Integrating a Virtual Learning Environment with Social Applications

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ABSTRACT

The work presents our experience as designers, developers and administrator of an e-Learning system (LMS) used by the Faculty of Economics of the University of Trento. The system started its work in the late 90s and was then rewritten under the increasing need of the users to promote new form of teaching / learning. Currently we are managing the evolution of the system in the direction to provide to the user a new personal learning space, near to the new logics of web 2.0 and social networks. In the paper we will describe three choices that we are discussing at this moment; from each choice derive many implication on the architecture of our e-learning platform.

Keywords

e-learning, web 2.0, social network

1. INTRODUCTION

The context of this work are two applications of Technology-Enhanced Learning developed in our laboratory: a Learning Management System (LMS) based on the metaphor of the virtual learning communities called On Line Communities, and the prototype of a Personal Learning Environment (PLE) called PEENV. The last prototype has been developed as a social network application that follows the approach usually referred with the term web 2.0.

The two applications were developed independently. The first system came into operation as from 2005, and is now used as the e-Learning platform for some faculties of the University of Trento. The second system is an experimental prototype that was built to investigate the didactic opportunity to use a personal educational virtual space in an academic context. Both applications are oriented at the Computer Support Learning (CSL) but while On Line Communities considers the virtual spaces as collective spaces, PEENV instead considers them as spaces shared with the personal social network.

This work presents the present state of our discussion on the possibility of integrating the two applications, and in general the interaction between two systems based on different logics (web 1.0 and 2.0). The final objective is to have a platform able to achieving two aims:

- Administrators able to manage the didactics of an academic institution
- Users socializing into social network spaces.

The advent of the Web 2.0 marked a clear shift from the mere “use” of the contents by the users, to the conscious and active new users involved even in the creation of the content. It has also changed the intrinsic characteristics of the users of the network; using the classification of Marc Prensky [10], the generations from the eighties are fully identified as Digital Natives in opposition to Digital Immigrants. New users appear to be more demanding of the on line services and definitely geared to a lifestyle strongly connected to the network, citing Licklider [11] a vital symbiosis.

Around the idea of web 2.0 there is also the belief that this is the modern and digital expression of the concept of democracy or better of “usercracy” (users cratos) [21]. The power given to the users is an inexorable process that starting with the Internet democratization, through the information democratization, up to the level of knowledge democratization. The last type refers to the freedom to know, learn, and produce content, through free knowledge management systems, validated by the entire web community.

Classical LMSs used to manage normal didactics of an academic institution, are seemingly at odds with the web 2.0 applications. In these systems the users do not have the same role, and the exchange of knowledge is not “democratic”. Nevertheless, web 2.0 approaches have recently received a greater attention in the field of e-learning applications; now it is very common to talk about “e-learning 2.0”. The theoretical ideas behind this new approach are based, in many cases superficially, on educational theories that emphasize the social construction of knowledge; starting from the ideas of Lev Vygotski [12] (the learning as a phenomenon on proximity), through different interpretations of constructivism [13, 14], the construction of Seymour Papert [15] to lead to the Connectivist approaches of George Siemens [16, 17, 18].

It is not the purpose of this work to discuss the theoretical nature of learning; we are designers, developers and administrators of Technology-Enhanced Learning applications, and we want to concentrate on this context. We agree on the point that individual learning processes are not merely formal; they derive also from the phenomenon of “social learning” as well.

In sections one and two of this we will briefly introduce the two applications (On Line Community and PEENV). In section three we will discuss how to integrate the two applications; in section four we will present three possible architectural solutions and the consequences that these different options can have in terms of effectiveness on the Technology-Enhanced Learning applications.

2. THE EVOLUTION OF A LMS

The concept of traditional LMS

In the academic year 1999/2000 the Faculty of Economics of the University of Trento decided to have a software system able to enrich its traditional teaching as an extension on the Web. The first aim was to settle the increasing number of teachers’ personal web pages into a single platform. To pursue this result it was necessary to have a Learning Management System (LMS) or a software tool, capable of supplying a virtual environment able to support the educational courses of the Faculty.

