A Method and Tool to Support the Analysis and Enhance the Understanding of Peer-to-Peer Learning Experiences

Anna De Liddo,* Panagiota Alevizou**

*Research Associate, Knowledge Media Institute, Open University (UK), **Post-doctoral researcher at the Open University's Institute of Educational Technology

Abstract

In this paper we look at how a web-based social software can be used to make qualitative data analysis of online peer-to-peer learning experiences. Specifically, we propose to use Cohere, a web-based social sense-making tool, to observe, track, annotate and visualize discussion group activities in online courses. We define a specific methodology for data observation and structuring, and present results of the analysis of peer interactions conducted in discussion forum in a real case study of a P2PU course. Finally we discuss how network visualization and analysis can be used to gather a better understanding of the peer-to-peer learning experience. To do so, we provide preliminary insights on the social, dialogical and conceptual connections that have been generated within one online discussion group.

Introduction

Open Education and the diffusion of the Web have broken the traditional barriers of 'where' education happens. Learning nowadays occurs outside of existing institutions, using free educational resources (OER) and blending between dispersed networks of peers. The diffusion of web-based social software has an impact on the ways in which people learn and important questions pertain on the practicalities and ethics of online research (Jones, 1999; Markham and Baym, 2009). How do we capture observations relating to learning experiences which unfold in a virtual space and are mediated by specific technologies?

In this paper we propose Cohere, a web-based social software, which can be used to record and visualize qualitative data and analysis of online learning experiences. We discuss the rationale behind the need of new, appropriate tools for virtual ethnography (Hine, 2000; Murthy, 2008) and online users observation and we present a proof of concept by showing Cohere in use.

Cohere is being developed, within the OLnet project (www.olnet.org), as the socio- technical infrastructure to develop Collective Intelligence in Open Education. It has been described as a Web tool to: i. collaboratively annotate web resources; 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 (De Liddo 2010).

In this paper we propose a different use of Cohere: as research tool for assisting the qualitative analysis of online learning experiences. In section one we discuss the benefits for using Computer Assisted Qualitative Data Analysis (CAQDA) tools for virtual ethnography and online observations. in Section two we describe Cohere and how it support the main QDA functions of coding and memoing. We continue section three with a description of initial results of a case study in which we explored how peer-to-peer learning takes place in an online course. Although we do not seek to generalize from observations, insights from visualization of data analysis are used here as a 'proof of concept' of the ways in which Cohere can be used for CAQDA in virtual learning environments. Finally in section five we discuss lessons learned and future work.

CSQDA tools for virtual ethnography and online observations

> 'Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretative, material practices that makes the world visible […]'
>
> Denzin and Lincoln
> (2000:3)

Qualitative Data Analysis (QDA) methodologies like thematic analysis, grounded theory, linguistic analysis and so on are used to explore multivariable social phenomena. More specifically:

- where it is difficult to quantitatively measure variables, or when quantitative data collection can not offer in depth insights
- when the aims are to provide an in-depth and interpreted understanding of participants' behaviours and learning about their social and material circumstances and motivations, experiences and perspectives
- when analysis can be open to emerging concepts and ideas and which may produce detailed description and classification, indentify patterns of association, or develop typologies and explanations (Snape and Spencer, 2003: 5)

QDA requires a dedicated and time-consuming effort from the analyst to be put on cyclic reflections and revisions toward the development of a deep understanding of the observed matter. In fact, there is a great deal of interpretation on behalf of the analyst, in order to observe and collect data.

Ethnographic studies and behavioural experimentations are also examples of research activities that usually require QDA. When looking at the Web and observing users behaviours in virtual environments QDA is usually based on users generated content interpretation. User-generated contents generally consist of blog posts, forum comments, or more articulated contents such as documents, images, presentations etc. The granularity and nature of content generally depend on the objective of the observation and can vary within a wide spectrum from computer logs to multimedia documents.

While in the literature CAQDA is more and more diffused to support QDA. Few tools have been designed and used to analyze data that are merely Web data (i.e. text, images, graphs and pictures published online).

CAQDA proprietary tools such as ATLAS.ti, NVivo, Transana, etc require that the raw data are analyzed offline and in an a specific file format, before the analyst can start his study. Certain issues arise when data comes from a public web page or database, ranging from ethical (permissions and privacy), legal (copyright regimes) and practical (e.g. it is usually difficult or

time-consuming to "clean" data coming from a web page and convert it to the appropriate format).

