

Early steps towards an e-learning community at the University of Calabria

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Abstract: In this paper we describe the early phases of an e-learning community evolution we observed during the execution of the project iCampus.Unical at the Faculty of Engineering of the University of Calabria. Such a project is concerned with the realization and deployment of a course management web portal, based on open source software. The evolution of the technological system and of the associated community, as well as the relationship between them, are examined in order to identify factors and actions which turn an e-learning system users community into an actual e-learning community.

Introduction

In the past decade many universities, or in particular university faculties, have conducted projects dealing with the embracement of distributed learning technologies. Most of these projects have started out with the development and deployment of a networked course management system (NCMS) (see Kamrat et al. 2002, Hines et al. 2000, Ullery 2002).

Their goals are:

- to improve traditional educational processes and to define new classroom strategies by creating more effective active learning situations;
- to introduce a viable tool for learners and managers of learning (professor, teaching collaborators, faculty advisors, principals...) in order to build an effective e-learning community, i.e. a cohesive unit which is able of better knowledge management in educational programmes.

The mere introduction of a NCMS in an educational organization does not guarantee the achievement of the above mentioned goals; anyway, there is a strong evidence that its wide deployment and fully usage are strictly necessary conditions for generating the critical mass needed to build an e-learning community. Moreover, in our opinion, a NCMS cannot be carefully designed or entirely selected "off-the-shelf" in advance. As a matter of fact, it evolves in response to the emerging needs of its users and the evolution can be carried out by taking into account a series of contributions coming from the community around it. New services of the NCMS, in their turn, trigger the community to change its structure, both in terms of components and relations among them. This coupled process is similar to the biological evolutionary process described by (Maturana & Varela 1998), and it has connotations of both co-ordination and co-evolution. Following such an approach, the e-learning community building process is regarded as an iterative evolution process where state changes that occur in the NCMS and the community are mutually dependent.

In this paper we describe the early evolution steps we observed during the execution of the project iCampus.Unical at the Faculty of Engineering of the University of Calabria. In particular, after a presentation of project backgrounds, it deals with:

- identification of basic needs of learners and learning managers (professor, teaching collaborators, faculty advisors, principals...);
- selection of a web portal platform for courses management as a working system that can serve seed functions for further growth;
- deployment and customization of the system;
- usage analysis results;
- technology and community co-evolution.

Backgrounds of the project iCampus.UniCal

In March 2002 the Academic Senate decided to support some projects which aimed to enhance knowledge and learning through the integration of ICT into educational processes at the University of Calabria. One of these projects was iCampus.Unical, presented by the Faculty of Engineering. Successively Giudalab was awarded a grant by the Engineering Faculty Council to conduct and carry out such a project. Giudalab is a research and educational laboratory at DEIS, Dept. of Electronics, Computer Science and Systems, and it has been involved, in the past 15 years, in many initiatives regarding the development/deployment/adoption of e-learning technologies, or, more in general, ICT for public or private organizations.

The project iCampus.Unical was based on the realization of a course management web portal (CMWP), called iCampus, and it aimed to build an e-learning community at the Faculty of Engineering. The development strategy was to make an open system, with the following main features, available:

- *Accessibility.* It should provide an easy-to-use interface for supporting classroom activities through synchronous and asynchronous connections inside and outside the class time;
- *Adaptability.* It should be able to respond to different requirements arising from many learning course scenarios;
- *Extensibility.* It should enable one to integrate new learning services, to add and modify tools, layouts, and so on, while the e-learning community evolves, and new needs are rising.

Before the beginning of the project, many individual and anarchic approaches to the introduction of e-learning technologies were spreading out in the Faculty of Engineering. Therefore, top priority was to supply a CMWP as a unique and cohesive technological tool that could help to build an e-learning community.

The expected main benefits could be summarized as follows:

Student side: a unique source for searching and retrieving educational materials is made available; moreover, communication services may enhance interactions with instructors or other students through frequent dialogues and prompt feedbacks;

Teacher side: a centralized CMWP management exempts teachers from worrying about technical problems and let them concentrate their efforts on improving educational practices and delivery of instructional content;

Faculty side: a large amount of useful course data are made available in order to carry out reports or statistics for educational processes evaluations.

iCampus.UniCal: the drawn path

In this section we overview the major activities that have been performed by technological infrastructure developers and education individuals or groups as a whole within the emerging e-learning community.

