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SoLearn : a social learning network

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Abstract— We have assisted the development of a significant number of e-learning systems, which have achieved great success in distance teaching and education, but most of these systems present some limitations and some disadvantages. Most of them are closed where learning resources are fixed and the adaptability, the flexibility, and the social relations are ignored and in most cases are not taken into account at all, actors of such systems tend to have a minimal collaborative navigation, awareness features and social relations analysis and they often find themselves isolated without a sense of what the rest of the learning community is doing. Significantly, new technologies had recently emerged: the social concepts and the social awareness features led to a significant change in the paradigm of collaboration and learning. These emerging technologies are increasingly being adopted to improve remote education and provide better enhancement for learning. These improvements are offered to students who, regardless of their computer systems, can collaborate to improve their cognitive and social skills. In this article, we present the concepts of a new paradigm of learning: CSSL (Computer Supported Social Learning) where we have implemented a first prototype called SoLearn that groups some of those concepts, SoLearn (A Social Learning Network) aims to provide its users with a new learning experience based on the social networks and enhancing with the social awareness concepts.

Keywords- social networks, CSSL, e-learning, social awareness, web communities, folksonomies.

I. INTRODUCTION

Collaborative learning is a strategy that aims to increase cognitive and behavioral profiles of learners. Several systems have been developed, but most of these Computer Supported Collaborative Learning systems have a lot of drawbacks [1].

New technologies had recently emerged: (1) the Social Web, which is used to describe how people communicate or interact with each other throughout the Web, the social websites are created around the connections of people of the same interest and the same preference. (2) The Social Awareness, which is used to understand the activities of actors. These technologies could well be a good candidate for developing new e-learning applications.

II. PROBLEM STATEMENT

In the current context where the Internet is booming, new forms of collaboration between remote participants are possible, which gave rise to new research in the field of e-learning. The developed works in this context are principally intended to propose new paradigms of working in teams and develop new collaborative learning environments that rely on computer networks. The new generation of Web (Web 2.0) focuses on the development of collaborative tools on the Web. Researchers on web technologies predicted with Web 2.0 to see an explosion of content generated by users, where the collaborative learning environments will be the main beneficiaries.

Based on this finding, it seems important to build on the two challenges mentioned earlier in the introduction to develop new collaborative learning environments that allow remote users to collaborate, and in particular, to share and build the collective knowledge and the social capital in a smooth way.

It is in this context that our work steps inside. It aims to: introduce the key concepts of a new learning approach: the CSSL - Computer Supported Social Learning- that means, to add social dimensions to the learning process basing on the social networking concepts to make the student feel like learning with a real human being not only looking at a fixed screen and to enhance the environment with social awareness features so that the user will be aware of all what is happening and what happened around him.

In this paper, we will propose an evolving social learning network which can adapt itself to its users in response to the system state. Our system is open, users can gather in social networks, so that any user can freely choose with whom he likes to learn, our system also gives structured awareness features to users in order to enrich their learning experiences, so that the system will help them to concentrate only on the learning process and not on the technology per se.

The rest of this paper is organized as follows. The next section presents some related works. In section 4 we illustrate the proposed model. Section 5 describes how does the model work in a real situation and section 6 presents an experiment conducted during the test period of

the system. Finally section 7 presents some conclusions and further works.

III. RELATED WORKS

The observation of human beings shows that they communicate and work together for a shared goal. Several psychologists demonstrated the effects of collective work on the process of cognitive development of people. Generally, people prefer to cooperate with each other. This can be for: Benefit from the partner's knowledge, building strong personal relationships with others, increasing the quality of work by critics and experience exchange [2], increasing the choices, as each person thinks differently, each may propose a different solution and to avoid duplication and redundancy of tasks. The concepts of collaboration have been applied since long time in many areas such as economy, sports, military, education, etc. our main focus will be on the collaboration in learning communities. While Collaborative learning [3] is a process in which participants acquire new skills and build new knowledge by means of the interactions that take place within the members of a group; E-learning [4] is a discipline devoted to research in educational technology that focuses on the use of Information and Communication Technologies within the context of collaborative learning. As a result of the efforts made in this research domain, many systems have been proposed in order to support the realization of different collaborative learning situations. These platforms, called Collaborative Learning Systems, typically offer an environment with several tools that users may employ to achieve some learning activities [5]. But in most cases, these collaborative learning systems have a lot of drawbacks and limitations, such as: the non consideration of adaptability, customization, reusability, awareness features, social dimensions, recommendations and so on.

