Shifting from traditional LMSs to Virtual Community Systems

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Abstract

The paper presents our experience in designing, implementing and maintaining the "Online Communities" project. Since 1999, a Learning Management System was used by teachers and students of the Faculty of Economics of the University of Trento, based on a blended approach. In late 2004, this system has been replaced by a new one based on a different approach, specifically a Virtual Community System (VCS) called "Online Communities". The new concepts implemented into the system help a traditional Academic institution to change the interaction paradigm with its users, from an approach based on "physical" relationships to one based on virtualization - as far as possible - of these relationships. This virtualization has been created through the mediation of Information & Communication Technologies, and in particular with the help of a virtual community system oriented not only to the typical e-learning aspects, but extended to all possible communication forms among the different actors that play a role in the academic community.

1 Introduction

Learning Management Systems (LMS) (A'herran 2001, Hall 2001, Mc-Mahon & Luca 2001) are software applications, normally based on web technologies, used to plan, create, and possibly assess the learning processes of an educational institution. Typically, teachers find in a LMS a set of functions to create and deliver content, monitor student participation, and assess their performance. To students, a LMS can provide the possibility to download, see and use the educational material, to use interactive tools such as discussion forums, chat, video conferencing etc. We can therefore consider LMSs as full-featured, normally complex system, with some complexity in terms of use. Indeed, we observe that these systems rarely adapt to the specific needs of an academic institution, due to their general mechanism of managing specific issues. Personalization is therefore a difficult and costly task, due to the lack of personalization tools or to the complexity of the system to be personalized. Moreover, inside LMS's data store we can find a lot of information extremely useful for administrative tasks: as an example, the dean's secretary could centralize many functions that are normally required to teachers, or reports derived directly by the daily teachers' activities. Also the relationship students-administrative offices could be facilitated, for example for the verification of exams, program of studies, plan of the lessons etc.

In the late '90s, the Faculty of Economics of the University of Trento decided to set up a Learning Management System (LMS) to be used for educational activities in a blended modality. The paper presents our experience in going in two different directions, respect to the mainstream that most of educational institutions follow today. First, we decided to replace the LMS approach, typically based on the concept of "course", with a highly pervasive "information system" approach. On top of this idea, we based our design on a more "community" vision of the educational institution, seen like a set of Virtual Communities (VC) any different users with different roles inside different communities (Parchoma 2005), all based on a broader idea on "information management system", rather then LMS. Second, we decided to "Make" the system starting from an existing LMS we already built. In our opinion, the quality of an academic institution is strongly related to the quality of its educational processes. These, in turn, are based on the complex relationship between professional competencies of researchers/teachers and used teaching methods. In the good and in the bad, the real processes occurring in an academic institution are based on the quality of this relationship. Studying in a high-quality educational institution means to learn from an intellectual environment where the knowledge transfer (education) and creation (research) are interwoven, perceptible and "internalizable" by students. In marketing terminology, this could be considered as the "brand"

of an academic institution. If we aspire to be seen as an educational institution with a high-quality teaching, we better try to reify our best practises into software processes and systems, instead of importing standard, pre-digested, homologated educational processes determined by software products that will be used by thousands of other institutions.

In this paper, we will try to justify why the shift from the traditional paradigms included in a LMS towards a VC system makes a learning environment more profitable and performant for its users. We believe there are many interesting aspects following this paradigm shift we are presenting. We will concentrate on one element, i.e., the extension of the traditional e-learning approach towards a concept of virtual community. Here we include issues related not only to educational aspects, but also to the solution of the multitude of communication and interaction problems that users have while interacting with the academic institution.

2 Building a Learning Management System

The first experience in using ICTs in learning context for our University was done late in 1999 by the Faculty of Economics, developing a software system call "Online-courses" (OLC) (Colazzo et al. 2002). The first version of the system was based on some assumptions of the authors that the following successful experimentations demonstrated to be valid.

The system is built with and around users' requirements, using agile and evolutionary prototyping software techniques. The software developing cycle and its architectural implications are derived from the needs of the actors involved in the process. Teaching methods vary depending on the disciplinary domain of the courses and on the specific user's preferences. In our opinion, a software system should not overwhelm the way people act by simplifying a complex relationship like the training process.