Ground functionalities requirements analysis

Of course, a requirement analysis was firstly carried out to ensure the understanding of the target e-learning community. The rationale was to characterize basic functionalities of a CMWP which could be used to start with a limited users community. Users were grouped in three main classes: technical system developers/administrators, learning managers (professor, teaching collaborators, faculty advisors, principals...) and learners (mostly students). Apart from standard administration functions and developing tools (access management, users enabling, templates configuration...), we identified the following basic functionalities:

For learning managers:

- classroom lifecycle online management;
- asynchronous messaging and communication management (public agenda, bulletin board,...), repository management of digital teaching material (slides, documents, quiz test, etc.);

- shared sandbox management for sharing group or personal feedback documents from students on assigned homework;
- threaded discussion forum management about classroom topics, poll/survey management to collect feedback from students;
- shared bookmarks management related to course contents;
- assessment tools to measure efficiency and effectiveness of online teaching activities.

For learners:

- download of documents and multimedia course material;
- read access to announcements on bulletin board and on shared calendar;
- two way interaction (synchronous and asynchronous mode) with teachers thru messaging system and threaded forums;
- self-evaluation test;
- FAQ about system features and course activities;
- access to shared bookmarks;
- integrated search engine for courses information retrieval.

Selection of a web portal platform for courses management

Three basic possible strategic directions were taken into account in order to create a starting platform:

- adopting a ready-to-go commercial over-featured solution; since source code is not available, such commercial system has low flexibility and poor extendibility; moreover, the integration with legacy software and existing IT-infrastructure is often highly problematic;
- developing from scratch a system that perfectly fits all specific requirements; this strategy is very expensive in term of resources and time. In addition to that, it requires a good experienced developers team that is not always available in a faculty environment;
- to adopt a semi-ready open-source software system (OSS) to be successively customized, configured and extended by adding new components or modules.

The third one is widely recognized to be the most suitable solution that can match both low cost investments and fully application customisation, (see Kaderali & Elhert 2003). Besides, many EU and Italian initiatives are currently devoted to support OSS usage in Public Administrations, as well as in education, and this has strengthened our motivation towards the use of an OSS.

The main driving force of an OSS is its developing community, the more it is extended the more a local developers team can mutually exchange its efforts with all community members. Many course management OSS platforms were evaluated under this perspective. Finally, our choice was to join the *Claroline* international development community, [<http://www.claroline.net/>, <http://www.dokeos.org/>]. Claroline platform is based on PHP server side script language and it is available in many languages (Italian included), it needs a very simple architecture based on the most famous open-source web server (Apache) and a well-known open-source DBMS (MySQL). The interface is very light and can be accessible easily from any browser (internet explorer, mozilla, opera). New modules and new features are continuously added as they become available from active developer members and they are tested by debuggers. The modularity of Claroline let local developers/administrators modify and easily adapt the source code to their particular organization context, (see De Praetere 2002). The last packaged release is fully compatible to current internet standard (XML, SCORM) for the best integration with the existing infrastructures.

Deployment and customisation

Starting from the packaged version of Claroline, the idea was to make a ready-to-go prototype based on its original version immediately available, but with minor customisations to fit our specific requirements:

- Registration and authentication of learners based on their university registration number as a unique key
- Enabling procedure for registration of learning managers and their account validation
- Customized administration module: interactive users database management via web to easy profile editing.
- News module to prompt course announcement in home page
- Self-developed tools to check db integrity (dead links, orphan courses...)

The firstly released packages were configured to run on Windows O.S. and, lately, were ported in more stable Linux environment.

The system deployment was firstly directed to users who were already experienced with existing e-services for educational process and afterwards other diffusion actions were carried out in order to make its usage as large as possible. The rationale was that learning managers with a good “digital” culture are more motivated and take

immediate advantages in using the system; moreover, they may suggest uses of technology in educational practices which enhance the deployment process.

In particular, in the first year of the project, a technology coordinators team was engaged to perform the following deployment activities:

- organizing public demonstration for learning managers on the system's use in order to improve the delivery of instructional content;
- coaching users and giving personal assistance through a helpdesk in order to let learners and learning managers feel more confident in their own technological skills;
- gathering course management issues, technical problems, bug notification, suggestions, requirements and so on, to be analysed for further system evolution.

The execution of such activities and few monetary rewards, provided by the Faculty Council to motivate professors to use the system, concurred to achieve a critical mass necessary for an e-learning community building.

Usage analysis

After the deployment/customisation phase we made an empirical analysis about whether and how the CMWP iCampus is being used in the Engineering Faculty. Such an analysis is important for four reasons:

- a "critical mass", i.e. a substantial and relatively consistent user base, is necessary for a community to function and thrive, (Markus 1990);
- the way a CMWP is used is believed to condition people understanding and the improvement of their educational activities;
- the way a CMWP is likely to be used, especially when alternative educational tools co-exist, cannot easily be predicted from its technological characteristics;
- how positive and negative externalities affect a CMWP adoption may be useful to identify factors which drive and constrain the e-learning community building process.