Recently, new dimensions or technologies are used to remedy those drawbacks of classical learning environments, for this purpose we opted to use revolutionary and promising trends: the social concepts and the social awareness, where we believe that several limitations of the classical collaborative learning systems previously mentioned can be eliminated or at least their negative effects can be reduced.

The Social Web is a specific term for the World Wide Web as a kind of Social Media. The term is used to describe how people socialize or interact with each other throughout the Web. The Social Web mostly refers to Social Networking and Content-Sharing sites within Web 2.0. These social websites are mostly formed around the connections of people of the same interest. There are for example said to be "people focus" websites such as PalBlast, Bebo, Facebook, and MySpace, that focus of social interaction, often by making the user create an online identity (a profile).

Recently sites have begun to employ new methods to make Web surfing a social experience. Users of social bookmarking sites like Del.icio.us can add Web documents to a collection and "tag" them with key words. The documents, tags, relationships, and other user-supplied information are compiled into what is called a "folksonomy" [6]. In the tagging systems, people are able to describe their own resources with their own words without any limitation and also find other users with similar interests as well as similar interesting resources in the tagging systems. Tags assigned by the users embody valuable knowledge, which can be utilized to search for content, to explore new content by following popular trails, and so forth [7]. Variability between writing some equivalents tags is disadvantageous in a search for resources by tags. Many researches attempt to overcome the limitations of folksonomies bringing them closer to semantically structured representations [8][9]. Tag clouds are frequently used to visualize a folksonomies. Tag clouds display more frequently used tags in a larger font, and display all tags in alphabetical order.

Often when speaking about the Social Web, "collective intelligence" or "social capital" is mentioned. Collective intelligence refers to the phenomena of internet users getting together, sharing content, in order to create something bigger than one single person could do [10] and the social capital refers to the value that an individual gets from the social network and to the stock of social trust, norms and networks that people can draw upon to solve common problems. While human capital refers to properties of individuals such as knowledge, social capital implies connections among individuals and the value accrued from these connections [11]. Knowledge is created and exchanged to a large extent through informal social interactions [12] and knowledge flows depend on the connections between individuals and on their attitude about sharing knowledge [13][14].

In order to establish strong links between individuals and to collaborate effectively, the user needs to know many things about his collaborators: Who are they? What do they know? Etc. so that, everyone should be aware of all what is happening and what happened around him, that's exactly what the awareness provides. The notion of awareness in collaborative environments has been studied in much detail in the last years. "Reference [15] first popularized the term and provided a general definition of awareness as an understanding of the activities of others, which provides a context for the own activity". "Reference [16] refined this definition for educational groupware". In distributed communities, communication technologies alone seem not enough to promote communication and knowledge sharing [17]. Thus, virtual environments must provide means to communicate social cues and context information [18]. Supporting awareness – to be aware of the ideas, knowledge, and activities of the others – has been used as one of the strategies to increase knowledge sharing and collaboration opportunities [19]. Awareness systems help people to effortlessly maintain awareness of

others, thus facilitate lightweight, emotional, and informal forms of communication [20].

In next section we will describe in more detail the system’s model, since is the main object of this work.

IV. THE SYSTEMS’ MODEL

According to the limitations of the classical learning systems presented previously and on the basis of the promising benefits provided by the social aspects and the awareness features, we describe our system SoLearn: a Social Learning Network enhanced with the use of social awareness features. This section describes the design principles and the architecture of our system, then explains the individual system components and a real operating scenario.

