changes in the way Science is explained. In this first part of the communication, it will be described both as a methodology and as a skill.

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2.1 Open Science as a Methodology

ICT, as it has been said, has changed Science. We are able to solve many new problems and for the first time, being more ambitions in the way research is performed. New questions that could not be tackled in depth, now it is possible to cope with. From Big Science to Open Science [11-13]. Open Science means that each of the steps of the scientific method can be conducted in an open manner. Consider some of these issues. Thus, Data can be gathered using Open Source Software, written down in an Open Notebook, processed and conclusions made. After that, results and papers can be written using Open Bibliographic Managers (like Zootero, for the collection, management, and use of research sources), submit through Open Journal Systems to an Open Access Journal, even using an Open Peer Review process.

Thus, each step involves learning classical scientific methodology but with the use of a series of new tools designed and used to ensure an Open view. Nevertheless, it has to be admitted the difficulty of being consistent in each of these steps. For instance, it may happen that the University could have bought a package of software, resources and tools not belonging or allowing an open view, such as some sources of information or payment bibliographic managers.

It could be also assumed that there is a need to have global indicators and parameters for being able to evaluate how Open is our day-to-day, considering both research and learning. These indicators should become achievement indicators for universities that decide to introduce a global Open Policies in their institution, and not just related to Open Access Policies, which have really been the first ones to be implemented because of the need to push and to implement national and international law and policies.

2.2 Open Science as a Skill

The new European Higher Education Area (EHEA) has allowed universities to consider in a better way and for best their degrees from the skill point of view. Thus, the new paradigm of university courses has taken place with the change of vision, from content to skills, emphasizing on skills we consider that our students should be trained in. So, we have also considered new skills that our students should learn without being linked to any content. Transversal skills allow indeed that teamwork, vision quality, ethics and the ability to improve from the mistakes of our students could be turned into new capabilities for them. Every University could design which of these skills were really added to their learning portfolio.

Taking this into account, it could be discussed if Open Science has be considered as a new skill in all degrees. From our point of view, it is not just a methodology or a tool that students and scientific could use, but even a philosophy that change their way of behave, changing from a competitive way of understanding Science to a new collaborative one [3,6]. Certainly, some scientific disciplines such as physics, seem to be moving more in this direction regarding other disciplines much more competitive. Still, we believe that consideration of the Open Science as a general skill in every degree of a university could help to standardize and generalize this view, since it could make a better use of resources and research results.

3 OPEN SCIENCE IN AN ON-LINE E-LEARNING UNIVERSITY

Considering what have been previously stated in the previous section, Open Science can be learned from different approaches, included in a scientific degree. We state that Universities should have to take it into account and try to implement it in the first term of the first year, for instance.

In this section different initiatives and steps for implementing an Open Vision in a degree will be presented, all of them carried out at the Open University of Catalunya. It is expected that they may allow an increase and implementation the Open Science vision as well as they will provide new skills to students. First of all, it has to be noted, as a way of knowing the Universitat Oberta de Catalunya (UOC), that its mission is to provide people with lifelong learning and education opportunities. The aim is to help individuals meet their learning needs and provide them with full access to knowledge, above and beyond the usual scheduling and location constraints.

For accomplishing the mission that has been noted, learning activity can be considered as the central figure of the educational model. Thus, the students have three main elements with which to complete it: the resources, collaboration and accompaniment (Fig. 1). The Resources includes the content, spaces and tools necessary to carry out the learning activities and their assessment. Collaboration is understood as the set of communicative and participative dynamics that favour the combined building of knowledge among classmates and teachers, through teamwork to solve problems, develop projects and group product creation. And, finally, accompaniment, as the group of actions carried out by teaching staff to monitor students and to give them support in planning their work, in resolving activities, in assessment and in making decisions. At the same time, the student receives personalised treatment from teacher accompaniment.

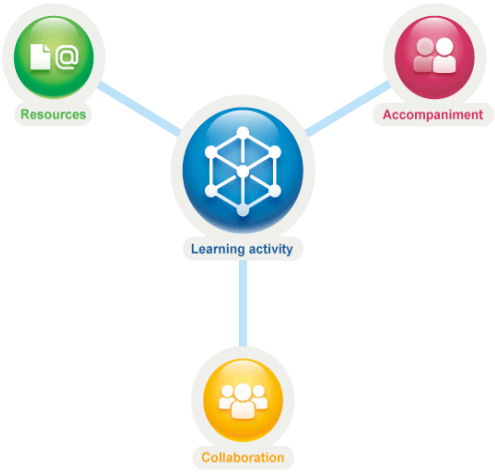

Fig. 1 Educational model at the UOC. Source: http://www.uoc.edu/portal/en/universitat/model-educatiu/elements/index.html

3.1 Resources

As it has been stated, Resources is a critical factor in the educational model of the UOC due to the fact that it is a virtual institution. There are many improvements and changes regarding the contents that should be done for implementing an Open vision. Obviously, the main tool and action is the possibility that contents could be Open Educational Resources, which can be considered as the parallel vision of what Open Access means in Research.