In what follows, in order to give an idea of the diffusion process of the CMWP iCampus, we present some analysis outcomes concerning only two indicators:

- Coverage Indicator, which measures usage extension inside the Faculty;
- Services Usage Indicator, which measures the affection of CMWP iCampus as a tool in course management practices.

More detailed results can be found in (Volpentesta et al. 2004).

Tables 1 and 2 describe the main attributes of the above-mentioned indicators (Labels: LM=Learning Managers, L=Learners, AY=Academic Year, Tr=Trimester, AV=Average number, C=Course, F=Faculty, FC=Faculty School).

<i>Indicator components</i>	<i>Definition</i>	<i>Metric</i>	<i>Time dim.</i>	<i>Context dim.</i>	<i>Data Source</i>
LM	LM subscribed	Total number of subscribed LM	AYs 02-04	F	UserDB
C	Enabled C	Total number of active C	AYs 02-04	FC	Courses DB
L	L subscribed	Total number of subscribed L	AYs 02-04	FC	UserDB

Table 1: Coverage Indicator.

<i>Indicator components</i>	<i>Definition</i>	<i>Metric</i>	<i>Time dim.</i>	<i>Context dim.</i>	<i>Data Source</i>
Documents	Material uploaded by LM, available for download by L	Weighed AV of downloads vs. docs dimension	Tr/AY	C/ FC/F	LM Docs repository
Boards	Announcements and notices	Total number of announcements	AY	LM	Announ. DB
L Works	Uploaded works by L	AV of uploaded works by L	AY	L/C	L Docs repository
Exercises	Self-evaluation test for L	AV of exercises inserted by LM	AY	LM	Exerc. DB
Web Links	Web Links posted by LM	AV of web links posted by LM	Tr	C	Web Links
Forums	Forums on course topics	AV of threads started by LM; AV of L posts for every thread	Tr	C	Forum DB
Statistics	C access statistics	AV of monthly accesses to courses	Month	C	Logs

Table 2: Services Usage Indicator

The evaluation of these two indicators has allowed us to derive fig. 1, 2, 3, which are related with the iCampus diffusion inside the Faculty of Engineering.

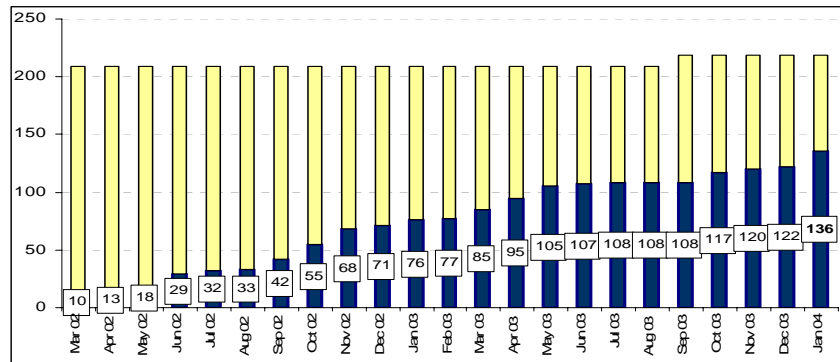


Fig.1: iCampus diffusion among learning managers. Estimated total number of faculty teachers in AY 02/03 was 209, in AY 03/04 is 219

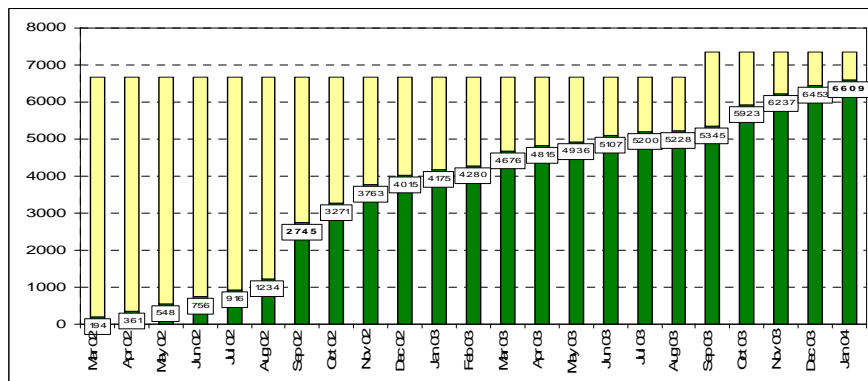


Fig. 2: iCampus diffusion among students. Estimated total number of faculty students in AY 02/03 was 6663, in AY 03/04 is 7345.

