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25 April 2024

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ABSTRACT

We want to show how the paradigm shift in the patterns of adaptive e-learning, in which besides offering educational paths with different course materials, depending on student ability, students are also offered to take the role of peer helpers, according to algorithms of similar cognitive relationships and their interpersonal skills. This is particularly suitable for the creation of a network that not only develops contacts among students in the individual university, but with different universities and is a permanent link with the territory. This network is the tool that is essential for maintaining relations with alumni already entered the work world, allowing the learning community to become a true community of practice. This is made possible by the fact that the natural social relations, conceived in the context of learning, are strengthened in the development of a community of peers who come together and learn synergically. The students, who will become active players in the work world, should be encouraged to maintain contact with the academic community, especially in a world where lifelong learning is becoming increasingly essential to withstand the challenges of innovation and training. We believe that e-learning along with social computing is the right tool to develop these connections, which are managed and promoted by the institutions involved. To address this opportunity it is necessary to create a database populated by students, with their cognitive and social activities that will enable a systematic and methodological approach to build relationships beyond the narrow confines of a degree program, allowing the management and development of cross-cutting relationships, not subject (or at least to a lesser extent) to mere personal and spatial limits.

1. INTRODUCTION

Higher education and transfer of innovation require the construction and development of educational systems on different levels, where basic theoretical and methodological foundations can be acquired in various disciplines with an emphasis on good practice in collaborative environment.

It is very important to test new opportunities to end up with full participation (Lave and Wenger 1991) to the activities and practices shared and implemented by various communities in the field of higher education. In this context it is important to allow students already in training for the possibility of being able to compare the reality with highly skilled and international opportunities, creating the largest networks of connections possible among students, between students and industry, and between students and research centers. This can be done by exploiting the potential offered by information technology in communication, in particular we are referring to the tools offered by Web 2.0 and social computing, enhanced by methods of artificial intelligence, such as information retrieval, context modeling (Pasi 2010). The term Web 2.0 refers to the so-called second-generation Internet services. Currently the development of the training is closely and inextricably linked to the development of information and communication technologies (ICTs). Web 2.0 provides the user, even the least experienced one in the use of ICT easy-to-use tools such as, for example, social networking sites, wikis, communication and folksonomy tools, which emphasize collaboration and sharing between users. Similarly to the process that is evolving the Web of data into the so-called Web 2.0, the web of person, the E-learning is evolving into E-learning 2.0 (Downes 2005). Using the tools of Web 2.0 not only it is possible to create learning communities (Brown and Campione 1994), but it is also possible to transform these communities of learning into communities of practice (Wenger 1998).

These communities are a vehicle to create a connective tissue not only within the single university, but also between domestic and foreign universities - and laboratories - facilitating the integration of high level graduates in the international job market; these communities extend across the country and abroad the limit of the single nations, making possible the creation of a transnational, shared and common know-how for the communities of practice.

On one hand , this intervention raises the quality of teaching, allowing to reach "higher standards" in the learning-by-doing teaching methodologies. On the other hand, it allows to push the limits of national and local connections in the direction of the Internationalization - the Canadian experience in this regard is particularly significant (McGreal and Anderson 2007).

The creation of communities of practice and of learning, particularly if incorporated into traditional educational contexts, can certainly offer more opportunities for future graduates and doctoral students to compete in the global labor market, and can also offer more opportunities to contribute to develop the increasingly necessary links between research institutions, and industry.

2. CREATING THE NETWORK

From the report drawn up by ANEE (ANEE 2005) on the state of e-learning in Italy, it results that 72% of Italian universities use e-learning solutions; but in most cases they are just web-enhanced forms of traditional teaching methodologies. The usual approach is represented by a large number of small trials, without adequate standards incompatible with the design models suggested by the latest teaching methods. Learning Management Systems (LMSs) are the dominant technology: lessons are incorporated into the LMS and organized in the form of courses, divided into modules and topics, with exercises given in the form of questionnaires, tests and discussions and with the support of thematic forums and blogs. These systems do not correctly stimulate the practice of what is called a "learning society ", nor promote the connection outside of the local contexts for purposes of international interaction. Also, students have no vision of the activities performed by their colleagues within the LMS (Mazzola and Mazza 2010).

In our opinion, to make high quality and effective training is essential to avoid the students isolation: it is important to overcome the limitation of localization, eventually creating "spontaneous" networks of knowledge and contacts, domestic and abroad. At this aim we want to integrate into LMSs, which are accepted and established standards in education, the Web 2.0 "tools", introducing:

- a) methods of context modeling, to profile people and for intelligent information selection, based on classification techniques (Text Mining), Indexing (Information Retrieval) .
- b) visual and instrumental means of communication for low cost remote interaction;
- c) tools for monitoring the students activities in the LMS.

The aim is to "implement" innovative tools, "enhanced" by artificial intelligence techniques for information and users classification to:

- a) create virtual communities of learning and practice that allow spontaneous and natural interaction between peer users who perceived each other as equal;
- b) facilitate the creation of networks of knowledge and people, by bringing people together, according to the contexts of practice and learning, regardless of physical location.