More importantly, when data are saved to be analyzed they are disconnect from the virtual context (Web pages) from which they have been extracted. This generates two level issues:

- The analyst looses potentially useful hints that may help him to make sense of the content they analyze (i.e. page formatting, images and metadata visible just when the data is accessed online)
- If new data are added to the data source Webpage they are not visible to the analyst. Therefore the results of the analysis are time-constrained and may become quickly obsolete.

These considerations highlight that the most diffused CAQDA tools have evident limitations in dealing with Web data. Based on this rationale in the following section we present Cohere a Web tool for QDA of online data. We describe Cohere main features and discuss how it supports virtual users observations by exploiting a Web annotation Paradigm.

Cohere: Web annotations and Tagging for QDA of online data

Cohere provides two of the main features for QDA: *Coding* and *Memoing*.

Coding and Memoing activities of qualitative Web data can be assimilated to the common users activities that in the Social Web 'language' are defined as tagging and annotation. By providing collaborative tagging and web annotations Cohere enables qualitative data analysis in a web environment.

Coding as Tagging and Memoing as Web Annotation

In QDA coding is recognized as the capability to label bits of qualitative data, by assigning them named concepts (Strauss & Corbin, 1998). Qualitative data in our case, can be both a Webpage's text and images.

In order to code text of a Webpage, users can use the Cohere's sidebar (Fig. 1). When the sidebar is open users can simply select the text or image they want to code and click on the icon 'add annotation' . This will open a dialogue box through, which they can both Code and Take Memo on the analyzed data.

Codes can be added by associating tags, while memos are added in the Summary and Description box (Fig. 1).

The analyst can also decide if she wants to make her memos public, private or share them with a specific group of people. This function makes possible collaborative and synchronous observations in virtual environments.

A Method and Tool to Support the Analysis and Enhance the Understanding of Peer-to-Peer Learning Experiences, Anna De Liddo, Panagiota Alevizou ⓒ

Proceedings | Barcelona Open Ed 2010 | http://openedconference.org/2010/
Universitat Oberta de Catalunya | Open Universiteit Nederland | Brigham Young University

4

Depending on the specific qualitative research method that is being used, the analyst may prefer to code and take memo at the same time, or split them in two separate activities of simple coding and memoing.

Coding and Connecting Memos

Memoing is an important activity in any qualitative research method. In grounded theory, in example, it is an activity which continues in parallel with data collection, note-taking and coding and it refers to a note that the analyst make to himself to remember a specific idea which occurred to him while coding. This idea usually concerns some hypothesis on how codes can be organized and what are the categories they fall into. More often memos are used to take note of connections between categories.

Cohere have a specific way to support the activity of making connections between categories and memos. Connections between memos enable the analyst to create specific pointers between observations and notes, which help them retrieve and reflect on them later on. Moreover Cohere enables the analyst to make connections between memos and code them. Codes associated to connections between memos, express the semantic of the connection, that is a further way to cluster the memos, by specifying their relationship. For instance we could code that a series of notes relates to material that 'is part of' a specific category; this notes 'make the same point as' this other note; other notes 'contradicts' each other etc. Specific verbs, or adverbs, are the codes that express the meaning of the connection between memos. The analyst can make connections between memos through the connections builder (Fig.2).

The capability to make connections between memos and categories offers a further sophistication to the coding features offered by Cohere.

Use Case: Observing Virtual Users in a Peer-to-Peer You University (P2PU) Course

An introduction to P2PU

Launched in September 2009 with the mission to put a 'social and pedagogical wrapper' around public domain content as well as open access and educational materials, Peer-to-Peer University (http://www.p2pu.org) has evolved into a public space that demonstrates the fostering of collaboration among activists within the open education movement, volunteer tutors and motivated learners in the design and facilitation of short courses.

Courses are developed collaboratively using a public wiki space and Google documents, as well as asynchronous and synchronous communication through private community subscription forums and online channels. Mediated implementation of 'courses', which run for six-study weeks, is through the use of Free Open Source software tools. Courses contain a syllabus and

study materials and a schedule for peer-interactions and assignments involving both synchronous and asynchronous peer participation, personal study and reflection and group-work. A number of topics and disciplines are covered within the offered courses, that range from practical and interest-based global issues, to more specific courses on online communities, web development, and pedagogy of open education. The 'Copyright for Educators' course during its second cycle (March-May 2010, http://www.p2pu.org/copyright-educators-cycle-2-mar-2010) is the object of analysis for this paper.

In the following we present 'a proof of concept' approach of the ways in which Cohere can be used to observe users' behaviors within the course.

