From Open Content to Open Thinking

Anna De Liddo
Knowledge Media Institute, Open University
UK
a.deliddo@open.ac.uk

Abstract: So far Open Educational Resources (OER) research has focused on the objective to 'open' education by making accessible free educational resources to the world. In the latest years the movement has matured, and a growing amount of OER have been made available by universities, researchers and scholars through several portals. Nonetheless, the level of adoption of OERs into common teaching practices remains quite low. In this paper we suggest that one of the main barriers to OER's adoption is the lack of "opening up" to people's thinking around OERs and we propose Cohere, a tool which aims at making this thinking visible and exportable in ways that support the emergence of "collective intelligence" around OERs research. Accessing Collective Intelligence (CI) around OERs is presented as a medium to know and understand what people think, how people design and use OERs thus increasing the easy of re-use of OER in learning and research practices.

Introduction and Motivation

Open Education is an umbrella term used to refer to several research topics at the crossroad of Online Learning, Higher Education and the Web. It is an increasing phenomenon that is resulting in the explosion of Open Educational Resources and Open Courseware projects and initiatives all around the world (Atkins et al. 2007). Together with these initiatives, an increasing number of learning technologies are being developed to support free accessibility, management and delivery of education online (McLoughlin & Lee 2007). Despite the widespread diffusion of the Open Education movement, the level of adoption of OERs into common teaching practices remains quite low. Why is this the case? Why is it so difficult reusing OERs? Common sense would suggest that it is in a teacher interest, who has access to free educational material, to use it to inspire and enrich their courses, but evidences show that when it comes to course preparation most of the teachers prefer to "make it their way". In this paper we propose that one of the barriers to OER adoption is the lack of transparency of practitioners' 'thinking' around OERs. The thinking we refer to is not necessarily translatable into formalized knowledge; it is rather informal and dialogical knowledge such as in example knowledge about people's experiences with an OER, knowledge about people's issues, ideas and opinions, not just in term of design, use and potential reuse process around that OERs, but more generally about the evidences and stories of use in concrete practice examples. In fact, where some teachers and scholars in higher educations may not be comfortable to reason in term of design patterns they still are practitioner and therefore they hold a knowledge and experience that may be of great value for others. What would happen if we capture and "open up" this thinking and this knowledge to the world?
In this paper we propose the concept that one of the main barrier to OER's adoption is the lack of "opening up" to people's thinking around OERs. In order to support a paradigm of "open" educational resources we propose to *open people's thinking about OERs*. In order to support this framework we present Cohere, a tool which aims at making this thinking visible and exportable by users in a way that support the emergence of collective intelligence around OER. We define Collective Intelligence an emergent phenomenon in which unforeseen opportunities occur as a byproduct of the collective users' action and interactions around OER. We aim to support and enhance the development of Collective Intelligence with the design and development of a socio technical infrastructure that underlines, recommend and point out the collective view around an OER. In the following we present Cohere a prototype socio-technical infrastructure to gather Collective Intelligence around OER. In section one we introduce the background knowledge, which motivate the design of Cohere. In section two we describe the conceptual framework behind the user experience and activities supported by the tool. Finally in section three we present snapshots of the Cohere's user interface and describe the main tool's functionalities. We conclude with section four by discussing future development and research activities.

Cohere: Collaborative Web Annotation and Mapping of ideas and OERs

As we pointed out in the previous section, we identify as one of the main barrier to OER adoption the lack of transparency of practitioners' thinking around OERs. In fact if we look at the main OER providers' portals we see that in the metadata associated to OER there is important information (such as i.e: intentions of the author, learning purposes, impact on learners, comments of readers, suggestion of practitioners, difficulties encountered by learners etc) that are not made explicit, and remain closed in the mind and interpretations of the authors, teachers, learners and scholars that interact with a learning resource. In order to unveil and make explicit these interpretations and knowledge we looked at Mark up and Multimedia Annotation technologies.

