Notes and annotations as information resources in a social networking platform

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ARTICLE INFO

ABSTRACT

Taking notes and annotations contributes in the learning process. Many platforms are developed as Computer Supported Collaborative Learning (CSCL) thanks to advancements in new technologies. A common limitation of these platforms is the restricted ability to share/retrieve notes and annotations (Su, Yang, Hwang, & Zhang, 2010a). This is because the annotations in these platforms are disconnected from the information system and they are only accessible in the annotation system. As a result, the annotations could not be indexed as any other information resources (e.g., a document). This means that the annotations are not accessible/visible like other resources. In this paper, we present an original semantic model in which notes and annotations are modeled as information resources. The semantic model is used within the MEMORAe web platform. Then we detail an experiment of collaborative learning made within a university course using the MEMORAe web platform. The feedback of this experiment shows us that students are satisfied with the use of the MEMORAe web platform for helping them to index and retrieve notes and annotations as any information resources.

1. Introduction

In a collaborative learning context, taking and sharing notes and annotations is a way to specify and exchange ideas. The collaborative learning is defined as "methodologies and environments in which learners engage in a common task in which each individual depends on and is accountable to each other" (Lan et al., 2009). (Alavi, 1994) views that collaborative learning increases the learner's contribution in the relevant subject and promotes problem-solving skills among learners. The advancements in new technologies and in Computer Supported Cooperative Work (CSCW) has enabled a dedicated style of learning called Computer Supported Collaborative Learning (CSCL) (Koschmann, 1996). As a consequence, many platforms are developed as CSCL and especially web-based platforms for collaborative learning (Barak, Herscoviz, Kaberman, & Dori, 2009) thanks to web 2.0 technologies (Lytras, Sakkopoulos, & Pablos, 2009b). Such platforms have taken into consideration the necessity of taking notes and annotating documents. A common limitation of these platforms is the restricted ability to share/retrieve notes and annotations (Su, Yang, Hwang, & Zhang, 2010a). This is because the notes and annotations in these platforms are disconnected from the information system and they are only accessible in the note and annotation system. As a result, the note and annotations could not be indexed as any other information resources (e.g., a document). This means that they are not accessible/visible like other resources. In order to solve this problem, we propose to consider notes and annotations as information resources in their own rights. As a consequence, notes and annotations could be shared and indexed like any other information resource (e.g. a document).

In this paper we remind the definitions of notes and annotations and we specify the definition that we adopt (Section 2). We also present the role of notes and annotations in collaborative learning and the limitations of current collaborative learning tools for managing notes and annotations (Section 2). We present an original semantic model called MEMORAe-core 2 in which notes and annotations are modeled as information resources (Section 3). Then we present the MEMORAe web platform that uses MEMORAe-core 2 semantic model and we illustrate how this platform is used to support managing notes and annotations as any information resource (Section 4). An experiment of using the MEMORAe web platform within a university course is detailed (Section 5). We discuss our proposal (Section 6) before presenting our conclusion.

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2. Notes and annotations in collaborative learning

2.1. Notes and annotations definition

Makany, Kemp, and Dror (2009) defines the note as being the essential of the information taken from a certain source. This source could be a lecture, a phone call, a meeting, etc. Bringay, Barry, Charlet, and Krim (2007) considers that an annotation is a particular note that has a target which can be an other annotation, a collection of documents, a document or a document segment (a paragraph, a phrase, etc.). The annotation's target must not be confused by the annotation's destination. The target is the annotated object whereas the destination is to whom the annotation is addressed. Both notes and annotations have a certain destination which could be the user himself/herself (personal use) or other members, but only annotations have a particular target. So when the user creates an annotation, he/she intends to comment, explain, etc. a particular thing.

According to us, the notes and annotations are user's transcription of ideas. An annotation is a transcription of an idea about a particular target whereas notes do not have targets.

2.2. Notes and annotations role in collaborative learning

Many research studies have pointed out the important role of taking notes and annotations for supporting collaborative learning. Nokelainen, Kurhila, Miettinen, Floreen, and Tirri (2003) affirms that taking notes and annotations motivates the individuals' ability to learn which in turns enhances the collaborative learning process.

