

# Supporting Collaborative Learning Across Social Media Applications

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**Abstract:** The lifelong learner of our times may use multiple social media applications to keep in touch with the emerging knowledge and with the relevant people in his domains of interest. However this kind of activity is not supported by the existing applications. This poster proposes a scenario and an application to help users manage their social learning activities in order to find the most relevant and most trusted information produced in the network.

## Introduction

The domain of Computer Supported Collaborative Learning aims to provide support for students learning together using computer technology. The way people learn in a social environment has been studied for more than half a century (Vygotsky, 1934/1986) and the fact that people learn socially is now generally accepted. Learning can be done in formal environments like school and higher education but can also be performed continuously through the learner's life. This lifelong learning can be done through postgraduate specialization courses taken by the learner from time to time or can be performed through the participation of the learner in a community of practice (CoP) (Lave & Wenger, 1991). A CoP is a group of people specialized in a domain that interact exchanging information and producing knowledge for that domain. The newcomers in the group learn by acquiring the community's knowledge and sociocultural practices.

The usage of communities of practice in CSCL has grown a lot due to the fact that the Internet has spread all over the world and the tools for online collaboration have become very evolved. The list of tools for the CoP started with mailing lists, forums, wikis and blogs and continues now with complex social networking environments. These environments allow the members of the community to produce content, to maintain and develop social connections, to find relevant content and to discuss it. All these features can be used inside a community of practice for lifelong learning. The problem emerging here is that the next step for these communities is their scattering across multiple social networking environments, and this is what is happening these days. The members of the communities are using multiple applications for creating, sharing and discussing content. The learner, especially the newcomer (or novice) will have difficulties to follow the relevant conversations, to retrieve the best content and to find quickly the needed and most trusted information.

This poster aims to describe the learning scenarios for a user in this kind of communities and to describe an application that aims to help the learner to manage his interactions with the community. The paper continues with a section that discusses the learning scenarios where this application could be used. The next section presents some preliminary results that we obtained using this application. The final section presents the conclusions of the work performed so far and the directions for future work.

## Learning Scenario

The scenario that we considered is one where the learner is a member of a community that uses multiple social applications (blogs, video sharing, photo sharing, social bookmarking). The tutor is simply a more experienced member of the community. His role is to guide the learner, help him to become an advanced or expert member of the community, introduce him to the community's artifacts. This scenario is a typical CoP learning scenario and it is well defined in (Lave&Wenger, 1991).

The relation between the tutor and the learner is one of the most interesting aspects of this scenario. This relation has the following characteristics:

- Interchangeability – the learner and the tutor can change roles for some specific sub-domains of the community where the learner might be more knowledgeable
- Acknowledgement – the tutor acknowledges the fact the learner follows him and tries to guide him in a direct way – communicating and providing feedback. If the relation is not acknowledged, the learner just follows the expert tutor and learns by reading the content provided by this one.
- Trust – the tutor is part of the learner's network. Therefore the tutor trusts him and also trusts the content provided by the tutor. The content on a specific subject created by a trusted user will be more relevant to a learner than the content recommended by a classical search engine.

- Strength – the relations can be of multiple types and strength. We classify the relations considering the most used names in the social applications and we describe which are their characteristics and their relevance for our work
  - “Friendship” – bidirectional, acknowledged relation. Both users acknowledge the relation inside the application. It is the strongest relation that can be usually detected in a social networking application
  - Follower – unidirectional, usually not acknowledged, usually the relation between a learner and his tutor. The learner subscribes to the content added by the tutor or comments on his blog or adds him to his blogroll. This relation shows that the follower watches the content produced by the followed. This relation usually implies trust between the follower and the followed.
  - Followed – unidirectional, usually not acknowledged. This is the inverse relation of the one above. The “followed” relation doesn’t generally imply trust as the tutor can’t have any idea or control over who’s reading his content. This is the weakest relation considered.

A final aspect of the learning scenario is that the user can learn from various types of content: slides, videos, text. These are posted in social environments and it might be very relevant for a learner to retrieve them when needed. The only way available to do that is by using the metadata for that content, the tags with which the authors have annotated their content.

Considering those aspects we consider that we can help the learner in his activity by:

- Profiling the user and his peers in the network based on their interests. Their interests will be obtained from the tags that the users and their peers are using to annotate content
- Providing relevant search results and recommendations based on content provided by the most trusted users in his network.
- Providing relevant tutor recommendations for a given subject.