The object of analysis are the discussion forums, where course students collaborate in order to complete group assignments or discuss given tasks. In particular we analyzed students' posts in the "Pink Group" (http://p2pu.org/node/729/document/2692).

Since the aim of this paper is to offer a proof of concept in of collaborative sense-making tools for capturing and visualizing the relationship between collaborative and peer learning, we focus coding on the following two interrelated dimensions, based on Burge's (1994) peer bahaviour models:

  a) participation: how do participants give alternative perspectives attending to the experience of others: how do they share resources and reflections?

  b) Affective feedback: do participants use each others' names, complimenting each other and offer supportive, remedial or critical interchanges?

Annotation procedure and information structuring

Firstly we applied coding and memoing. We tagged clips of forum discussion's text by keeping in mind the general question: What is relevant here for the phenomena I want to observe? We tried to identify, name, categorize and describe the phenomena found in the text.

We looked at each post, highlighted clips of text, and tag them with codes, which quickly started grouping in three main categories:

- People
- content
- Rhetorical moves

Around these main categories we built the second phase of: 1) memoing and 2) making connections between memos. As previously said this means taking memo of hypothesis or premises on the observed phenomenon and creating semantic connections between memos. The semantic of the connection is the code or label, which express the meaning of the connections, that is to say the reason why the two memos are related. We identified two main memos connection codes:

- Posts
- Addressed to

In fact these two links type enabled us to connect the three main categories: people, data and rhetorical move, as detailed in figure 3. Figure 3 also shows the emerging codes (sub categories) for each core category.

Sorting: Network analysis and visualization

Another key activity in QDA is *sorting*. The ways in which data and observations are sorted affect the ways of reflecting on the analysis and interpreting the observed phenomena. In fact, data layout and visualization usually help the analyst to recognize the emerging structure of the phenomenon or thesis that is being studied.

Cohere has a network approach to data sorting and visualization. Data, codes, and memos can either be listed (ordered by creation time or code type) or represented in a graph like structure. Images associated to codes in Figure 3 represent the icons used to visually recognize codes while exploring memos and data in Cohere's graph like structure.Below we present 3 examples of how by coupling network visualization and code searching, Cohere provides novel ways visualize results of qualitative data analysis.

Example 1

Cohere supports focal network searches, therefore it enables the analyst to focus on one piece of data or observation and search the database by focusing on that element. Figure 4 for example, shows the representation of the activities of the Pink group as they have been observed and coded in the use case. By looking at the image we can recognize that 4 participants have been addressing the group attention on different aspect of the learning experience. Some of them, for instance, by asking questions to the entire group (see question icons in Figure 4). By looking at node icons the analyst can make sense of the different rhetorical moves each participants have done and compare performances of the different participants. It is evident from the image that two of the participants (up right and up left of the image) have been more active then others.

Example 2

A part focal data analysis, Cohere also supports analysis on the full database of all memos. If we search all memos which have been connected with the code "post", accorting with the coding structure (see fig.3), we expect to obtain the network showing the people, and the data or rethorical moves that they have shared in the discussion forum . Results in Fig.5 show that there are 6 cluster, that is to say 6 particiapnts in the discussion forum and it is equally evident who are the most active and what activities they have carried out. This visualization offers a useful way in for data exploration and reflection. It is easy for the analyst to familiarize with the data and make visual and conceptual complarison between the emerging codes and their relationships.

Example 3.

Finally network search can be coupled with code search in order to spot more specific relationship between data. By searching for the code "complain", for example, and by focusing

on posts addressed to the all group we can see what participants have declared to be uncomfortable with the technology or unhappy with the course organization, and what participants have posted more complains (Fig. 6).

Conclusion

In this paper we have proposed a method and tool to support QDA in virtual environment. Moreover we have presented a proof of concept in which we show Cohere in use to observe students interactions in P2PU course.

Results of application shows that Cohere is particularly promising when making collaborative QDA, since it enable a virtual working space in which several analysts can share data and codes, and build on each other work. Moreover Cohere provides sophisticated coding features such as connections between memos and coding of those connections so that they can easily retrieved and searched. Finally we proposed a new network paradigm for data sorting and representation. This feature is particularly useful when it comes to codes analysis and phenomenon interpretation since the analyst can use visual cues to make sense of data and spot hidden connections.

Even thought this particular P2PU case study is still in progress we can describe some lesson learned on the course we analyzed, in particular on course pedagogical design. Although there is no cohesive design across the courses, the most popular activities that seek to facilitate the mediation of what we would call a 'learning space' follow a similar pattern for engaging peer and collaborative learning: 'read-think-reflect-share-peer comment'. Observations within the site (and metapages, including discussions with facilitators) suggest that 'Copyright for Educators' has implicit pedagogical designs that evolve during the 6 weeks that the course runs.