The usage of a LMS should not be mandatory. In a real situation, there are people not attracted by e-learning technologies, and that will therefore avoid using the system. These subjects could not be labelled as "bad teachers". Every constraint on the nature/type of learning objects used inside the system is needlessly restrictive and counter-productive. This does not mean that learning objects built using standards (like SCORM) are not usable in the system, but we cannot imagine that this is a necessary condition. There must be no filters between a teacher and his/her students. A teacher should not need for an "intermediary" in order to interact with his/her students through ICTs. This "welfare" teaching model, where an intermediary helps teachers to produce educational material has failed in our University as probably in others.

Based on this assumption, the software should behave like an amplifier of the communication space between teachers, students, tutors, and assistants.

We are aware that these ontological prejudices are arguable (Herrington et al., 2005), in fact, they do not coincide with those of many other software implementations, but our experience presented in this paper has verified them all as being successful starting points.

OLC, started its services in late 1999. It was a traditional Learning management system built around the concept of "course. The majority of its functions were devoted to the two main actors of every educational process, i.e., the student and the teacher. In fig. 1 the central classes of the system with their relationships are show in UML notation
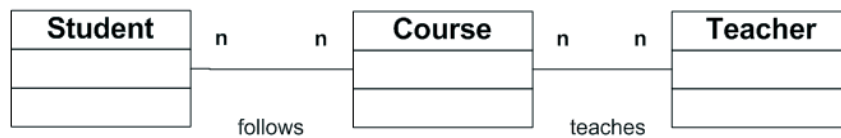

Fig. 1 Core classes in the OLC system

The functionalities were all included in the services available inside one course. The most important services were the following:
- synchronous services: chat, remote application control, videoconferencing, FTP;
- asynchronous services: bulletin board, forum, mail;
- informative services: contact information, course program, course information, timetable, recommended books, bibliography, exam modalities, course syllabus;
- upload /download services.

This system has been mainly used by the Faculty of Economics, but during these years it has been extended to courses of other Faculties. In table 1, the main highlights of this experience are listed

Table 1: summary of OLC usage

Online courses present in the system since 1999	670
Online courses activated during 2004/05	218
People enrolled in the system	11.939
Number of total qualified hits since the full operational activity of the system (2001-2004)	1.273.333

3 Moving towards a Virtual Community System

The successful experience of the OLC system showed a number of questions that stimulated us towards new approaches.

The first issue regarded the systemic nature of learning. If we use such software system we can observe that this system is strictly connected with other sub-systems of the general information system of the institution itself. An obvious relationship is with the students' secretariat, where typically we have all data regarding students' careers, financial information regards fees, exams, etc. Another trivial relationship regards the information system that helps the Dean and her staff to manage their activities, from simple to complex decisions (timetable, course assignments, exam and bachelor commissions, study plan formulation, etc.). This second option clearly regards the governance of academic institutions, and specifically didactic activities. An effective system for managing teaching activities mainly needs data streams from outside the institution, but at the same time needs to be feed with a variety of information from its internal educational processes. The possibility of having this information is intrinsically connected to the availability of some form of computerized learning management system. Without a computer-mediated communication universe, it's hard to extract data from the phenomenon going on in the field: the only possibilities are to extract some of them (not all of them) from the records of the students' secretary or from questionnaire, and this means to have a relevant delay in the availability of the information. Besides, decisions involving process changes (for example, course assignments, study plans etc.) are assumed corporately in different discussion tables (Degree course council, Faculty council, Campus-wide council). Most of the ordinary activities are articulated in diffused and capillary discussion moments, that sometimes overpass the official schema and meetings (Chang 2003, Michailidou 2002, Ma 1999). Under this perspective, the abstract concept of "course", around which many LMSs are built, seems to be an unnatural restriction.

One of the most relevant problems in the university education are the dropout rate and, on the other side, the prosecution of studies beyond the terms. Usually, the reasons behind these phenomena are only partially known, and most of the times involve subjective motivations. Students leaving the studies should be considered as a defeat for the educational model of an academic institution. A greater attention given to students with difficulties could decrease the phenomenon, but also in this case, every possible intervention will be useless or inappropriate if not supported by data from the information system.