A good definition for them could be found even in the Wikipedia, “"teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. Open educational 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 possibility of offering open content in some subjects by the UOC has effects on not only their own students enrolled in that course, but also allows students from other degrees and other universities to use these contents. In the website of OpenCourseWare at the UOC (Fig. 2) different subjects from different degrees can be found.

As a matter of fact, all Open Educational Resources made for different degrees and different languages allow students from many other institutions and universities to read them, meaning that the educational value of them is broader than the classroom. Thus, it could be considered that there is not just an educational value but even a social value, as it is spread to the whole society.

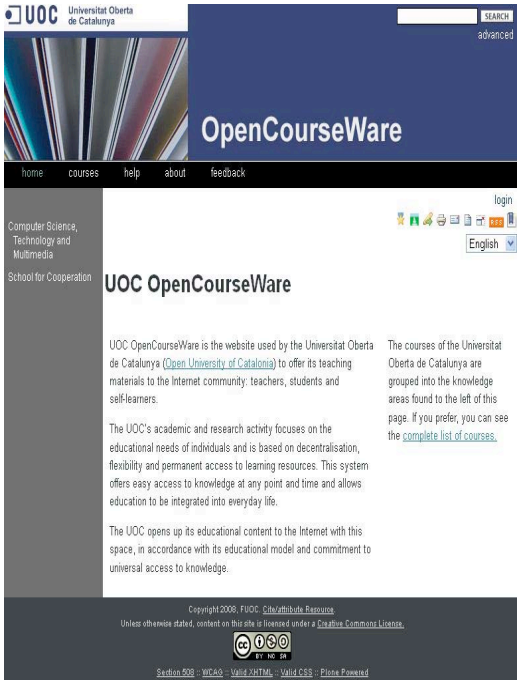

Fig. 2 Screenshot from the UOC OpenCourseWare Website.
Source: http://ocw.uoc.edu/front-page/view?set_language=en

But in addition, and it is shown in Fig.3, there are other ways of providing open content. Thus, the example shows a course of Bachelor in Information and Documentation, "Information Policies," which is not only open but also is in a different format, suitable to be worked in a different way. The wiki format could allow even being edited by students allowing them to add comments or new information sources. In this sense, this new format provides a faster way for updating contents which it could be really important for subjects strongly dependent on day-to-day. This could be what it is happening to “Information Policies”, which is a subject that depends on new laws that catalan ans spanish legislative system, even the European one.

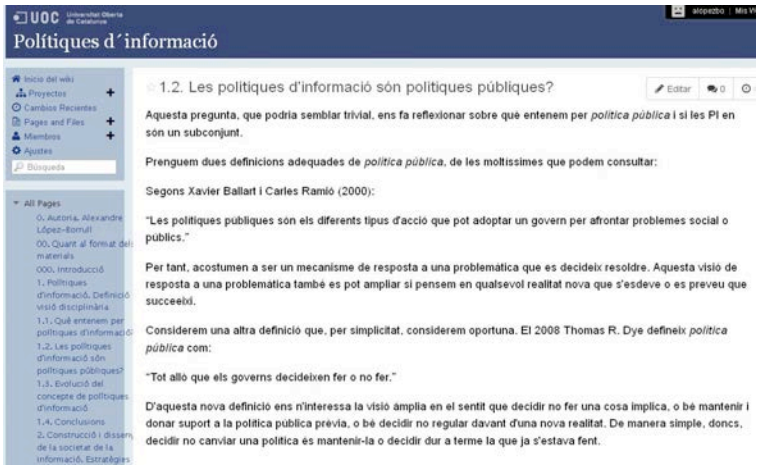

Fig. 3 Teaching Materials from Information Policies, in a wiki format.
Source: http://370096-97919.uoc.wikispaces.net/

Related to contents, in the model of UOC some other resources are important, considering not only the ones created for the subject but also other contents that could be find in the bibliography, which complement and add value and meaning for the students. The Digital Library plays an important role in the UOC allowing many other resources to be included into the digital classroom and, of course, managing their copyrights. As it is known by everyone, this is a real problem for universities, even harder for the virtual ones. Thus, many Open Access resources can be found in classrooms, including

papers, books, chapters, communications and many other kinds of documents and contents suitable for classrooms and subjects.

It should be noted that an option for promoting the Open vision could be the decision of choosing just papers or contents that could be found in an open and free way. Of course, it implies a different filtering that has to be balanced with quality, but nowadays it is possible to find a huge amount of information and knowledge in most of disciplines in an Open Access way.

On the other hand, we think that it is important for students to understand that many resources that they find in their digital libraries are not free, but paid by the institution. In disciplines like Information Science, information sources and databases useful for finding information as well as images, movies, sounds and other formats in Creative Commons should be learned by students in order to fullfill the legal requirements on copyright. This could be considered as supplementary skill in their degrees.