Active representation of the learning space draws on the learning design of the course, but also includes the process of learning as it is occurring within the particular learning space. Representing this can help visualizing structures of intended learning, and the 'learning in use', and guide or inform the design process for future outlets within this particular open course, or other OER. We discuss these in a related paper at this conference, whereby the relation to peer interaction and distributed mentoring is further explored. The figure below exemplifies pedagogical design implicitly evolving within this particular learning space. as a process. The intended outcomes and audience are explicitly stated in the course outline, and the pool of learning materials is structured in such a way to promote an inscribed pedagogy that addresses three core dimensions (see bottom left corner – part of tutors' role in relation to defining learning outcomes):

i. Informative: help indentifying copyright issues around education
ii. Practical: work with different IP jurisdictions and the legal practicalities for open education design
iii. Social and deliberative: exchange ideas about open education beyond and within the context of copyright

The network of interactions mediated through the interface tools facilitated by the site (see roles, tasks and activities in the map), produces a set of novel resources that if visualized

appropriately, it presents structures of intended learning, and the 'learning in use'. These can guide or inform the design process for future outlets within this particular open course, or other OER(s).
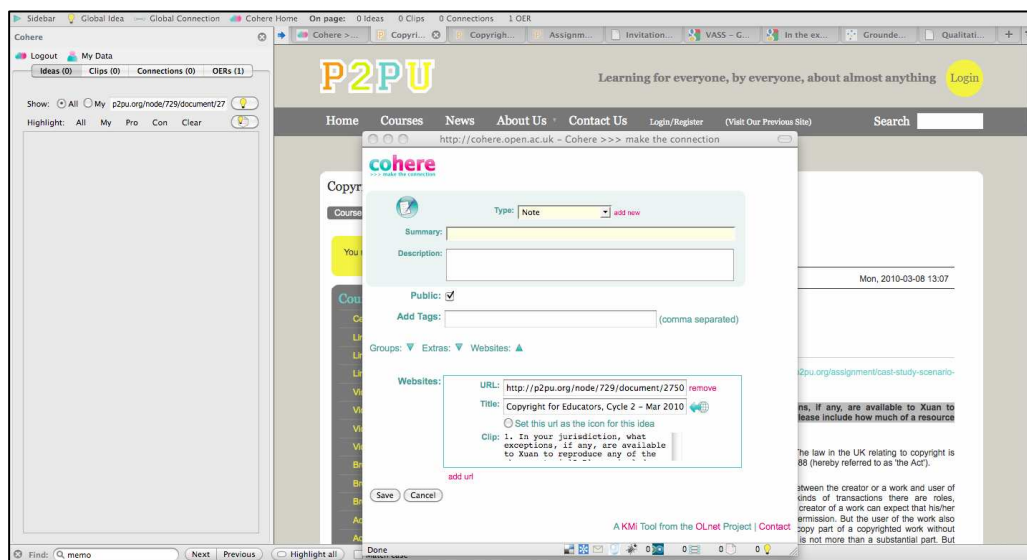
Figures

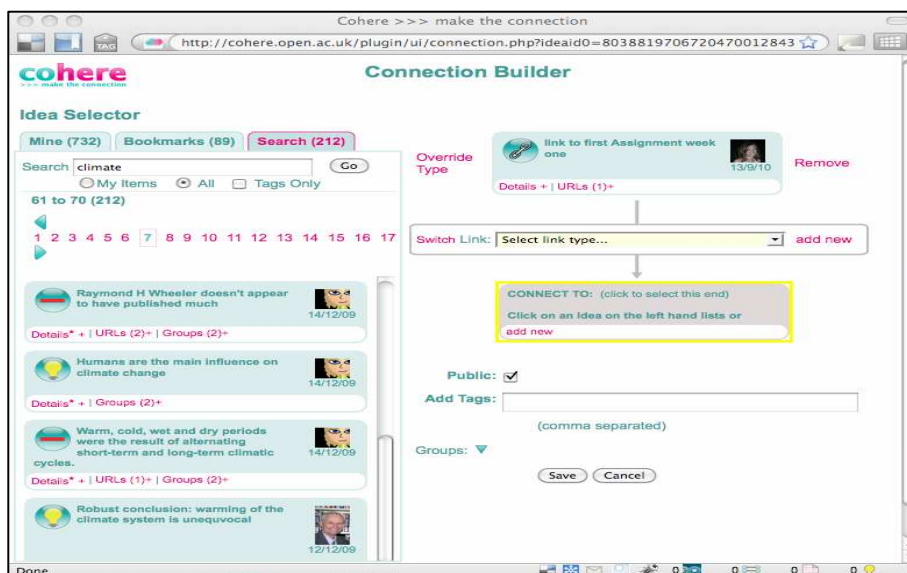**Figure 1: Coding and Memoing through the Cohere's sidebar**