Late research in the field of e-science communication reports on the use of Mark up and Multimedia Annotation technologies in order to enhance the power of the search of scholarly articles and to improve the understanding of the literature (Buckingham Shum et al. 2000, Clark & Kinoshita 2007). The main objective of multimedia annotation technologies, in this research field, is to enrich scientific article with annotations of users understandings and semantics. We propose to apply these research principles and technologies to the field of Open Education in order to provide learners and practitioner with tools to capture the interpretations, semantics and understandings that users gather while reading or analyzing OER. In this way these interpretations can be made explicit in form of resource's annotations and can be shared between students, practitioners, scholars and other peers. This also helps to fulfill the objective to enrich the scope of OER with a new 'social dimension" of multiple users' interpretations, that can be further commented, connected, compared and discussed. Moreover these interpretations can be used by other users as valuable clues for understanding, exploring reusing and remixing OERs.

Based on this rationale we designed and developed Cohere (Buckingham Sum, 2008). Cohere is a Web tool to: i. collaboratively annotate web resources, and in particular OER, available online; ii. create meaningful semantic connections between annotations and iii. make sense of complex issues by exploring, filtering, debating and better understanding other people's thoughts. Cohere is a prototype to gather Contested Collective Intelligence (see De Liddo & Buckingham Shum, 2010) around OERs since it builds on community thinking to make sense of the OER research world. In particular with Cohere, researchers and practitioners in Open Education can make their thinking visible and sharable with online communities; they can collaboratively annotate the Web, leverage lists of annotations into meaningful knowledge maps and engage in structured online discussions.

Cohere builds on a conceptual model which consists of four main users activities through which the users can make their thinking visible and contribute to the development of Collective Intelligence around OERs. As detailed in Figure 1, the four activities are: 1) annotate, 2) connect, 3) explore, 4) filter and make sense. Each of these activities corresponds to a specific task that the users can perform with Cohere and to specific features that unable the task to be accomplished. In the following we describe Cohere's main features activity by activity.

Fig.1. Cohere Users Activities Model

Cohere Main Features

Annotate

With Cohere, users can underline (mark up) and comment (annotate) OERs and any Web resource. Selections from a webpage (clip), or a whole webpage (Url), can be associated with a textual note entered by the user. The user can also select a categorization for their annotation, e.g. are they posing a question, offering an answer, making a, argument? This function has two main advantages: it helps the user 1) to better organize and retrieve their notes and 2) to make their thinking visible for other users to explore and understand. Cohere has a Firefox extension that enables users to see their and other people's annotations in a sidebar of their browser. As we can see in the following image (Figure 2), different clips, annotated by different users, are underlined in grey in the Web page. At the same time users annotations are listed in the sidebar together with the picture and name of the author of the annotation, the icon identifying the type of annotation, the text of the annotation and the text of the clip/clips (if any) to which the annotation refers. Several clips can be associated to the same annotation text; when this is the case, by clicking on the text of the out-sources clip, users can jump to the url of the OER source of the clip. In this way users can navigate different OERs and Web pages by following people's ideas and annotations.