3. BUILDING THE LINKS

If we consider all the students enrolled in university courses, they are divided in programs of different degrees and levels, and are enrolled in classes studying topics related to their curricula. The goal is to create a social network among students in order to promote the transfer of knowledge among peers, avoiding the sole reliance on the teachers and tutors actions; we want to overcome the barriers of classes and course divisions. To promote active participation in community life, the e-learning system must provide the right features to the students, making it possible to manage their contents and relationships. The idea is to provide the possibility to integrate the learning materials supplied by teachers with students material; this approach in literature is called "crowdsourcing", i.e. the "contribution of all participants".
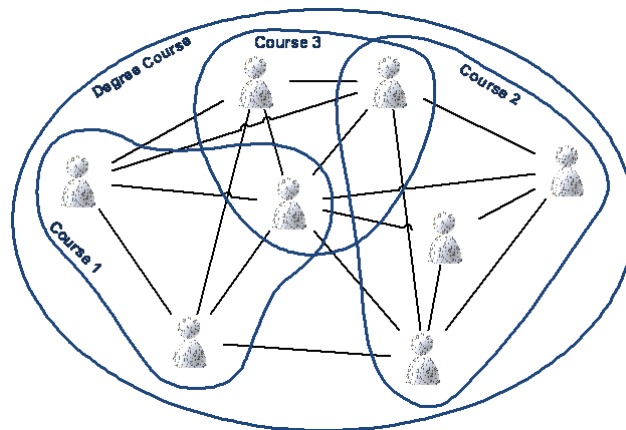
■ Students social network

In order to provide support, the e-learning system needs information about the competence and learning style of each student. For the competence the usual e-learning system provides tools used to evaluate student's knowledge. At any time, it is possible to know the level of each student and the difficulties she/he is facing in understanding and learning particular topics. Such evaluation can be performed at different times: at course enrollment time, and during its delivery. For the learning style we propose the adoption of a test model called cognitive efficiency test, which combines test performance with the mental effort required by the student to complete a test (Cognitive Efficiency = Performance / Mental Effort). Besides the coherence rating, the student is also asked to rate his mental effort in using the specified learning material (Dominoni, Pinardi and Riva 2010).

In order to improve the self-management features, every student has the possibility to rate other students competence and to rate the learning materials they autonomously shared, making possible to promote what is considered useful to the community. This way, we want to stimulate students relationships inside the network, and we want to use the given rating information to provide adaptive suggestions about learning materials – and already held discussions – that are considered useful by the students themselves, connecting these information to the competence level, the topic and the learning style. This also allows to choose the right course for the right people, improving educational achievement of students, and helping to create a curriculum of studies best suited to every student (Young 2011).

A fundamental suggestion will be provided about "experts" (students) in areas in which the students lack of competences (peer helper and peer tutoring). The cognitive similarity identifies the "experts" - peer helpers - who have already faced similar problems with a similar learning approach. Starting from this, it is possible to create a network of contacts between people, regardless of the type of course and physical presence, allowing the building of a community of answer (Pieri, Dominoni and Pinardi 2011). This will help to give birth to networks of peers for the support and growth of a community of practice (Williams Woolley, et al. 2010)

This goal can be achieved:

1) by placing in a traditional LMS, a representation of the network of links through an ontology that represents users relationship, students cognitive performance, and cognitive effort; (Dominoni, Pinardi and Riva 2010)

2) through a recommendation system suggesting the peer helpers cognitively more similar, and the information linked to them more interesting compared to the related topics;

3) last but not least, by creating an architecture that integrates "Live" services into the LMS, to allow a more natural way of relating.

The method must lead to an automatic support system, to replace or to help professional tutors; it allows to identify peer experts; it facilitate the creation of a network of knowledge, overcoming the local boundaries, and the isolation problem, allowing the comparison between peers, even at international level.

The adaptive *social* learning is different from adaptive learning, in which the content is changed sole on the basis of people capacities. While the latter has the purpose of increasing educational effectiveness, the adaptive *social* learning has the important consequence to stimulate people relationships. On one hand, this has the lasting effects of creating an actual community of learning. On the other hand, it helps to create a community of practice, in which ex-alumni can keep in touch with academia and research communities, providing practical support for lifelong learning between industry, and academia.

4. CONCLUSION

The strategy to be implemented in order to create a network connection to intra and inter university, with the simultaneous expansion toward the territory is based on the extent of previous works (Colleoni, et al. 2009), (Dominoni, Pinardi and Riva 2010), (Pieri, Dominoni and Pinardi 2011), (Bondi, et al. 2011).

Transforming the LMS - enhanced with artificial intelligence tools, and using methods for communication and interaction that are supplements to Web 2.0 - it is possible to create learning communities of practice that are "Live" (i.e. connected in synchronous way) and 2.0 (i.e. interactive, intelligent and spontaneous). They will be able to break the barrier of the local and national isolation of the students and to facilitate collaboration between industry and research groups at national and international level (Thomas, Kellogg and Erickson 2001).

This approach make possible to overcome the classical adaptive approach (Brusilovsky and Peylo 2003) that is static and limited in terms of community interaction; the idea is to use technologies such as presentation, and adaptive and collaborative filtering of contents, coupled with technologies to identify "peer help " and to support "peer tutoring", reaching a more socially dynamic approach able to overcome the barriers of a closed community.

The realization of this recommendation e-learning system involves the following phases: an initial assessment of the classification of users, followed by a continuous and dynamic process of collecting information about the interactions that occur within the community and about people's skills. Participation in community activities will be stimulated with the study of appropriate incentive mechanisms.

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