Fig.2: Connection builder window: Memos can be selected between your own, bookmarked or can be searched by keyword/code
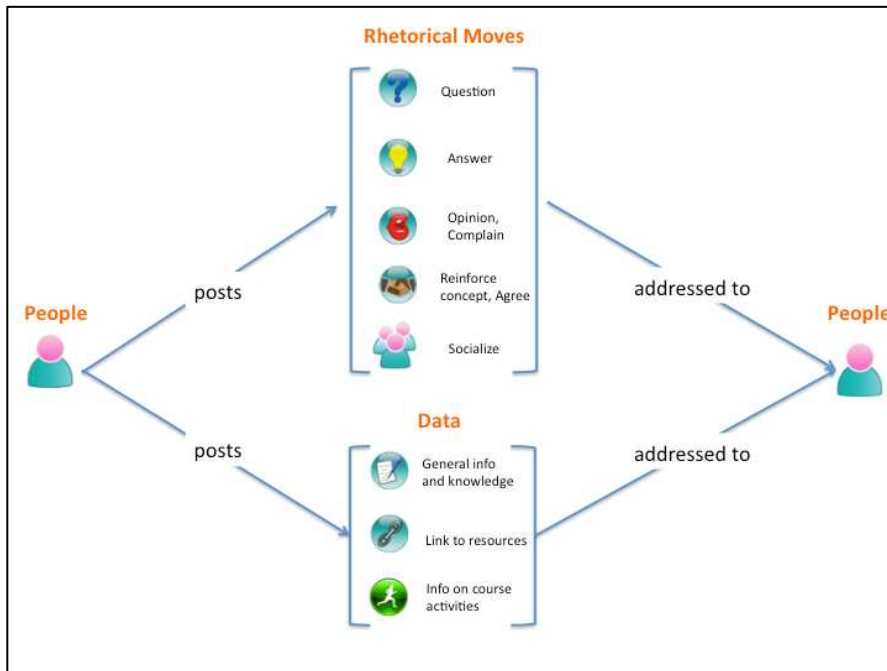
Fig. 3: Structure representing main categories, sub categories, and relationship between them
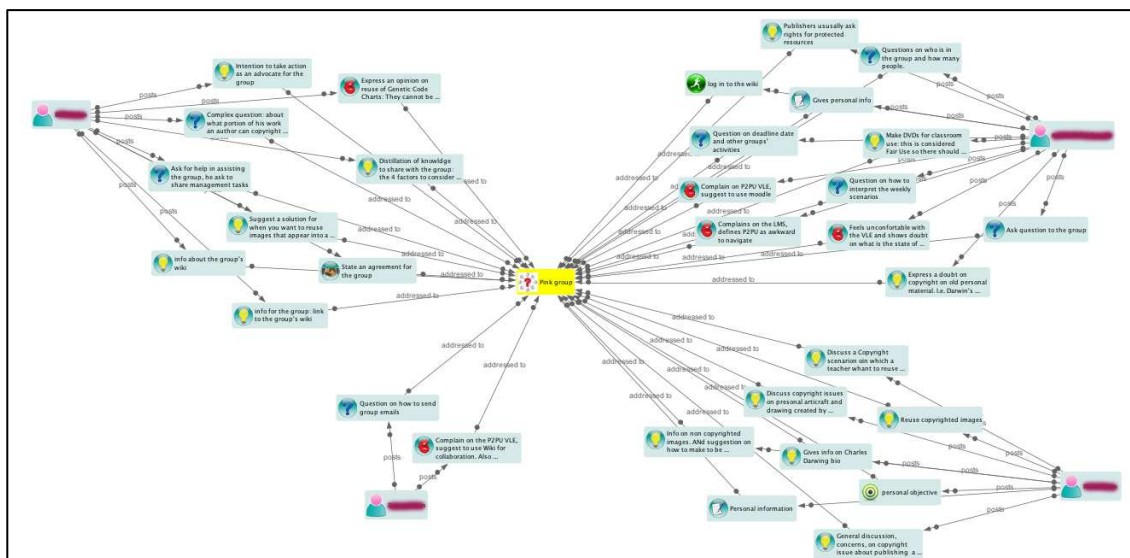
Figure 4: Network of memos showing what people contributed to the pink group and the nature of the contribution. Icons represent main code sub-categories (purple lines overwrites participants names)
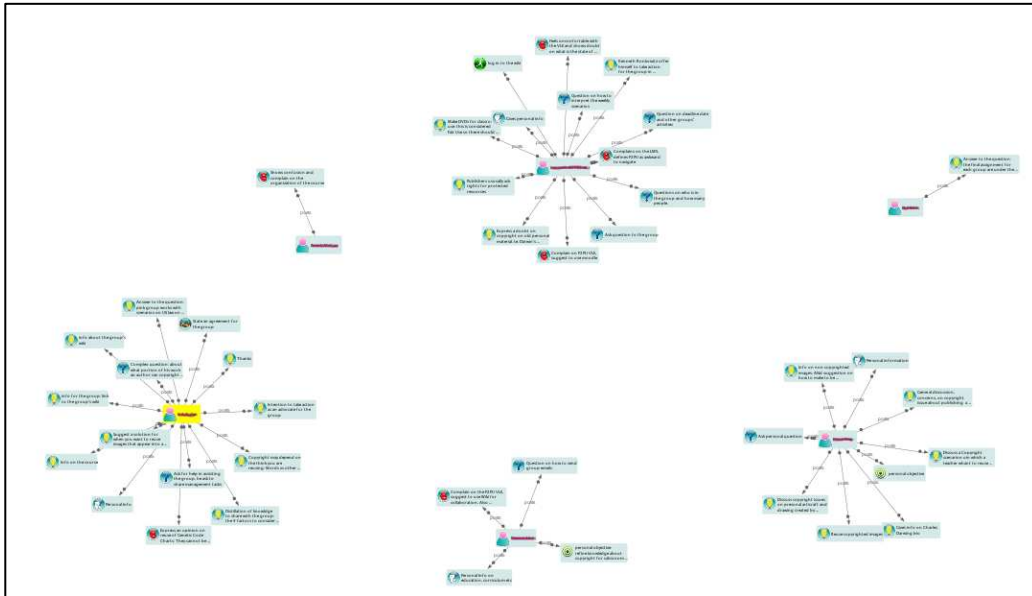
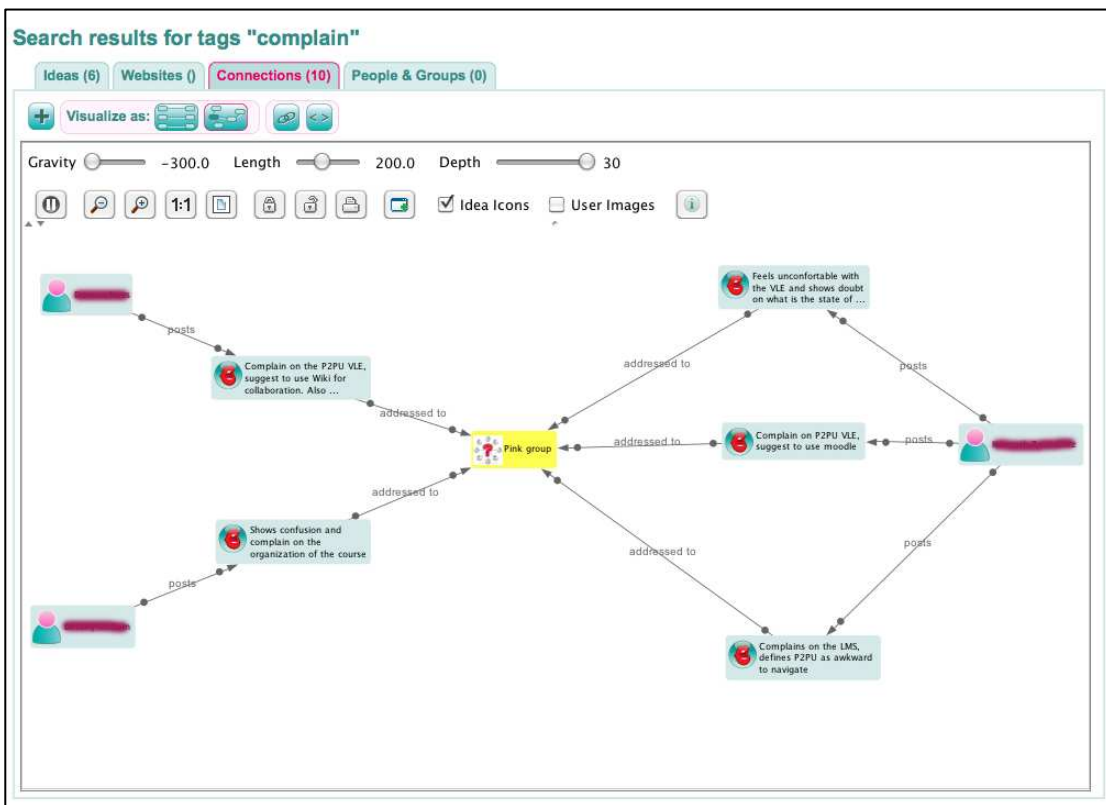**Figure 5: Clusters representation of memos per participant and posts**

