INCLUSIVE OPEN EDUCATIONAL PRACTICES: HOW THE USE AND REUSE OF OER CAN SUPPORT VIRTUAL HIGHER EDUCATION FOR ALL

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From Open Educational Resources (OER) to Inclusive Open Educational Practices (IOEP)

One of the most important trends in education in recent years has been the creation of a vast integrated network of experts and institutions which are generating high quality validated content for use and reuse by everyone in the world. Open Educational Resources (OER) are digital resources with potential educational value for educators, students and self learnerswhich have been published on the web with an open license or are in the public domain (D. White, M. Manton, 2011). Evidence demonstrates OER can be of different types and sizes, ranging from simple educational resources, readings, images, open textbooks, videos, links, up to complete courses called OpenCourseWare (Downes S. 2007). See Figure 1.

Although OER were seen at first as informal instruments to widen participation in Higher Education through the facilitation of access to quality content, throughout the years have been increasingly used in educational formal practices as well. In fact, from an academic perspective, OER hold an educational value and pedagogical structure. Educational resources developed in open environments can be continuously improved and adapted for use by a wider community of educators. Thus, the use of OER enhance educational innovations by rapidly disseminating new ways of teaching and learning. Indeed educational resources that can be reused promote collaboration and participation by all. Therefore, OER call for the notion of open educational practices which relates to any educational activity involving the creation, use, or dissemination of an adaptive open learning resource.
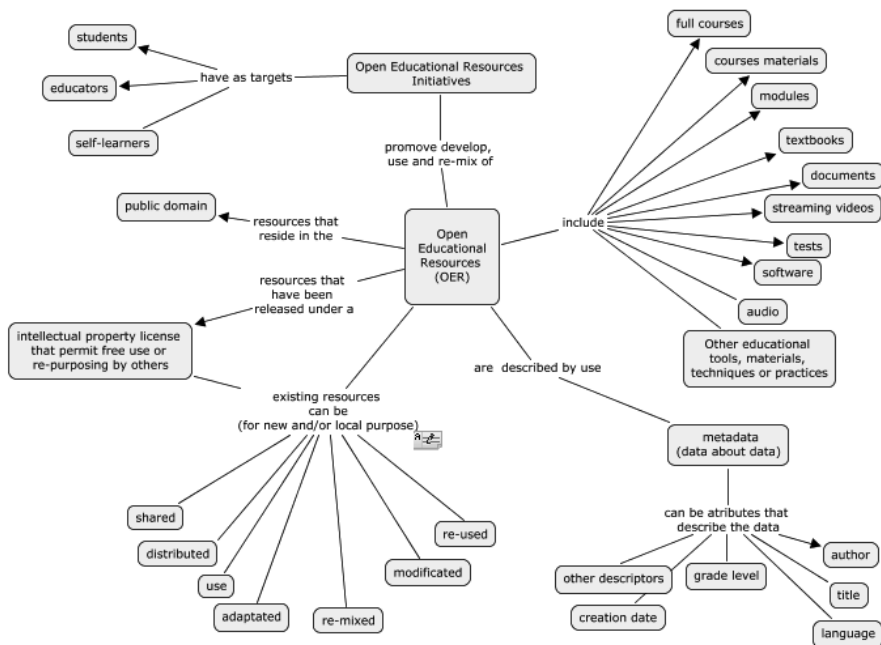
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Figure 1. Ontology Concept map on OER / OCW (Piedra N. et al, 2010)

However, even if OER are increasingly available across the globe, evidence shows their use is not proportional. This is due to the fact that the production of free access digital resources alone is a necessary but not sufficient condition to widen participation in Higher Education. In order to achieve this goal we need to develop strategies that effectively integrate the use of these materials in the daily practice of teachers and students, as well as improve the visibility of existing resources. This new emerging concept of open educational practices (OEP) can be best defined as practices which support the (re) use and production of OER in the framework of educational policies that promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning process. After concentrating on building infrastructure and tools, researchers and practitioners have learned how critical for success it is to move now to the design of improved learning experiences and innovation in educational settings, particularly formal ones. Beyond access to open learning architectures, the focus of open education is now on learning as a process that can be built and shared in an inclusive way.

