LMS and Web 2.0 Tools for e-Learning:

University of Deusto´s Experience

Taking Advantage of Both

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Abstract— **Information and Communication Technologies have enabled us to gather much more information, to process it better and to disseminate it to anybody in the world. So, these technologies appeared to be one of the most powerful tools for educators. The experience or the University of Deusto in applying a Competence-Base Learning Model supported in an LMS and the results of the adoption of this Learning Model to a new Open Source LMS give us the lights of LMSs experience in University. The adoption of 2.0 technologies in the classroom through an initiative of the Telefonica Chair has result in a test bank and a very useful experience for educators interested in applying these technologies so as to know the lights and the shadows of this tools.**

Keywords-component; education; LMS; Web 2.0; Learning Cycle; Competences; e-Learnine.

I. NEW TECHNOLOGIES IN EDUCATION: A MIRAGE OR A MIRACLE?

Are Information and Communication Technologies bringing any good to Education? This was the question which UNESCO began with its Newsletter on Education in the end of 2003. They wanted to pinpoint that it was a chimera to trust in any single technology to transform education [1], more than that, we would like to add that a bunch of well chosen technologies could hardly produce any good result if they are not properly backing an effective pedagogical framework.

In fact, having the best means and the best technologies does not always turns out in obtaining the best results if those means and technologies are not guided in the right direction.

Most of the experts would agree with us in thinking so. Information and Communication Technologies have enabled us to gather much more information (and under some conditions, to transform it into knowledge), to process it better and to disseminate it to anybody in the world (of course, if that one has granted the access to the net). But technologies, by themselves, will not give us a place in heaven.

II. MAUD: THE PEDAGOGICAL FRAMEWORK OF UNIVERSITY OF DEUSTO. A COMPETENCE-BASED LEARNING MODEL

The University of Deusto, a pioneer in this field, has been developing and implementing a unique pedagogical framework during the last ten years, known by its acronym MAUD (University of Deusto´s learning model) [2], which has been the foundation of the Tuning Project [3], now spread not only around European Universities (and supported by European Commission) but to the United States and South America ones as well. MAUD is based in autonomous and meaningful learning and centered in students´ skills and competences development as advocated in the European Higher Education Area.

The development of a competence-based model found in ICT a natural ally allowing teachers and students bear part of their interaction and monitoring of their learning process in an Learning Management System platform.

The Chair of Telefónica has been involved over last two academic years in several projects related to the use of information technology as supporting tool in the learning process, two of which are presented in this paper.

III. MAUD: LEARNING CYCLE

MAUD encourages students´ personal development and meaningful learning. Meaningful learning cannot be based merely on the acquisition and repetition of information that has been delivered by someone else. To this effect, meaningful learning should involve thinking, combining activities of observation and contextualization with activities of reflection that help to understand situations and contents. Thus, MAUD [4] defines a structured learning cycle organized in five stages, as shown in Figure 1.
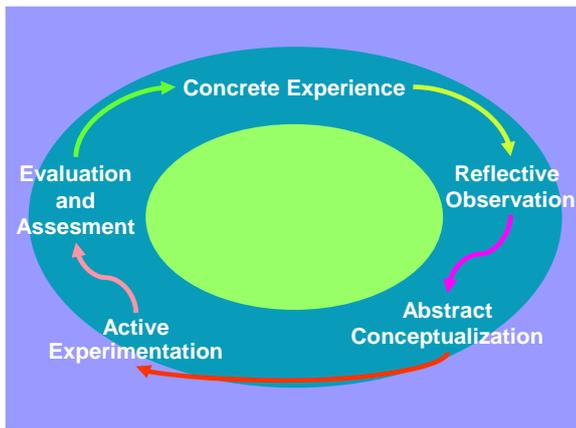
Fig.1 Learning Cycle Stages

A. Concrete Experience

To sum up, this first step tries to put the student in relation with the topic to be learned/studied starting from her knowledge and experienced got beforehand. People do not begin learning form point zero, but from the standpoint of their own knowledge and experience. Therefore, the model seeks to motivate the student through his own experience and context to come close to the idea of the topic. During this step, defining or describing the problem under study and sharing the objectives of the training process between professor and student are key issues.

In this first phase of rapprochement there can be introduced various strategies to assist the person to ask the proper questions to contextualize a particular subject: Linking to other contexts, experiences, future expectations, questions of how to learn, questions on the subject, common perceptions.

B. Reflective Observation

This phase is an essential step in meaningful learning. Reflective observation involves knowing how to see, opening our eyes to look at the reality that surround us and, secondly to question through reflection the considerations that this observation, in the form of ideas, objectives, goals, experiences, contents or conducts, really means.