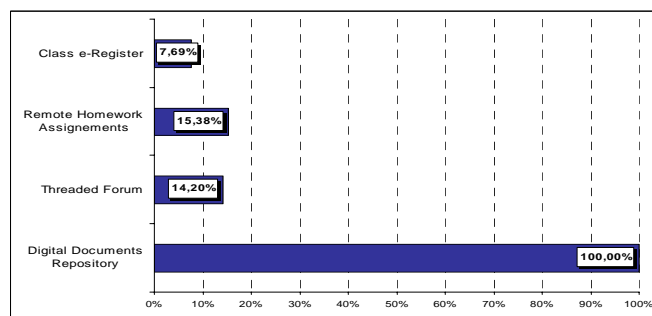


Fig. 3: Percentage of learning managers using iCampus services during AY 2002/2003

Technology and community co-evolution

Since the beginning of the project the CMWP iCampus and the community around it, as well as the relationship between them, have evolved time after time. At the beginning, iCampus was regarded as a mere technological tool to support a student, or an instructor, in his/her individual educational activities, inside and outside class time. Emerging needs and requirements collected from single users triggered an extension of the original Claroline package. New services and modules (e.g. class e-registry, interactive multimedial syllabus, online test dynamic management, internal search engine on single course document repository) were added in order to improve assessment practices, instructional content delivery and learner's goals addressing.

Successively, iCampus was required to support the work of many classroom communities, regarded as micro-communities of educational practice, (see Wenger et al. 2002). As a matter of fact, learning managers who began experienced with the use of the system decided to introduce collaborative learning experiences into their classroom through iCampus mediated communications. This provided feedback to developers, in order to extend functionalities for student group management (group task assignments by learning managers, role assignments to students within the group, groupwork integration in course activities...). Actually, such requirements were acknowledged by the worldwide Claroline developers community and the current available packaged release includes most of this features.

At the time being, a huge step forward would be represented by the moving from a set of micro-communities, strictly confined to classrooms, to an organic e-learning community, extended to an entire university (or a faculty, at least). Such a community, not only would work to support educational processes, but it would also continuously work to improve its ways of working by learning from experience, (see Senge et al. 2001). Of course, this evolution would reflect on fundamental changes to management processes, organisational structures and human resource allocation, as well as to technological systems, required to support collective management of community knowledge.

Effects, derived from the use of iCampus, seem to encourage the University of Calabria to take actions along the above mentioned evolution direction. Some of them, observed in the last year, are:

- a rapid diffusion of those basic educational practices which have enhanced teaching and learning in courses of iCampus;
- a better adaptation and demarcation of all courses of iCampus, thanks to the transparency of their contents;
- the emergence of collaborative learning initiatives across the community (some professors have used iCampus to drive inter-classrooms team experiences).

References

De Praetere, T. (2002). *Philosophie du logiciel Claroline*. Belgium: <http://www.dokeos.org>

Hines, M., & Downing, R. (2000), *Building a Virtual Knowledge Community*. Proceedings of Society for Information Technology and Teacher Education International Conference, 2000 (1), Association for the Advancement of Computing in Education, Norfolk, VA, 2134-2137.

Kaderali, F., & Elhert O. (2003). *Experience with Open Source for e-Learning*. Proceedings of EADTU Annual Conference Madrid, "E-Bologna" - Progressing the European Learning Space, 2003, Madrid, Spain.

Kamrat, I., & Haselbacher, F. (2002). *E-Learning Initiative Based on a WEB-Data-Based University Information Management System*. Proceedings of the International Conference on Computers in Education, Washington, DC, USA: IEEE Computer Society, 874-878.

Markus, M.L. (1990). Toward a 'Critical Mass' Theory of Interactive Media. in J. Fulk and C. Steinfield (Eds.), *Organizations and Communication Technology*, (pp. 194-218). Newbury Park, California: Sage Publications.

Maturana, H.R., & Varela, F.J. (1998). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Boston, MA, USA: Shambhala Publications.

Senge, P., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2001). *Schools That Learn*. New York, NY: Doubleday.

Ullery, J.C. (2002), *Beyond Familiar Shores: Faculty Teaching With Technology*, Proceedings of the 30th annual ACM SIGUCCS conference on User services, Providence, Rhode Island, USA: ACM Press, NY, USA, 148-152.

Volpentesta, A., Frega, N., & Filice G. (2004), *Icampus: Portale Web di supporto alla didattica*, Report for the Engineering Faculty Council, University of Calabria, Arcavacata di Rende, Cosenza, Italy.

Wenger E., McDermott R., & Snyder W.M. (2002), *Cultivating Communities of Practice*, Boston, MA, USA: Harvard Business School Press.