The resulting system, called On Line Courses, started to function from the second half of 2001. On Line Courses was extremely simple but effective; it was based on the metaphor of course. Each course was associated to a virtual space called e-Course. As in a real courses held in the classroom, the teacher had the responsibility for the e-Course and could possibly be assisted by one or more tutors. Students interested in a subject were free to register themselves in the e-Course. An e-Course provided a series of electronic-communication services to
On Line Courses was a dynamic web-based application; the system was built upon the association between people and courses as shown in Figure 1.

Figure 1: summary of the architecture of On Line Courses

On Line Courses remained active since 2001; in mid-2005 gradually extended its use to other Faculties of our university. During its trial period On Line Courses were constantly changed, thanks to the availability of its source code, and improved by adding new services. In 2003 some observation convinced us to redesign the software:

- Models of teaching / learning (such as learning by problems, learning by projects, cooperative learning and their combinations) can hardly be connected to the e-Course, especially when the software directly represents the metaphor of traditional courses;
- The needs for cooperation within the academic environments is extending to all the activities that constitute the context in which didactic takes place;
- The organizational didactic scenario is changing under the effects of new regulations or decisions made by academic institutions, and these changes will inevitably reflect on the LMS functionalities. It is important to note that these types of changes are usually the result of a debate process in which both elements of cooperation and negotiation interact;
- The didactics of an university are not built only as a set of studies and tests, but these activities are inevitably intertwined with the university’s organization and its information system;
- In an academic context, not everything concerning teaching: for example, the entire faculty is more than a container of degree courses and a degree course is more than a container of lessons.

To answer these (and others) needs it was necessary to find another founding metaphor, which had at least three basic characteristics: to be general, suitable to support the cooperation processes and capable of modelling in an adequate way the organizational realities of an educational institution. This metaphor was found in the concept of virtual community. The system that arose, called On Line Communities, was born in 2003 and runs in February 2005. It is still the platform in use at the Faculty of Economics and at other Faculties of our university.

The concept of a new LMS: On Line Communities

In the previous part we have shown the reasons for the development of the new architecture of our system. In this section we will recap the main features of On Line Communities portal [5], the Virtual Community System used in our projects.

The collaborative approach [1] [4] is a very strong incentive for us for the development of On Line Communities; the philosophy that led us to rebuild the system is to allow the exchange of users’ experiences within a virtual environment, and within well-defined areas known as “communities”. This approach is very different, for example, from the traditional ones of other e-learning applications (such as those cited above). Our work started before the boom of web 2.0 [9], that has now invaded and changed the way people think and build services on the net.

The complexity of managing virtual communities is objectively quite different from that of a course. It requires a different approach also in the management of roles and permissions. There is an ever increasing need to provide, in the logics of integrating systems, a single moment of aggregation of the various services in order to enable subjects and systems with different interests (if they are not divergent) to access the same object, acting according to their own competences.

The architecture of On Line Communities is based on five fundamental classes (see Figure 2): Person, Community, Role and Permission. The combination of the roles and permissions defines the Profile for each user.

Figure 2 Relationship between the Entities of On Line Communities

The objective of the current version of On Line Communities system was to create a collaboration space for people connected to the web, where it could be possible to widen the virtual space for relationships among the actors. The system is built around the metaphor of “virtual community”. The main characteristics of a community could be summed up as follows:

- Each Community avails itself of a certain number of services.
- The services are general applications that enable the users to communicate in synchronous and asynchronous way, to publish contents, to exchange files, to coordinate events, etc.
- The potential services of a community are activated by a manager of the community according to the needs, and the users of a community can use them with different rights and duties.
- The communities can be aggregated into larger communities with hierarchic mechanisms and infinite nesting levels.
- The communities can be aggregated in an arbitrary way into larger communities disregarding the possible position of a hierarchical structure.
- All users are recognized.