For a tutor, this application could be relevant to monitor the activity of his followers, to manage, analyze and retrieve the content they produced and to identify the most knowledgeable learner on a given domain. As the relations are interchangeable the tutor can also use the application to keep in touch with the new discoveries in the domain he’s interested in.

## Description of the application

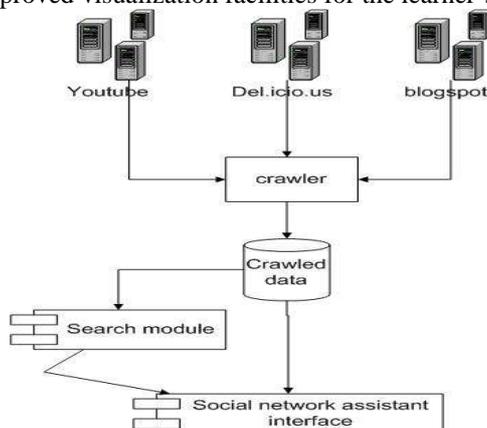
We have decided that the purpose of the application should be to manage the network of the learner providing personalized search and recommendations, providing relevant results that the learner can *trust* as they are provided by his community of practice.

In order to achieve these goals, the application needs to monitor the learner’s existing network, indexing resources for future search, discover potential new peers, answer the learner’s queries and perform recommendations.

The monitoring part is made of a knowledge acquisition module that fetches data from the social networking applications that the learner uses. The module uses the specific social applications’ APIs to extract data about relations, content and annotations produced by the learner and his peers and the peers of their peers.

The search module uses the data indexed by the monitoring module to provide the user with results and recommendations. The search is performed using a tag search algorithm – FolkRank (Hotho, 2006). This algorithm allows search on all the types of documents indexed by the monitoring tool – videos, photos, presentations, bookmarks, considering only the tags added by *trusted* users for those specific documents.

Finally the last module of the application is the user interface. This aims to provide results and also to offer improved visualization facilities for the learner’s network.



## Preliminary results

The first results were the analysis of some user networks in order to see their structure, their dimension, the number of resources, the problems that could appear in search. For example, using data obtained from the monitoring tool we have analyzed the network of a random active user on Youtube.com and we have searched some concepts that are used by people in his network. The user had 826 other users connected with him on the first two levels. These users created a number of almost 10,000 annotation on movies with more than 17000 tags. These numbers are for one user and for only one platform. If the user would have used also a blogging platform and a social bookmarking one, the numbers would have been much bigger.

After gathering the data we have analyzed the tags used in the network using tag clustering and we have discovered that depending on the communities that a user belongs to, the tags can have different, ambiguous meanings. For example, we have identified in the same user's network the term "eclipse" with two different meanings – astronomic phenomenon and music item – and probably if the study would have contained a social bookmarking platform as well, we would have also identified the meaning "software application". This means that we need to consider the semantic differences between words inside a user's network because even when searching a user's network, which we expect to be a focused space, we can find polysemantic words. We also used Markov Clustering Algorithm (vanDongen, 2000) to find clusters of tags. These clusters can help the user to rapidly identify the topics discussed inside his network. An example with the first 3 sets of tags for the user that was discussed above is presented below:

- obama 2008 mccain Election president barack Hillary Clinton convention DNC democrat campaign primary presidential elections voting vote Republican Democratic
- metallica hetfield kirk lars ulrich else matters
- vista windows apple PC macintosh jobs

## Conclusions

We presented a learning scenario and an application for managing the learner's activities in a distributed community of practice. We believe that the learning scenario is adapted to the learning process in the Web 2.0 communities and we have developed an application that helps the user adapt to such an environment and to obtain maximum benefits from it. We have also studied the structure of the data existing in such a network in order to improve the existing tag based search algorithms.

## References

- van Dongen S., *Graph Clustering by Flow Simulation*. PhD thesis, University of Utrecht, May 2000.
- Hotho A., Jäschke R., Schmitz C., Stumme G., *FolkRank : A Ranking Algorithm for Folksonomies*. *LWA 2006*: 111-114
- Lave J. & Wenger E.(1991) *Situated Learning: Legitimate Peripheral Participation*, Cambridge University Press.
- Vygotsky, L. (1934/1986). *Thought and language*. Cambridge, MA: MIT Press.

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