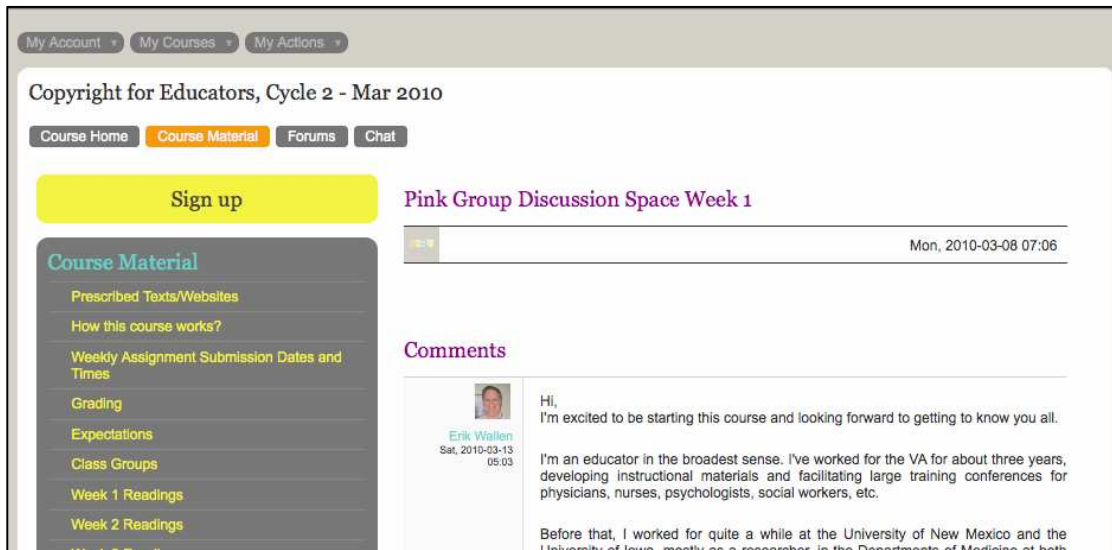**Figure 6: Coupled search of memos by code and semantic connection**