Therefore, the community is a container ready for didactic processes, but not only: research teams, recreation groups, friends, secretariats, board of directors, colleagues, anything that could be an aggregation of people around a scope using virtual spaces on the web. The core of the application is composed by some abstract entities, i.e., Virtual Communities as aggregation of People to which some communication services are available in order to obtain certain objectives. In detail, a virtual community [7] [8], is a space on the web dedicated to a collaboration objective, populated by people who communicate among each other, using a series of communication systems. With this approach, it could be possible to represent all the hierarchical relationships between different types of communities (such as Faculties, Didactic Paths, Master Degrees, Courses, etc.).
On Line Communities had been experienced with a limited number of users since 2003, and was finally released early in 2005. As from 2005 it was used by the whole faculty of Economics of our University in all its components (students, teachers, dean, secretaries, administrative staff, external partners) and others faculties are using the system in many courses. At present the system has more than 1400 active communities, 8500 users and about 1.5 million unique accesses since November 2005 (see Figure 3).

Figure 3. On Line Communities access (November 2008)

Given that a most detailed list of functionalities is beyond the aim of this paper, On Line Communities supplies a series of articulated functionalities which we prefer to call “services”:

- “traditional” services: asynchronous (forum, agenda, upload & download of learning objects, newsgroup, notice-board, classroom management, management of course pamphlets and of users, etc.) and synchronous ones (chat).
- Integration services with external information systems (for example, the Personnel information system of the organization).
- Services for the fruition of “off-line” courses, i.e., courses already held and recorded, digitalized and made available to controlled communities of users (with the possibility to synchronize the video with slides using a webcast service SCORM compatible).
- Services for the creation of evaluation test, quizzes, polls etc.
- Statistics about the users behaviour (using an internal data warehouse enriched by activity logs).
- mobile Services to support mobile learners. We are developing in cooperation with the Åbo Akademi of Turku (Finland) some innovative services which meet the mobility needs of the subject who wants to learn “on the move”, performing learning/collaboration activities directly through his/her mobile device.
- Support services for cooperative and collaborative on-line learning, that is, services for sharing knowledge on a certain topic useful for collaborative learning (group learning that stems from the sharing of individual knowledge within the group itself) as well as for cooperative learning (group learning that stems from sharing tasks). Into this category we can count services such as blogging and wiki.

A PErsonal learning ENVironment (PEENV)

PEENV is an experiment of a Personal Learning Environment, and like On Line Community allows the creation of virtual communities of users (more connected with the logic of social networks). The application has three main goals:

- To create a learning environment enabling the creation of virtual meetings. In these meetings participants have the possibility to share their knowledge and the system turns out to be a repository in which information previously scattered on the Web may be collected, shared, managed and even enhanced through the creation of communities and tools for assisting interaction among learners.
- To create virtual communities which have no correspondence to real learning groups (in which group members gather in the same physical location).
- To create horizontal (rather than vertical) power relationships avoiding the traditional dichotomy “teacher vs. learner”.

The ‘aggregative’ task PEENV is expected to carry out is the mainstay of the project. In fact, since the Web is overflowing with data, it is sometimes so difficult and time-consuming for a user to retrieve and organize them that they are forgotten about, or else go lost [19]. PEENV – and, more in general, Personal Learning Environments – has been developed for simplifying information management by means of tags and social bookmarks. PEENV’s aim is – among others – to demonstrate the efficacy of these mash-up processes: this would mean facilitating learning without developing new applications, as it would be possible to use all those easily accessible applications which are already on the Web. In effect, it would be useless to create new blogging, file management or image storage platforms, owing to the massive presence of analogous services existing on the Net.

On registration users will be requested to specify both their account details and their blog RSS address in a series of external Internet services.

Figure 4: PEENV Environment and its Aggregations; Picture Suggested by [20]

The users of the system are allowed to upload files either indirectly (files associated with a user are imported into the system depending on the options selected on registration) or directly (files may be uploaded directly from user into his/her account). The system enables any user to select a file and bookmark it; in addition, he/she can also recommend it to the community he/she is a member of. It also enables users to create personal networks by bookmarking their favorite contacts, and makes possible for any user to post his/her comments to blogs as well as to comment on files.