Marshall and Brush (2004) indicates that sharing notes and annotations provides an opportunity to facilitate making individual knowledge a public one. As a consequence, the knowledge value of these notes and annotations is accumulated when they are shared. Yang, Chen, and Shao (2004) precises four benefits for implementing notes and annotations taking within a collaborative learning environment:

1. *Attention*: helps the learners to focus on a particular subject (e.g. an annotated sentence).
2. *Discussion*: encourages the learners to discuss a subject based on each one's particular opinions.
3. *Organization*: Learners could construct their own knowledge based on other notes or annotations.
4. *Indexing*: Learners should be able to easily retrieve notes and annotations by means of an indexing system.

Indexing notes and annotations requires considering them as information resources in their own rights. Thus, it would be possible to search an annotation/a resource by its own index(es). Considering the annotation as an information resource in its own right requires to precise a link with its target. This link enables the accessing of the target by its annotation.

2.3. Limitations of current note and annotation taking platforms

Many collaborative learning platforms have recognized the important role of notes and annotations. For example, Annotea[1] is a web annotation tool proposed by the Word Wide Web Consortium. Annotea improves the collaboration by sharing annotations of a web document or a selected part of it. However, annotations in Annotea are considered to be as metadata of the document and are only accessible via the annotated document, so they are not themselves information resources. Yang et al. (2004) and Su, Yang, Hwang, and Zhang (2010b) proposed a PAM (Personalized Annotation Management) in which learners annotate shared documents. In this case, annotations become part of the annotated document and we are obliged to open the document in order to access its annotations. Concerning the note-taking platforms, Microsoft One note[2] and IBM note[3] are powerful note taking tools. Nevertheless, notes are not information resources and they can only be shared by e-mails.

These systems consider the annotations as an integral part of the annotated document. Thus, it is not possible to index these annotations. Accessing these annotations requires a previous search to the annotated document.

3. Note and annotation modeling within the semantic model MEMORAe-core 2

In this section, we present how we model notes and annotations as information resources in their own right in MEMORAe-core 2 model. We then specify (in Section 4) how this model is exploited within the MEMORAe web platform for collaborative learning.

MEMORAe-core 2 (mc2) semantic model (Fig. 1) is a part of MEMORAe approach for managing heterogeneous resources of knowledge in organizations. This model contains the concepts that describe "how we collaborate". MEMORAe-core 2 is built using owl (Web Ontology Language). The model focuses on knowledge sharing between groups of individuals within an organization. So there are two main aspects in MEMORAe-core 2:

- *Modeling the individuals and groups of individuals*: The model views the organization as a set of users belonging to groups. Each group has its own sharing space in which users can share or access knowledge resources. Each user belongs to at least two groups: personal and organizational. The user's personal group has only its user with no other members (this is for personal use). Organizational group has all members of the organization.
- *Modeling the resources of knowledge*: The resources in MEMORAe-core 2 are defined as "vectors of information". The resources are divided into two main categories: simple and composed. A document, an agent can be direct examples of simple resources. Composed resources are composed of other resources (e.g: a forum is composed of many forum posts).

MEMORAe-core 2 model uses the following semantic web standards (Deparis, Abel, Lortal, & Mattioli, 2014):

1. sioc (Semantically-Interlinked Online Communities) (Breslin, Bojars, Passant, Fernandez, & Decker, 2009): It aims to enable the integration of online community information.
2. foaf (Friend of a friend) (Brickley & Miller, 2010): It describes persons, their activities and their relations to other people and objects.
3. bibo (Bibliographic) (DArcus & Giasson, 2009): It describes the bibliographic resources.

We consider notes and annotations as resources in their own part. We modeled them in this way in the MEMORAe-core2 model. The "mc2:Note" class is added to MEMORAe-core 2 model using "bibo:Note" class as a base (by equivalence). The "mc2:Note" class specializes the "mc2:Document" class and this latter is a subclass of "mc2:SimpleResource". The document is considered to be "a

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