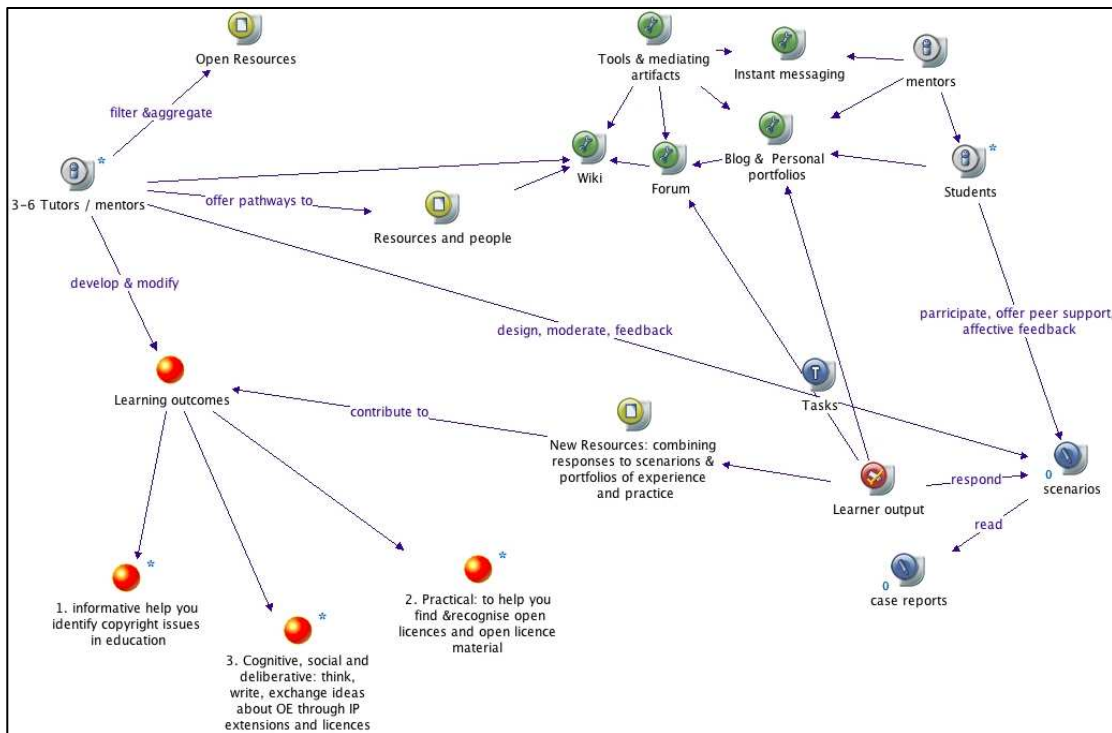**Figure 7: P2PU: Copyright for Educators group discussion space**