In this paper we submit the idea that online open education needs also to fully integrate a third pillar apart from technology and pedagogy, which is ethics. In order to be fully open, virtual education needs to be inclusive. And, to assure this objective, it needs to articulate learning tools and methods with values.

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The 2012 Paris OER Declaration paves the way for IOEP

Since the 2003 World Summit on the Information Society Declaration of Principles, the online education community has assumed the commitment to build a people-centred, inclusive and development-oriented Information Society. One where everyone can create, access, utilize and share information and knowledge. The recent 2012 Paris OER Declaration follows the same path by explicitly recommending all national states to "promote and use OER to widen access to education at all levels, both formal and non-formal, in a perspective of lifelong learning, thus contributing to social inclusion, gender equity and special needs education" (Unesco, 2012).

Indeed every human being has equally the right to learn. However, this universal right calls for a differentiated realization. In fact, opposite to common belief, widening participation in Higher Education is not achieved by simply providing mass-access to quality content. On the contrary, the universal validation of that generic right critically depends on the possibility of each and everyone access content according to his/her own differentiated needs. When considering learners with disabilities, the issue of accessibility becomes more complex indeed. Different kinds of special needs may be involved (physical, sensitive, cognitive). This notion of different kinds of accessibility makes it imperative therefore to use a holistic approach to the design, use and reuse of OER. This is an approach which promotes inclusive open educational practices.

Given the international regulatory framework on the rights of learners with disabilities, each country has established special laws for securing these rights. These regulations seek to ensure equal opportunity, non-discrimination and universal accessibility for people with disabilities. In the context of technology and distance education a number of standards and guidelines have been developed to help ensure that digital resources produced/used in the field of education are accessible for all. In general these studies consider the accessibility only in relation to the design of resources. However, as discussed in this paper, at the time of measuring the accessibility of resources it is critical to ensure guidelines for OER use and reuse which consider the different types of disabilities and educational aspects involved in an integrated way.

Accessibility Standards for OER

The concept of OER is commonly associated with sharing open content in public repositories. This concept of OER is independent of the format used for files, which can be PDF, HTML, etc.. One way to classify these OER would be based on whether or not they meet accessibility standards. For example, in the case of web-based

resources OER could be classified according to web accessibility standard WCAG 2.0. WCAG is the acronym for Web Content Accessibility Guidelines, developed by the WAI (Web Accessibility Initiative, a branch of the W3C (World Wide Web Consortium) which monitors the web accessibility.

Whereas "equal opportunity" not only refers to the accessibility of the resource but also covers the conceptual content accessibility of the resource, it is proposed to extend the principles of perception and understanding of the WCAG [16] to the content of the resource (pedagogical / cognitive accessibility), and classify the resources from evaluations by users, experts and end users, considering the different types of disabilities and educational resource pedagogical purpose.

The WCAG [16] standard specifies guidelines in the production of web resources in order to assure they are robust, understandable, operable and perceptible to people with disabilities. These patterns guide the web design, and each pattern contains a set of checkpoints with different priorities (priority 1, 2 or 3). Compliance with all priority points 1 states that the design of the web resource will have a level of accessibility, i.e. complies with all that HAS to be accessible. If the application meets all checkpoints of priority 1 and 2 then the resource achieves an AA accessibility level, i.e. complies with all that HAS and NEEDS to. And finally fulfilling all priority points 1, 2 and 3 AAA accessibility level is reached, indicating that the resource meets all checkpoints that HAS to, NEEDS to and SHOULD comply with. In short, WCAG 2.0 accessibility focuses on web design resources, and accessibility levels (A, AA and AAA) are established based on the fulfilment of all checkpoints of priority 1, 2 and / or 3. Such guidelines for accessibility of OER design are not limited to web resources, but extend to other formats of educational resources, such as PDF [18], [19] and Macromedia Flash [20].