A. System overview

SoLearn is a Social Learning Network which aims to:

- Give a major focus on the learning process and not on the technology per se;
- Provide intelligent recommendations, based on the observation and the analysis of the user’s social relations and activities;
- Allow learners to gather in small social networks;
- Recommend the best collaborators, the best tutors, the best learning tools at the right time;
- Make all actors also aware of all what is happening and happened in the environment;
- Provide for each actor an autonomous and adaptable space;
- Keep traces of all the activities;
- Notify all actors with the last updates;

B. Overall System Architecture

Figure 1. illustrates the architecture of SoLearn where we can find its different modules and interfaces:

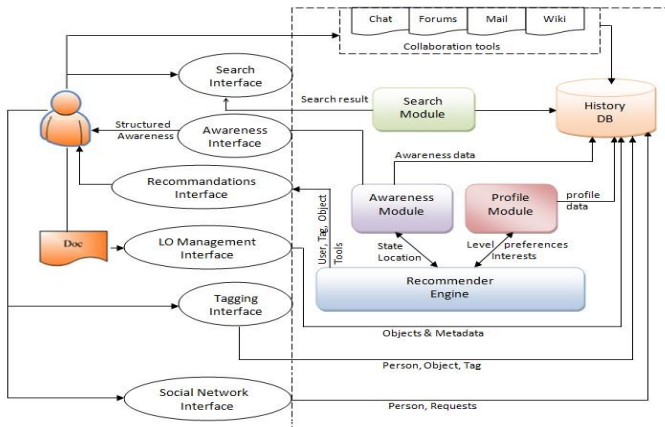


Figure 1. SoLearn Architecture.

- The **Recommendation Engine (RE)** is the core of our system; the operation of the latter is based on extracting the knowledge from the Awareness module and the user Profile module. The RE produces the recommendations according to the “Collaborative Filtering” strategy; the latter is a method of making automatic predictions (filtering) about the interests of a user by collecting preferences or taste information from many users (collaborating). But, one of the biggest problems that adversely affect this method is the “cold start” problem; it concerns the issue that the system cannot draw any inferences for users or items about which it has not yet gathered sufficient information.

In our case, the “Cold start” will not pose any problem, since the learner at the beginning use of the system does not know in advance his needs in terms of the appropriate learning resources and the best collaborators, tutors, etc. (at First, he just sets general targets to achieve, for example, he wants to learn the java language, then he does not know in advance the experts of java language to contact them and the best learning objects he should take first), so, he starts looking for resources about java and as he goes along with his learning and interactions with other members of his community, the system will update his Cognitive, Behavioral and Social Profile and begins to record his preferences and his interests, at that time, the system can start recommendations according to a comparison with the his profile and the other members’ profiles and the overall system’s state. It’s exactly like teaching in face to face where the student has no idea in the first sessions on the details of such a course and does not know the other students who have a good knowledge in a particular field, but the day after the other, when the teacher begins to give details about courses he will start building an overview of what he will need and who should ask for help.

- The **Awareness module**: this module manages a set of indicators for the various users’ activities: the rate of activity / inactivity, rate of participation of each member in the completion of each task, etc. It also provides users with a set of perception, visualization and notification tools. Providing accurate and immediate information about users’ activities and the system’s state will reduce the waste of time searching for the relevant information.

The **Social Networking Interface**: provides users with means and tools to build their social networks whatever its type: learning, communication or development network. It’s in this space where actors manage requests or demands to join such a network. A Social Network Analysis tool will be

offered to provide complete information about who was in the network. We have defined four types of networks that delimit the relationship between the different actors: Learning Network, Assistance Network, Development Network and Communication Network. Gathering in little social networks can solve the debate of the number of learners a group must contain in the classical learning environments, because anyone will be free to choose learners who better fit his preferences.