Moreover, any user will be able to find out those members who are most proximate to him/her, regardless of any direct relationship already established with them. The degree of proximity is evaluated on the basis of a comparison between personal tags, community memberships and bookmarked files. Finally, not only is it possible for users to find out members which are proximate to them from the point of view of the profiles; they can also find out members who are geographically proximate to them.
3. THE INTEGRATION BETWEEN PLENV AND ON LINE COMMUNITIES

A system such as On Line Communities, that is to say a collaborative environment that wants to stimulate the participation and put to value cooperative work of the users, is an example of a computer support cooperative system dedicated to teaching/learning intended to extend its functionality to instruments of Web 2.0. The term Web 2.0 [2] was used for the first time in 2003 during a brainstorming session between O’Reilly Radar and MediaLive International; in that occasion the term was coined following a reflexion on the evolution of the Web and the self-selection of the Web Applications after the collapse of dot.com companies. In contrast with what it may seem “Web 2.0” is not the definition of a neo-digital structure but only a label that identifies the evolution of the structure of the pre-existing global net in the “social” sense.

Some differences exists between the cooperative approach connected to the web 2.0 logics and that one used by On Line Communities. To overcome these differences requires a changing of the rules used in the virtual space is required, and these changes have a direct influence on the entire architecture of the system. The cooperative virtual space of On Line Communities is actually closed. The users participate in the system directly with their real identity. In fact a person who enters a virtual community of our system is authorized by the community administrator, and from that moment he/she is automatically in contact with the people inside the community. This is the pillar of the virtual community: I’m in the community because I share its scope. So I don’t have to declare, accept, or manage my contacts inside that community, and I’ll be connected to a friend of a friend of a friend. Of course, On Line Communities allows the users to manage friends’ lists, but this is different from managing community members. The differences between “friends” and “community members” is very cut, and the user is allowed by the platform to manage these two different concepts.

Given that the increase of the social interactions is not a negative aspect, but the risks deriving from the direct use of Facebook approach into an environment with different aims (something like “I’m a friend of a friend who was the friend of my friend…”) is very high. The rethinking of the system with these ideas, could change our community system to a sort of “community 2.0” system: we like to define it as a “Private community Environment” (PCE). Those circumstances (lack of anonymity and control of the external accesses) have origin in two explicit requirements of our Faculty of Economics. The exclusion of anonymity is the result of a belief, that normally indicates that the anonymity into virtual learning environment should be banned, so that the actors cannot shirk from their responsibilities. The second circumstance (accesses controls) stems from the will of a substantial number of teachers to block the publication on the network of their own courses’ Learning Objects. These choices made the system impermeable to the users’ social dynamics, or to the communities existing in the social networks.

To overcome these limits without affecting our Faculty requirements requires a radical change of the system architecture is required, that sees the person as a member of one or many more communities. On the other hand, in the web 2.0 applications the participants exist as individuals who, for example, can create themselves a specific community.

The difference between the two approaches is that the communities in our systems are created as an extension in the virtual space of real didactics, instead of web 2.0 approaches, where virtual communities emerge from the users’ interaction networks. Following the previous discussion some further observation needs to be made. Firstly according to some recent statistics [6], the majority of users who use the so called “social networks services” are concentrating on the well known “peoplesurfing”: navigating into the friends’ profiles, look at pictures, personal information, etc. We are aware of the clear phenomenon that is emerging from friends’ social network [3]; it is true that the action of adding a person to the friends’ list requires an approval, but it is also true that a user can see at any moment the people connected to his/her friends. On the one hand this opportunity could be positive, but on the other it can be critical within a learning context (within a university, but also within business contexts). On the other hand forcing web 2.0 services to become e-learning services in an e-learning platform is a hazardous operation: the result could be an evident loss of quality, confusion, workarounds and possibly users’ dissatisfaction.

4. THREE POSSIBLE SOLUTIONS FOR A WIDER COLLABORATION ENVIRONMENT

After the last observations we have decided to think about three different possible solutions, in order to achieve two fundamental goals:

• To make our system more permeable to all experiences that take place inside the web, including applications for social networking and Web 2.0 (very popular among users at this moment);
• Keep control, up to a certain level, of the actions taken by users of our system. In fact, the context within which we are is connected to learning environments / or academic work, and not directly to leisure time.