In recent years several evaluation projects and proposals of metrics assessing the accessibility of web resources have been developed. Some of these works focus on the measurement / assessment of online learning environments considering education as an integrated, interrelated and dynamic process where technical aspects (platforms, resources) and pedagogical ones (such as educational processes, cognitive styles) interact. Other works focus on the measurement of web resources, many of which based on the WCAG standard (Vigo M., Arrue M., Brajnik G., Lomuscio R., Abascal J., 2007; Brajnik G., Lomuscio R., 2007; Freire A., Fortes R., Turine M., Paiva D., 2008). In these last two works in particular two considerations appear repeatedly: (1) it is not enough to simply measure WCAG 2.0 checkpoints compliance, and (2) the importance of complying or not with the checkpoints is related to the educational purpose of the resource and the type of disability which affects the user.

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Brajnik G., R. Lomuscio (2007), present a very interesting problem that can be related directly with our case. It is whether the metrics describe if a website is more accessible for certain user groups than others. The authors propose a methodology for measuring accessibility that combines automatic evaluations based on WCAG, with the expert reviews which should consider the types of disabilities and objectives. They advocate a mapping between WCAG checkpoints and types of barriers related to the types of disabilities.

Most research has considered the pedagogical aspects related to learning objects, the user's profile and the context of use, using metadata for describing educational aspects of the object or resource, and scents or judgments made by the community (experts, end users, and others). Different styles of assessment range from very simple mechanisms as an indication by the user if the resource was helpful to more sophisticated forms as LORI used by the project eLera [21] filled by experts. Therefore, a possible way to classify OER may be considering the level of understanding of the content of the resource perceived by different user profiles, determined by the type of disability, while taking into account the pedagogical objective of the resource.

The WCAG 2.0

WCAG was first published in 1999 in its version 1.0. A second version (WCAG 2.0) was published in 2008. In the first version the standard established general principles of accessible design. It is divided into 14 guidelines that provide design solutions and using as an example common situations in which the design of a page may cause problems of access to information. The guidelines also contain a series of checkpoints (65 in total) that help detect errors.

Each checkpoint is assigned to one of three priority levels set by the guidelines:

- Priority 1: are those aspects which a web designer **has** to comply with because, otherwise, certain groups of users could not access the website information.

- Priority 2: are those aspects which a web designer **needs** to comply with because, if it were not so, it would be very difficult to access information to certain groups of users.

- Priority 3: are those things that a web designer **should** comply because, otherwise, some users may experience some difficulties in accessing information.

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According to these checkpoints pursuant levels are set:

- Conformance Level "A": all checkpoints of priority 1 are satisfied.
- Conformance Level "Double-A": all checkpoints of priority 1 and 2 are satisfied.
- Conformance Level "Triple-A": all checkpoints of priority 1, 2 and 3 are satisfied.

As for WCAG 2.0, it is an official W3C recommendation which is based on the1.0 version. It bases on four fundamental principles: **Perceivable**, **Operable**, **Understandable** and **Robust** (in reference to the features of an accessible Web document).

- Perceptible: The information components and the user interface should be presented to users in a way that can be perceived.
- Operable: The components of the user interface and navigation must be operable.
- Understandable: Information and the management of the user interface must be understandable.
- Robust: Content must be robust enough to work with current and future technologies.

Each of these principles divides in various patterns to a total of 12. Each of these patterns in turn is atomized into "success criteria" (Success Criteria) that form validation and which total 61 (in concept, equivalent to the 65 checkpoints of the WCAG 1.0). W3C recommends that new and updated content apply WCAG 2.0 instead of 1.0.

A proposal for accessibility classification

In light of the principle of "equality of opportunity" in education, one may wish accessibility should have an educational component related to the level of understanding the users may have of the OER content. We therefore propose a classification based on the references described in the previous section which addresses in an integrated way the educational objectives of OER, the difficulty level of understanding of the content of the resource, and the user profile determined by the type of disability.