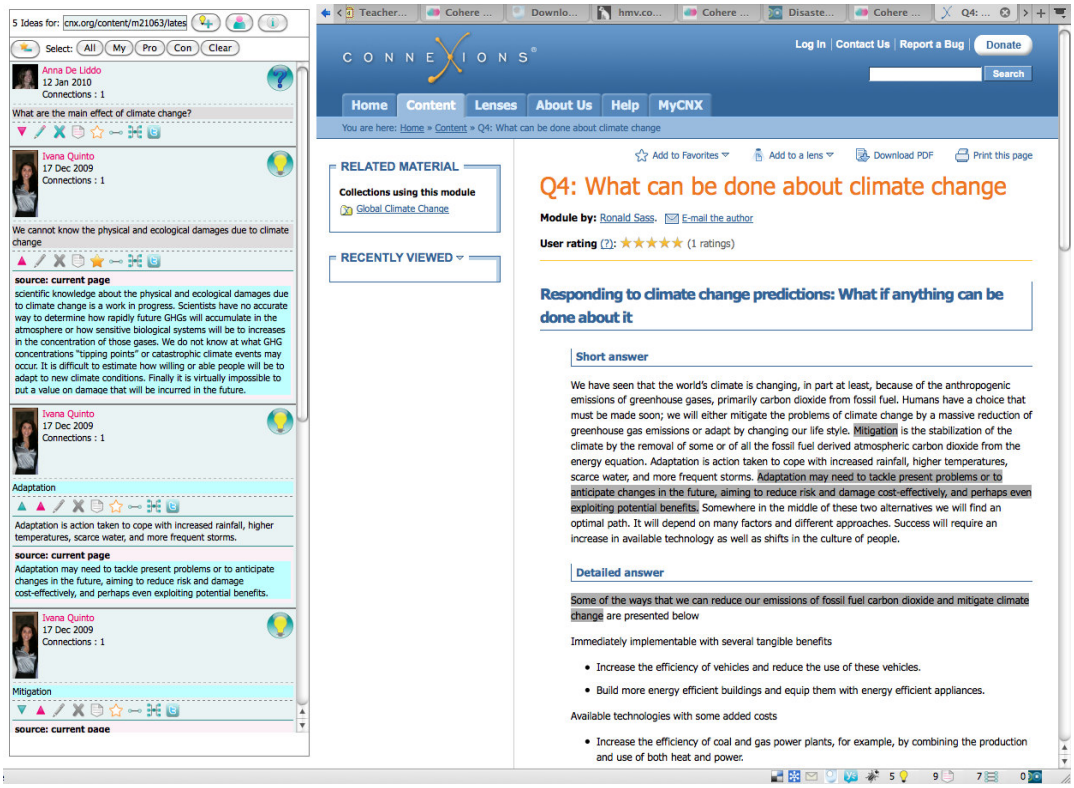
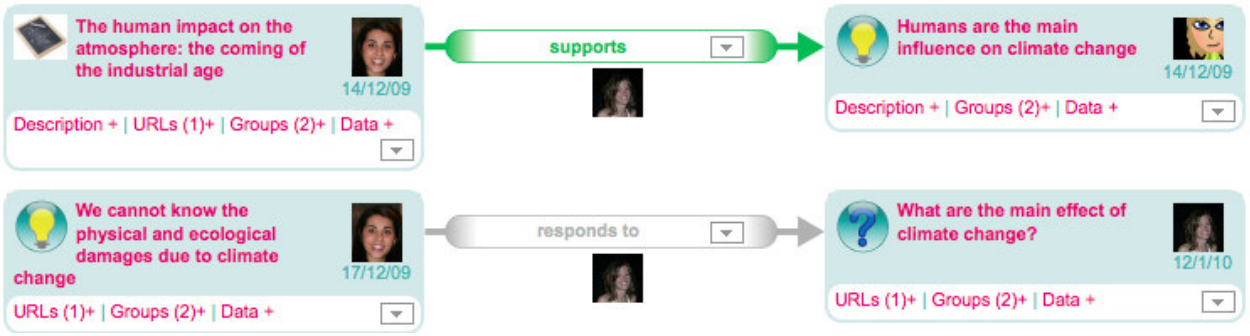


Fig 2. Collaborative annotation of OER and Web Resources.

Connect

Cohere also enables connections between annotations. Annotations can be connected with meaningful relationships that explain how they relate semantically to one another. Labeling connections semantically is another way in which users can make their thinking visible. In fact by reading connection labels users can understand better other users' interpretation of how two web resources are related; they can then compare this interpretation with their understanding and eventually decide to critique it. This is the first step toward the engagement in structured online discussion. The following image shows two semantic connections, which are represented as triples consisting of two annotations plus the semantic connection between them. As we can see in Figure 3, both annotations and semantic connections have an author associated to them. Therefore users can connect annotations that are not authored by them. By providing this feature Cohere enables users to generate a new type of content in form of semantic link. This

content is structurally different form text and common annotations in textual format since it enables to build structure and bridges between information that may be stored in different locations, refer to different context and be raised by different communities. In this sense the power of connections is to leverage annotations to an abstract conceptual space of network of ideas (see also Figure 4, right part).