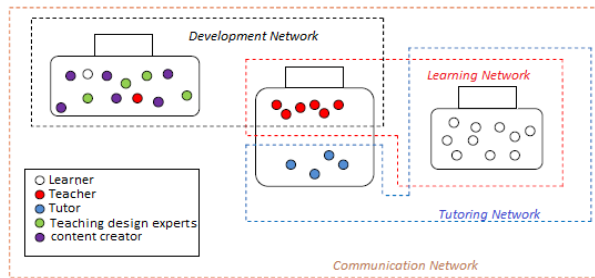


Figure 2. SoLearn different networks.

- The **User Profile Module**: This module is responsible to initialize the different profiles: social, cognitive and behavioral of each learner and their new updates that takes place at the end of the different activities namely: learning, assessment, collaboration, application support, etc.
- The **learning resources management interface**: it supports the management of learning objects: creation, update, search, personalization, etc. To keep track of learning objects we need to store them in a special database called a Learning Object Repository (LOR). The role of LOR is to aggregate a collection of learning objects for a defined community and store them in a single location. CAREO (<http://careo.netera.ca>) is an example of a digital repository with customized learning objects metadata (LOM) which is widely used to index learning objects. LOM is a data model used to describe a learning object and similar digital resources used to support the reusability of learning objects, to aid discoverability, and to facilitate their interoperability. The RE needs this module to recommend the best learning objects for users that better fit their needs.
- The **collaboration tools interfaces**: it manages a set of a synchronous collaboration tools (chat, whiteboard, video conferencing, etc.) and an asynchronous ones (forum, e-mail, Wiki, etc.). The RE needs this module to recommend the best collaboration tools for users.
- The **Tagging interface**: It provides users with the possibility to tag the different objects created by the different users and allow them to participate in

the creation of the overall system Folksonomy. Using Tags will enhance the learning objects retrieval and classification, finding similar users according to tags will be also very easy.

- The **Awareness interface**: it's the bridge between the users and the awareness module, allows users to visualize the structured awareness produced by the awareness module, such as: "who is online, users' activities, resources they use, etc."

V. OPERATING SCENARIO

We all agree that one of the most big problems of the e-learning environments is the *technification* problem which refers to the need of technical skills that makes it difficult for teachers and students to use learning systems, that means, users of this type of internet systems will concentrate on the way to learn how to use the system and not to concentrate on the learning process; so that to reduce the negative effect of this problem we have proposed to implement a system that looks like Facebook, based on the statistics provided by the Facebook site: More than 500 million active users, 50% of our active users log on to Facebook in any given day, average user has 130 friends People spend over 700 billion minutes per month on Facebook. From these statistics we can assume that a very large number of people are familiar with the use of the most functionalities of Facebook, hence we assume also that the user of our system will easily use it.

To start a learning situation the learner must authenticate to access to the system. A successful authentication gives the learner the opportunity to access all services provided by SoLearn. The system automatically directs the learner to the News Feed or the system Wall. During his learning, the learner can invoke the following modules:

1) The news feed or the wall

The learner can invoke the "News Feed" to see the last activities' updates of the learning community; it looks like the Facebook wall. The SoLearn Wall is a metaphor of the classroom where the teacher casts the lessons and the learners start asking questions, commenting, debating and exchanging ideas about the lessons;



Figure 3. SoLearn Wall.

In this space learners can:

- Find their courses published by teachers;
- Download the courses;
- Add files, photos, videos, audio streaming and Status, which allow learners to inform their friends of their whereabouts and actions. Depending on the privacy settings in SoLearn, a learner can see the publication of all the other learners of his training level (Master 1 for example) or only the publication of his social network.
- He can add comments on the publications of the other members in the community;
- And also add Tags to the different learning objects and participate in the creation of the folksonomy.

2) *The Awareness features*

SoLearn provides some awareness features like:

- Who is online: a service that shows the online users in the system.
- What's going on now: a services that provides a global state of all the active users in the community, offering information about their location in the system and the task they are carrying out with the time of any action. Depending on the privacy settings in SoLearn, a learner can see the awareness information of all the other learners of his training level or only the information of his social network.
- Activities traces: keeps all records of all activities of the various members.