Figure 8: Implicit pedagogical design in the P2PU course 'Copyright for Educators'

Acknowledgments

Bibliographic references

De Liddo, A. (2010). From open content to open thinking. In: World Conference on Educational Multimedia, Hypermedia and Telecommunications (Ed-Media 2010), 29-30 Jun, Toronto, Canada.

Denzin, N. K. and Lincoln, Y. S. (2000). *Handbook of Qualitative Research*. (2nd Edition). Thousand Oaks, CA.: Sage.

Hine, C. (2000). *Virtual Ethnography*. London: Sage,.

Jones, S. (1999) (ed.) *Doing Internet research: critical issues and methods for examining the Net*. Thousand Oaks, CA. and London: Sage

Markham, A. & Baym, N. K. (Eds) (2009). *Internet Inquiry: Conversations About Method*. Thousand Oaks, CA. and London: Sage.

Murthy, D. (2008). Digital Ethnography: An Examination of the Use of New Technologies for Social Research. *Sociology*. 42(5): 837-855.

Snape, D. and Spencer, L. (2003). The Foundations of Qualitative Research. In J. Richie and J. Lewis (Eds.). Qualitative Research Practice (p. 1-23). London: Sage.

Strauss, A. L., and Corbin, J., (1998). *Basics of Qualitative Research: Techniques and Procedures for developing Grounded Theory*. London: Sage.

About the authors

Anna De Liddo

Research Associate, Knowledge Media Institute, Open University (UK)

Anna De Liddo is Research Associate at Knowledge Media Institute of the Open University (Milton Keynes, UK), where she works in the Open Learning Network project (www.olnet.org) at the design and development of a Collective Intelligence socio-technical infrastructure to enhance collaborative learning in Open Education. She gained her PhD at Polytechnic of Bari, Italy, investigating ICT for Participatory Planning and Deliberation. After that, she held a Post-Doc position at the Open University within the ESSENCE Project, investigating and evaluating human-centred computing tools to help tackling wicked problems such as Climate Change.

KMi (Knowledge Media Institute)
Open University
Walton Hall,

Milton Keynes,
MK7 6AA, UK
a.deliddo@open.ac.uk

Panagiota Alevizou
Post-doctoral researcher at the Open University's Institute of Educational Technology

Panagiota Alevizou is a post-doctoral researcher at the Open University's Institute of Educational Technology working on the Open Learning Networks project (Olnet). As part of her research she has been engaging with numerous stakeholders and projects in the OER community to develop working framework on the nature of openess and collaboration that characterizes the mediation of open resources, while addressing the opportunities and challenges relating to participatory interfaces, web 2.0 pedagogies, adoption and (re)use. Her broader background is in media and communications and her interest in open source/ open content communities was sparked while working on her PhD and has informed her teaching and research at the universities of Sussex and London School of Economics and Political Science

IET (Institute of Educational Technology)
1st Floor Blue, Jennie Lee Building
The Open University,
Walton Hall,
Milton Keynes,
MK7 6AA, UK
p.alevizou@open.ac.uk

A Method and Tool to Support the Analysis and Enhance the Understanding of Peer-to-Peer Learning Experiences, Anna De Liddo, Panagiota Alevizou ⓒ

Proceedings | Barcelona Open Ed 2010 | http://openedconference.org/2010/
Universitat Oberta de Catalunya | Open Universiteit Nederland | Brigham Young University

14