Explore

By creating OER and Web pages annotations, and by creating connections between annotations on different web pages, users can navigate the Web by following people's ideas and semantic connections. They can jump from one Web page to another by clicking on other people's annotations that are shown in the sidebar (Figure 4, left part). Alternatively they can discover Web resources by exploring the network of interconnected annotations (Figure 4, right part). This helps users to reuse and build on other users' ideas.

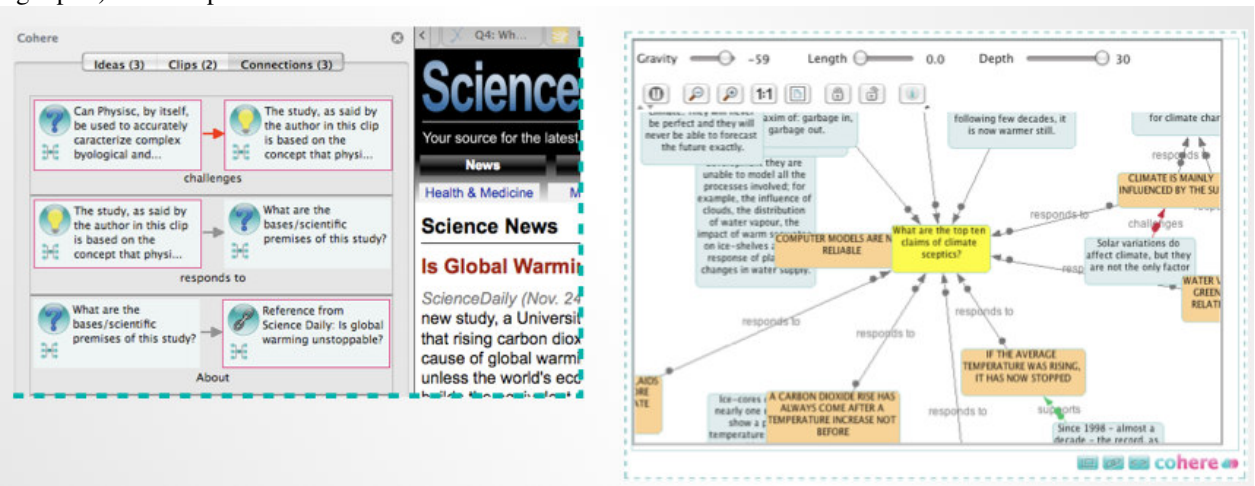


Fig 4. On the left, Cohere Sidebar to Navigate Web Resources by meaningful connection, i.e "challenges, responds to, about"; on the right, Cohere UI to Explore the Network of Annotations.

Filter and Makesense

In the previous sub-sections we showed how Cohere offers a space for annotating, organizing, connecting resources and reflecting collaboratively on the understanding of such resources. But once those resources and annotations become too many in number and complexity in order to make sense of them we need to activate some mechanism to reduce information overload. To tackle this issue Cohere provides filtering by semantic connection; it supports queries such as: show me the map of annotations and clips that are in contrast with this hypothesis, that support this theory or that contradict this assumption. This function helps to reduce the users' cognitive overload in processing complex graphs and it supports them in focusing and making sense of specific issues. I.e in Figure 5 we show a network of annotations filtered by "about" link type. Filtering on this semantic link retrieves topic-subtopic maps. In this example the map shows 5 types of issues for OER research and, clustered around them, the users' annotations that fall in each typology. This example is extracted by a network of over 50 annotations, 38 clips and 85

connections of four different semantic types. The network would have been illegible if no filtering was applied; filtering by semantic type enables to automatically generate thematic views on the data thus supporting the sensemaking process when information overload becomes an issue.