3.2 Software

Clearly, the Software is an important part, mainy as a tool, of the work that a student must be conducted while studying a degree. This can range from the most general and practical vision for the development of any of his works, to the possibility of choosing a really specialized program in any of the disciplines that allows you to perform a specific task program.

Promoting an Open Vision regarding software should be allowed to present the various possibilities offered by each program to the count on an Open option. For instance, in Information Science, it is possible to find good software for performing tasks related to the discipline, and allowing information professionals to manage from a collection (KOHA) to references (Zotero).

In this section, it has to be considered that usually the choice for suitable software from an educational point of view it is not always an individual decision, but usually an institutional one. Thus, it could happen that institution could take the decision of the purchasing of a software instead of choosing the Open Source Software alternative.

3.3 Activities from students

Students may also be considered as content creators. The UOC model is based on a continuous assessment linked to a series of practices in which students make a series of works . To make this work, consultants and teachers can decide, for instance, to use a wiki for a collaborative content creation. Even doing individual work, a student may be able to make available this work to his colleagues in the classroom.

The main example of this kind of work is the Dissertation, the Final Project (Treball Final de Grau in catalan, TFG) that every student must perform for finishing the four-year degree, as the catalan and spanish education system have stablished [14-16]. Considered as well as a course, it presents a number of special features. Thus, it is an extensive, original and different work for every discipline.

Nowadays, there is a hard pressure for universities. One of the challenges facing universities in the EHEA were to achieve excellence. One way of doing this was to stimulate specialisation and competitiveness between them. The Lisbon European Council [17] stated that Europe needed excellence in its universities to make it a more competitive and dynamic knowledge-based economy with the capacity to sustain economic growth and create quality jobs that guarantee greater social cohesion. Therefore, two of the current university aims are a) to Guarantee greater adaptation of the university educational offer to the requirements of the employment market, and b) Increasing university contribution to local and regional development [18].

Considering this point of view, the Final Project of students should become not only a final work for a university student but also the first work of these students in his professional experience. Together with his curricular, this project should be their professional business card in order to get into the labour market. Even in this work, the Open vision should be incorporated. Thus, the institutional digital repository college called O2 (Fig. 4), is promoted for being used so that students could publish there their work. So, having their work in the digital repository allow them to have it available for any future use they could decide to have.

Therefore, the student raises awareness of reputation in his digital trail network created and the TFG allows an obvious first step [19].

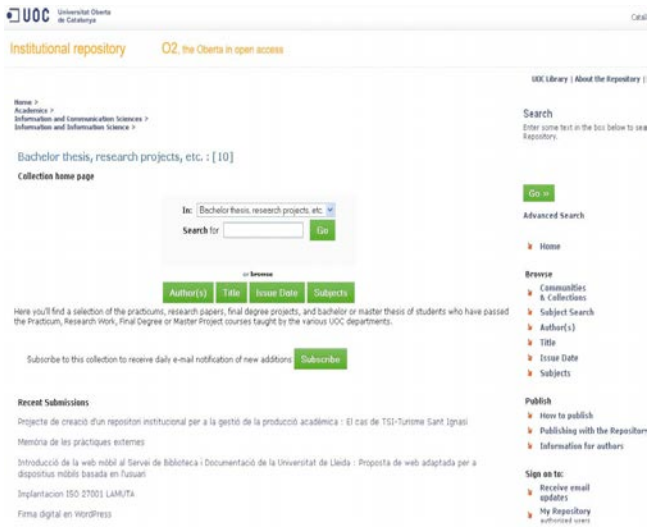

Fig. 4 Screenshot from O2, the digital repository in the Universitat Oberta de Catalunya. Source: http://openaccess.uoc.edu/webapps/o2/?locale=en

4 CONCLUSIONS AND TRENDS

The Open movement has had a significant growth in a few years. It has had to prove, first, that it was not an alternative to quality, and also it had been able to create a broad range of elements, from programs, journals and databases to support their attitude and allowing institution, scientists and legislators to consider it viable. Still, it is difficult to live with a complete Open vision today. It is supposed that legislative changes and policies will push the universities and scholar publishing fully to Open Access.

For those who fully believe in an open vision, and an Open Science, it is essential and crucial to promote this vision in students incorporating it a skill and as a methodology in their first steps in academic career.

Thus, considering the existence of multiple aspects of the possibility of incorporating an Open view, it should be incorporated as a cross-curricular skill, in an academic career. This would allow global vision in each subject and content to show another way of doing science and allowing students and future professionals to get ready for changes that will probably will come and will improve Science implementing different options that have been presented in this communication.

In this paper and the oral presentation it has been shown some examples of how this Open vision can be implemented in a university. In this case, in a virtual university as the Open University of Catalonia, whose own learning model shows that it is possible to incorporate this Open vision in multiple aspects and stages of the learning process of students.

The path taken by the Open movement in these nearly fifteen years gives hope in the sense of how it can change not only the way in which science is conducted, but also as how it is spreaded. As Edition, Music and Audiovisual industry have changed, Universities begin the real changed due to the possibilities that ICT will allow.

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