On one hand it is proposed to classify the level of OER according to the WCAG 2.0 accessibility level achieved, by the pedagogical objective of the resource and the

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types of contexts of use (user profile and / or characteristics of the environment) determined by the types of disabilities. For this, we will use the method proposed by Brajnik G. and R. Lomuscio (2007), presented in the previous section, according to which a mapping between the checkpoints of the WCAG 2.0 and the types of barriers is used [22]. Experts determine how to classify the resource according to the type of disability and educational purpose. In our case we suggest to ask experts to indicate the degree of importance (high, medium, low) of each barrier. In this sense a resource will have a:

- level of "pedagogical accessibility A" if it meets all checkpoints listed as "highly" important by experts;
- level of "pedagogical accessibility AA" if it meets all checkpoints listed as of "high" and "medium" importance;
- level of "pedagogical accessibility AAA" if it meets all checkpoints, that is the ones listed as of "high", "medium" and "low" importance.

We note that a resource not meeting WCAG AA level, could nevertheless be classified with level "educational accessibility AA" according to this classification if the non complied checkpoints affect only aspects which are irrelevant to the pedagogical objective of the object or to the context of use. This is because in both cases these aspects are of low importance.

In addition we propose to classify OER regarding the understanding of content achieved by the different user profiles. We call this "pedagogical content accessibility" of OER for different types of disabilities. Basic assessments of "the information contained in the application" (very easy to understand, was understood, difficult to understand) made by end users grouped according to their disability profile will make possible to classify OER by level of content understanding in each type of disability. This type of evaluation allows that classification of OER in what regards understanding of content for different disabilities is determined by users themselves using the resource and will be increasingly accurate.

Table 1:   Classification according to "Pedagogical Accessibility to Content"

	Very Easy to Understand	Easy to Understand	Difficult to Understand
Problems of Sight			
Problems of Earring			
Problems of Moving			
Cognitive Difficulties			
…			

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Classifications proposed here follow a similar direction to the concept managed by the IMS (IMS, 2002) when linking OER with comparability. Because it is possible for different OER to share a same pedagogical objective although having been developed using different technologies each offering features by type of disability (video, text, etc..). In short, they may have been designed for specific user profiles or contexts of use.

As shown in the discussion, pedagogical aspects are critical to determine OER accessibility. In light of this, we have presented a set of procedures that make possible to include them in the evaluation and classifications of OER. The proposal presented in this paper combines important elements in the evaluation of resources or learning objects. These include automatic assessments, community assessments (end users, experts), WCAG, types of disability and educational objectives. We must determine the level of detail of the types of disabilities that will be used in the project. It could disaggregate large groups as 'hearing problems' into more specific groups such as "deafness", "hard of hearing", etc.. This type of classification manages to bridge the points of view of design and pedagogy, articulating them in an ethical framework.

Conclusions

It is critical for every author and web designer of OER to be aware of the ethical and legal aspects which justify delivering accessible academic content. In fact, the educational value of OER use depends on how these resources allow access to quality learning experiences for all. This is why OER authors and web designers should be trained in the technical aspects needed to provide educational content in an accessible format. Keeping in mind however that in order to adapt or create material that is accessible to people with special educational needs (ex: physical disabilities) may require in several cases the assistance of qualified personnel, whether related professionals or specialized institutions.

Creating accessible OER is as important as measuring the degree of accessibility achieved; not only from a technological point of view but pedagogical as well. Therefore, it is necessary to have evaluation processes which take into account standards, pedagogical goals, users' profiles and contexts of use. These kinds of evaluations require the participations of authors, experts, reviewers, and end users, who provide feedback that can be used in the evaluation processes.

There are formats and technical platforms which are more accessible than others, allowing more easily to change the language or parts of the document. Thus, the realization of the universal right to access quality content by all individuals,

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including the ones with special needs, is basically an ethical responsibility of all content providers of open education resources.

Finally, a note should also be presented regarding the critical aspects of searching and finding OER, as well as accessibility of content for all. The later also constitutes a part of the ethical responsibility of open education providers. In fact, all open digital resources must be described using metadata and should be interchangeable. However, even in the cases this feature is met, differences in the programs may make it difficult to search through different education systems. This is another ethical challenge of the global OEP community.

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