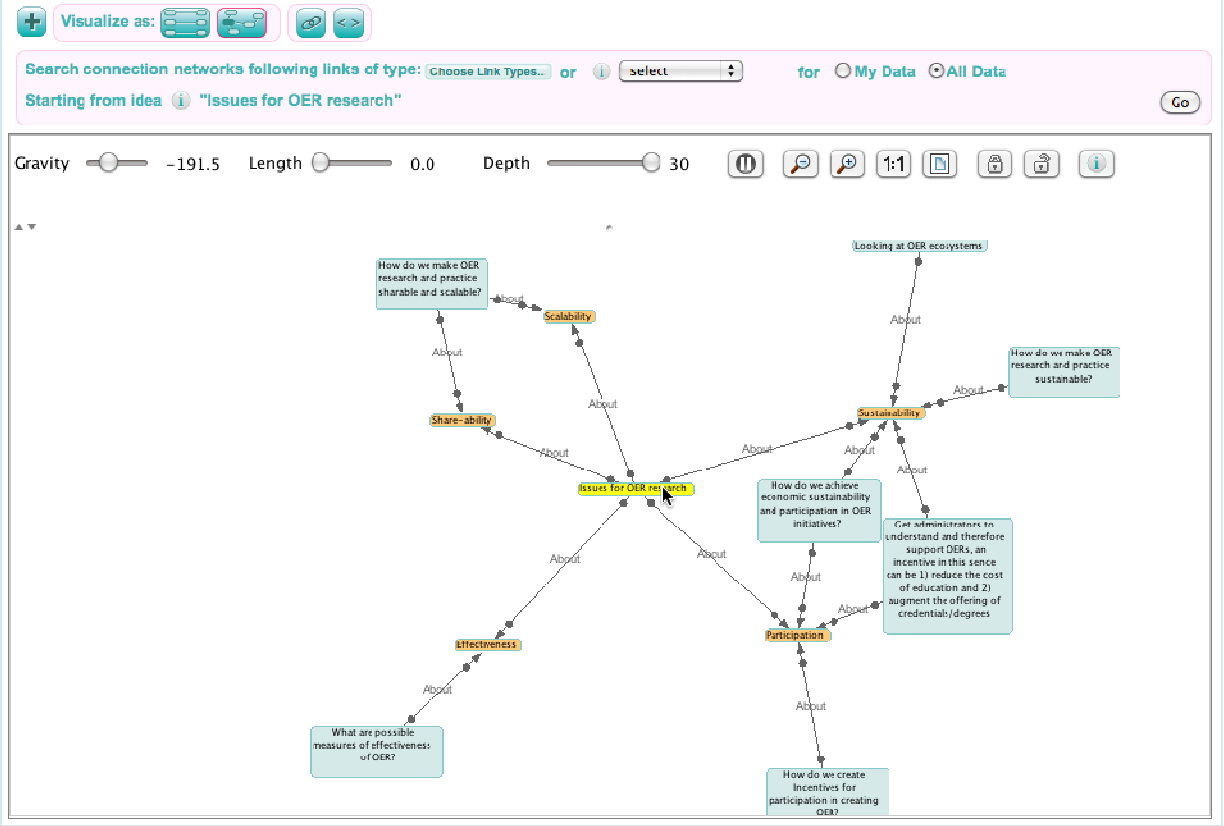


Fig 5. Annotations Network Filtered by "about" link type.