The problems connected to the evolution towards the web 2.0 environments are partly derive from the role given by the user to the system and the perceived purpose of the platform. This implies the need to reorganize the personal users’ virtual space; an evolution of the already existing personal spaces of On Line Communities. In fact, the users now have a personal home page in which to access to their own communities, the subscription to others, the profile management, the events management and so on.

Following these approaches we need to drastically change the users’ personal home page and its services, building a real Personal Learning Space.

Concerning this question we are at present discussing at this time three different options.

First approach: outside from the communities

On Line Communities could enable its users to manage a Personal Learning Space (PLS) like PLENV for example, outside the system, providing all the necessary services connecting to the favourites social network sites. This technique is basically used by all social network platforms. The user of a blog platform, for example, can access a restricted area where all the management tools are accessible; on the other hand the external users can access to the blog and leave comments.

In this area the user could export his/her own educational contents, stored in On Line Communities, and share them with the friends inside his/her preferred social network. The bond for the Learning Objects (LO) copyrights (created by the university teachers) is not a problem. We could restrict the export from the system to the material distributed by Creative Commons licenses only. Furthermore, the LO are not the only type of materials contained within the platform. In On Line communities there are some content that we could call Meta LO or content generated by the interaction between members of the community (such as the content of a forum); there are other types of content, i.e. organizational ones (the timetable of the lessons, exams, etc.). For all these contents, the problem of copyright does not arise and it could be exported by the users’ PLS. In terms of work this solution
has a lower impact on the current architecture of the system; we have only to provide new functionalities increasing the number and the type of services accessible from the On Line Communities home page.

Second approach: inside the communities.

The second choice is to make On Line Communities, and in particular its structure, more permeable to the other virtual spaces on the network. Following this approach, users can import their material, information and expertise from external web 2.0 or social network tools.

The new approach allows the user to have at least two options:

- Share his/her PLS with the other participants of On Line Communities;
- Import content within On Line Communities from external services.

In other words this approach follows the creation of a “free zone”, customizable by each user; for example add the most useful services, import extern contents, and share all these information with the social network of On Line Communities.

Third approach: making a permeable border

The third solution is to provide the On Line Community with a permeable border in both directions. This option foresees the unification of the two previous solutions, i.e. to imagine the new users’ Personal Learning space as an aggregation of two distinct environments. The first within inside On Line Community (as in solution 2), the second outside the platform (as in solution 1). The user will have be free to decide what part of his/her relations and contents to import (into On Line Communities) or export (to social networks applications). From a technological and management point of view this approach presents more problems than solutions. This solution also requires a strong review of many parts of On Line Communities, and in particular the management of users’ roles and permissions.

These approaches have different values, in particular regarding the teaching strategies; in fact exporting the contents outside an e-learning platform could accentuate the social role of the educational institution as a source of knowledge and best didactic practices.

On the other hand, the second solution allows the importing of external data and their complexity into the platform; using this approach it is possible to create a more organic connection between the informal learning experiences (very common in the social processes on the web) and those formal ones, typical of the educational context.

The third solution seems to be the best, in terms of users freedom, but the most difficult for didactic institutions. In fact, while the institutions are becoming a knowledge center through the participation of its members, at the same time they are being exposed to the risk of the complexity and the personal relationships of its members.

5. CONCLUSION

One of the thoughts that arise from the discussion presented in this work is that the extension of a learning management system requires some architectural choices. As the evolution of the system from the previous e-course metaphor, also the rethinking of the platform to a more “social” approach needs an important rethinking of its architecture.

The paper has shown three different solutions to open our system to new approaches more connected to the logic of web 2.0; we have discussed about the difficulty to integrate new services based on that logic into a platform build some years ago. One of the benefit is that the architecture of our system was thought in a layer logic, so the integration and transformation of some part of it could be simpler than other “closed” approaches.

Now we have to decide between the three choices presented in the paper; the first could be the simpler but also incomplete for the aim of our future application. The third is obviously the most difficult but at the same time integrate the possibility to exchange the contents between the two environments (On Line Communities and the PLS, like PEENV).

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