In conclusion, the necessity of combining the systemic nature of a learning system with the collective nature of decision-making processes in an academic institution, and the necessity to supply technological tools to extend educational

institutions' policies, led us to reconsider the nature and the intrinsic architecture of the LMS used by our Faculty. As the foundation of this process of revision of the general architecture of the system, we set the idea of "virtual community" as the cornerstone of the system. For a review of the most recent experiences in Online/Virtual communities, see (Havelock, 2004).

4 The Virtual Community system (VCS) "Online Communities"

Virtual communities (Jones 1995-1997, Lévy 1994-1995, Rheingold 1993, Turkle 1995), are something else respect to the concept of community as in the classics of sociology. Their use in a formative environment is further different. The traditional model implemented inside LMS (like OLC itself) demonstrated some limitations and contradictions. The majority of these systems, in fact, assign fixed roles to subjects participating to educational processes. These roles are normally included in a vision of the training process that we could define "transfer" model: the teacher owns the knowledge, and this is transferred to students via a sequence of lectures. The student learns from references or books while guided by the teacher's lecture.

This model, once reified in the software, represents a crystallisation of the original model, only apparently more participatory (students have to do some actions in the virtual), but substantially it enforces the power of one side (teachers, in fact, can use the software with higher privileges than students). Consequently, many non-traditional learning and teaching approaches (like Problem based learning, Cooperative learning, Learning by projects, etc.), instead of being facilitated, are obstructed by the software itself. Moreover, if we consider technical courses, where more practical skills must be acquired and demonstrated, very often students have to develop a project. This could be an individual work, but more frequently it is a joint effort among students of a group. It would be more productive to let students work together also using cooperative tools that allow them to interact among themselves and with teachers / tutors, but this kind of collaboration "freedom" (with all the administrative problems behind the scenes) is very often extraneous to a typical e-learning system, like our old OLC. "Online Courses" got immediately the appreciation of two classes of students: working-students (in our Faculty, approximately 50%) and students living outside our town. Students belonging to these two categories are those that most frequently leave the study degree, and after the release of the system we recorded a decrease of this drop-out effect, though there is no clear evidence about this relation.

In order to intervene on these situations, we could proceed in two directions. The first consists of creating an alerting application available for the students' secretary. When the student is at a crisis in his/her career, the frequency to

the exams decreases like (very often) the results in the exams. It would not be difficult to highlight these situations and to point out them to university / faculty authorities, thus avoiding that this important information stays hidden into administrative meanders. Nevertheless, this way of acting highlights the problem when it's too late, when the student's problems have already produced their effects. A second solution could be easily implemented using electronic communication, by creating direct communication mechanisms between students and teachers, thus avoiding delays and further difficulties for the students. Probably both solutions must work together, but what is clear to us was that the limited nature of the "course" concept was not suitable for this scope.

These are only some examples in order to represent our decision to shift towards a more flexible, structured, wide definition of a communication space between people acting inside an educational institution, trying to go beyond the limitations of the approach based on the idea of "course". In fig. 2 we quickly sketch the central part of the schema adopted for the realization of "Online Communities".

OLCom, at present, the system is based on more than 300 classes, but all the main concepts are managed around these concepts: People; Role; Community; Right; Duty and Permissions. OLCom is exited from the experimentation phase in June 2005, after a long test phase and now is used in extensive way at the Faculty of Economics. We summarize its main characteristics:

- better, clearer, easier roles/duties/rights management thanks to the creation of a community container, with people enrolled in the community with specific roles, duties and rights;
- decentralized administration to the responsible of the community, that can in turn create other communities in which deciding the permission mechanism for their users;
- possibility of managing people having different roles in different communities;
- possibility of traversing hierarchies as in the case of teachers that have people in their courses from different faculties or institutions, or adding intermediate level of hierarchies also when a hierarchy has been created;
- possibility of creating communities between persons not related with educational activities (like secretaries, research groups, students' associations, etc.) with specific permissions on the community;
- extensibility of the hierarchy and the relationships between communities to whatever level and degree of complexity we desire;
- extensibility of the system to new services that are instantly activated to the respective communities simply by choosing permissions for groups, single participants, entire branches of communities etc.;
- more flexible management of hierarchical relationships between com-