Conclusions and future research

In the early stages in which the conceptual foundation of Online Learning was developed, a primary goal of Online learning was reducing the price of education while at the same time improving the number of people that could have access to it. However this view offered a very limited vision of what online learning and more broadly Open Education is becoming: that is, not just an online passive transfer of knowledge from teacher to students (Anderson 2004). It is more and more considered opinion that online learning needs to embed the 'social dimension of learning': exchange and discussion of ideas with other learners and with teachers and scholars are key learning 'chances' that needs to be valued and enabled, so that, on one side, online learning and Open Education can offer equal opportunities as face-to-face learning, and at the same time, face-to-face learning can be supported with cost-effective alternative solutions for teaching practices. The new challenge for the OER movement is to fill the gaps between face-to-face and distance and/or technology mediated Education. So that OERs can be also re-used in face-to-face teaching and learning even if their native environment is and remain the Web. In this paper the Web is proposed as the medium trough which Collective Intelligence around OERs is gathered, explored and exploited by the users. We discussed the problem of OER adoption and reuse in learning and teaching practices and we made the hypothesis that two main reasons for this are that: 1) much of the information and knowledge useful to reuse an OER remain hidden in the mind of others, such as i.e. the author, the readers, the scholars and the practitioners that interact with that OER 2) and that the knowledge of many others, which may help to make OER reuse more effective, is not appropriately crowdsourced and structured. In order to test the validity of these hypothesis we designed and developed Cohere, a tool to make explicit people's thinking (point 1) above) and gather Collective Intelligence around OERs (point 2). Cohere enables to add a social layer to OERs consisting of the formal and informal experiences of the people that acted and interacted with an OER. This layer is what we call Collective Intelligence.

Cohere gathers Collective intelligence around OERs basing on a Multimedia Annotation paradigm, in which users interact with OER through a process of reflective reading, commenting and annotation, connections, exploration, filtering and sensemaking of OER contents. Moreover Cohere provides an online collaborative environment in which scholars, practitioner and peers can engage critically in structured online discussion around OERs since it enables an abstract conceptual space in which ideas can raise and grow out of their specific context and, while preserving reference to it, can be connected to ideas coming from other contexts.
In this paper we describes Cohere following research plan aims at design (storyboard) and develop an interface for gathering CI around specific OER pages and OER project in form of embeddable widgets so that we can crowdsource the contribution to CI around OER research. Moreover we plan to drive specific evaluation studies in the Open Education field in order to test to which extend the Cohere CI infrastructure supports the level of adoption of OERs in teaching and learning practices.

Acknowledgments. Cohere is being developed to enable Collective Intelligence for the Open Educational Resource movement, as part of the OLnet Project (http://olnet.org). Funding is gratefully acknowledged from The William and Flora Hewlett Foundation.

References

Anderson, T. (2004). Toward a theory of online learning. In T. Anderson & F. Elloumi (Eds.), Theory and practice of online learning (p. 2). Athabasca University, Alberta, Canada: Creative Commons.

Atkins, D. E., Brown, J. E. and Hammond, A. L. (2007) A review of the Open Educational resources (OER) Movement: Achievement, Challenges and New Opportunities. Report to the William and Flora Hewlett Foundation.

Simon Buckingham Shum. (2008) Cohere: Towards Web 2.0 Argumentation. In Computational Models of Argument (COMMA), volume 44, 2008.

Buckingham Shum, S., Motta, E. and Domingue, J. (2000). ScholOnto: An Ontology-Based Digital Library Server for Research Documents and Discourse. International Journal on Digital Libraries, 3, 3, 2000, pp. 237-248 [www.kmi.open.ac.uk/projects/scholonto].

Clark T and Kinoshita J (2007) Alzforum and SWAN: The Present and Future of Scientific Web Communities. Briefings in Bioinformatics 8(3):163-171; doi:10.1093/bib/bbm012. PMID: 17510163

De Liddo, A. and Buckingham Shum, S. (2010). Cohere: A Prototype for Contested Collective Intelligence. Workshop on Collective Intelligence in Organizations: Toward a Research Agenda, ACM Computer Supported Cooperative Work (CSCW 2010), February 6-10, 2010, Savannah, Georgia, USA. Available as ePrint: http://oro.open.ac.uk/19554

McLoughlin, C. & Lee, M.J.W. (2007). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. Proceedings of ASCILITE Conference 2007 (pp.664-673). Singapore