SoLearn provides also some Social Networking features, like:

- My Social Network: a space where a learner can see his social community that means the members he chooses to learn and interact with them. Our system provides the name, role (teacher or learner) and state of any member presented in the network, and according to the latter the system proposes to send them a mail if they are offline or whether to chat or send mail if they are online.



Figure 4. Example of a Social Network.

- Requests Management: Manages all the requests to join a social network; the learner has the choice to accept or to ignore any demand, the acceptance of a demand leads directly to the presence in the applicant's network and vice versa, the applicant becomes a member in the network of the learner who accepted the request.
- Show tag cloud: allows learners to see the entire folksonomy and to see the popular tags used in the system, clicking on a tag will show all the learning objects tagged with that tag and all the users they have used this tag to annotate learning objects.

VI. EXPERIMENT

An experimental study was accomplished within the computer science department of Guelma University (Algeria) with master and license students. Learners (counting 15) and teachers can have access to the system through the intranet of the university. The feedback of our system's usage was obtained through questionnaires at the end of system usage. Questions are taken mainly on browsing flexibility, social networking, social tagging and awareness features.

After a week of system use, it was established that from one hand, learners have appreciated the first prototype of our system (in alpha testing). In addition, learners have showed a big concentration when using the system. As mentioned on Table 1, the majority of learners have also appreciated the idea of implementing a learning environment that looks like Facebook, they find themselves familiar with the use of the most functionalities of SoLearn, another interesting feature admired by learners was the possibility to gather in a social network and freely choose with whom they like to learn, they also found it very interesting to be aware of all what is happening in the system. From another hand, teachers have appreciated so much the idea of the "Wall", they approve that having immediate "comments" from students and other teachers is an innovative feature, where they found a simulation to a real classroom, where teachers and students can discuss, debate and ask questions about lessons.

For the question "Is it interesting to find learning objects and users according to tags?" answers were shared, because learners were not familiar with such concepts of social tagging and folksonomies, then they couldn't determine the results that they expected from the system. For the question "Showing your interaction, is it a kind of spying or private life violation?" only 15% of learners' answers were positive, because, the majority of them consider that the fact of showing their interactions to the rest of the community where they belong, is exactly like the interaction in a real classroom, where anybody can see, hear and feel the actions of others, their gestures, cues, exchanges, and communications.

TABLE I. A QUESTIONNAIRE THAT MEASURES LEARNERS' AND TEACHERS' SATISFACTIONS.

Questions	Positive Answers
Are you a regular Facebook user?	95%
Do you find that using SoLearn is similar to using Facebook?	90%
Do you appreciate the SoLearn wall?	80%
Was the interaction easy at the beginning?	85%
Is it interesting to find learning objects and users according to tags?	30%
Does the global folksonomy give a real view of the system's trends?	35%
Have you used the tag cloud?	40%
Do you find that learning with your own network is a good idea?	95%
Do you prefer to only see the updates of your network?	80%
Is it interesting to be aware of all what is happening in the system?	95%
Showing your interactions, is it a kind of spying or private life violation?	15%
Is it interesting to show your statistics in your profile?	80%
Do you appreciate the system notifications?	70%
Did you like learning in a social sight?	95%

VII. CONCLUSION AND FUTURE WORKS

In this paper, we have presented a new learning approach based on the key concepts of using the social web and the social awareness, the CSSL, to address the problems of the classical learning systems namely: the adaptability the flexibility and the workspace personalization, our contribution has led to implementing a social learning network called SoLearn, the main core of the latter is the recommender engine, which is based on the information provided by the awareness and the users' profiles, SoLearn is designed as a social web environment for purposes of use simplicity where learners and teachers can gather in a social networks and try a new experience of learning in a social dimension.

Our future works will incorporate the semantic Web in the content creation and in the collaborative tagging process to remedy the problems of tag's ambiguity and to enhance the global folksonomy. In a further step, we will introduce the Social Networks Analysis which aims to measure the relationships between users, communities, URLs, and other connected information/knowledge entities. For us the nodes in the network are the users and communities while the links show relationships or flows between the nodes.

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