munities, that have different relationships respect to "courses";
• time management inside the community: the visibility of events of the community could be seen from a hierarchical point of view, from a roles/rights/duties point of view, from a device point of view (computer, mobile phones, PDA) (Colazzo et al.,2004).
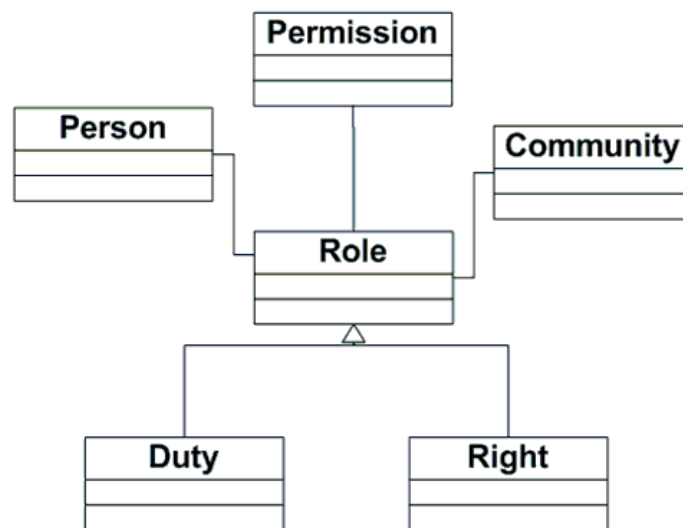

Fig. 2 Core classes of OLCom

5 The deployment of "Online Communities"

The development of OLCom started in 2002 from a discussion regarding the limits of OLC system. During 2003 the project team designed the new architecture, and in early 2004 the new system was ready to be tested on the field. The primary objective was the implementation of all the functionalities provided by the old system, but the necessity of submitting the system to a long experimentation, due to its novel approach, has emerged immediately. The experimentation phase took 4 bimesters, at the beginning with some courses where students were asked to contribute to the project. This initial step was fundamental to orient the development of the system, and to capture users' need and difficulties with the new approach based on the concept of community. A second, wider test was performed during the 2004/2005 academic year. In figure 3 the monthly accesses from November 2004 to March 2007. OLCom has been operative for all the courses in the Faculty since the first bimester of 2005/2006 academic year.
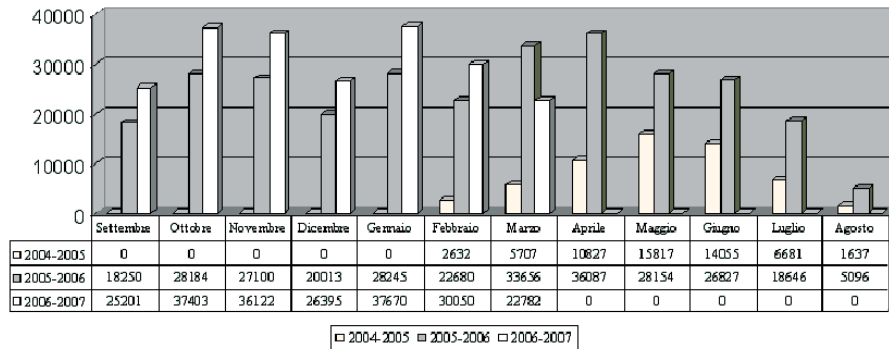
	Settembre	Ottobre	Novembre	Dicembre	Gennaio	Febbraio	Marzo	Aprile	Maggio	Giugno	Luglio	Agosto
2004-2005	0	0	0	0	0	2632	5707	10827	15817	14055	6681	1637
2005-2006	18250	28184	27100	20013	28245	22680	33656	36087	28154	26827	18646	5096
2006-2007	25201	37403	36122	26395	37670	30050	22782	0	0	0	0	0

□ 2004-2005 ▣ 2005-2006 □ 2006-2007

Fig. 3 "OLCom access rate 15 Feb. 2004 - 22 Mar. 2007

6 Conclusions

Facing teaching and learning problems using ICT tools in academic settings emphasizes the systemic nature of these processes. The governance of these systems assumes a crucial role. Academic institutions, during one thousand years since their birth, have built governance methods and practises based on the conscious participation of innovative and educational processes' actors, on a diffused network of decisional moments, on unwritten though not less important and binding traditions. These are complex governance forms that cannot be simplified beyond a certain limit. The risk of an excessive simplification in the name of efficiency is real and present. We believe that software systems in academic institutions should be built assuming that complexity and personalization are fundamental requisites.

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