It is the student who takes the responsibility of linking ideas, feelings and values with their own reality and way of seeing the world. Learning materials are the basis of student work, and must represent a challenge for them to transform their knowledge and previous experience in new and deeper understandings.

This phase should help learning things and concepts, their use and applications, their effects on others, and so on. The purpose of this phase is the person to ask questions, be concerned, as no significant learning can occur if individuals do not question about what they are learning and their circumstances. Evidence shows that students have great difficulty in asking questions and questioning about themselves and their surroundings. This is a clear indicator of excessive dependence from their teachers.

C. Abstract Conceptualization

Abstract Conceptualization follows Contextualization and Reflection. Then, the purpose is to learn as deeply as possible the theoretical positions on the issue, bringing the student the theory that from a specific scientific area has developed. Conceptual learning is based on the acquisition of knowledge, scientific terminologies, facts and data, methods and strategies, principles and theories that shape scientific knowledge of each subject.

This is a learning process based on the use and application of cognitive skills such as understanding, analytic-synthetic thinking, critical opinion and divergent thinking, enabling integrated and meaningful learning.

The conceptualization phase allows the scientific mainstream and, at the same time, it is a phase that helps the mental structuring of ideas, principles and theories, linking them with other ideas and thoughts that help to embed information and especially to produce knowledge.

The conceptualization of coping may be an individual at an early stage and later as a team. The contribution of intellectual styles and individual characteristics of each member are the basis for enrichment of the group.

D. Active Experimentation

The fourth phase concerns the linking of theory and practice. It includes any activity that promotes development of skills and abilities of students in applying concepts, theories or models with the aim of further strengthening them. There can be included drills, exercises, projects, or research designs.

It is an especially appropriate stage for collaborative work, learning to cooperate and develop social and interpersonal skills. This individual and social nature of learning has the potential to create powerful learning environments that use traditional and virtual experience as a resource for collaborative learning and to integrate academic and social life. In this regard the contribution of an LMS and, as discussed in subsequent experience, Web 2.0 happen to be a very powerful element.

E. Evaluation and Assessment

This final evaluation of the results achieved in the learning cycle has several perspectives. A staff assessment for the students to reflect on what they learned. A formative dimension that is based on the consideration of feedback as the key to student progress. Finally the evaluation of work and study of each student as an accountability process.

IV. ICT IN EDUCATION: LEARNING MANAGEMENT SYSTEMS AND WEB 2.0 TOOLS

As everybody knows, the boom in ICT has fostered the development of virtual education or e-learning, above all, to gain efficiency in the new paradigm of Higher Education as it is been promoted by most states in Europe. Among them, Learning Management Systems –or Content Management Systems- and those architectures related to the Web 2.0 are the most popular tools to make virtualization in education possible [5].

But these advances in information technologies have produced, as well, great controversy in the education community about the ideal model, whether it is a LMS or anything based in Web 2.0 architectures, to support in the most appropriate way the learning model. Deusto was not outside of this discussion and that is why from the Chair of Telefónica some projects in both directions were proposed in order to provide tools and guidance on their use that were helpful to teachers and students in developing the learning process.

V. A LMS TO REINFORCED MAUD

According to a recent study carried out by the California State University (23 campuses, 450.000 students, 47.000 people in staff) about "The state of Learning Management in Higher Education Systems", at least in USA, LMS based in proprietary software are, to a large extent, the most used solutions to virtualize the learning-teaching process. [6]

Maybe because of the same way of thinking, maybe because human being likes to create new things, the first development of MAUD at University of Deusto was based on an e-learning platform built ad-hoc for the University, called "ALUD". The decision of developing a specific tool, based in proprietary software, rather than adopting an existing one (even under Open Source Code) was due to the primary objective to adopt of an e-learning platform perfectly adapted to the conceptual framework of the own learning model so that it would guide and support the work of educator, not only in development, but in the very conceptualization of her subjects.

More recently, the opportunity of adapting the well-known Open Source Learning Management System, Moodle to the MAUD was analyzed. It should offer educators a platform widespread in the educational community, and therefore it should be easier for them to share and to exchange courses and materials while a suitable environment to learn the conceptual model they use.

The aim of this project was twofold. For one hand, University of Deusto took advantage of this process to rethink the whole tool (ALUD 2.0 was born) and for the other, it was agreed that the new solution should be an Open Source based Learning Management System; so, in this way, it was Moodle the new LMS chosen.

It is to be said that, from the perspective of the University of Deusto´s Model of Learning (MAUD), two key elements should be added to Moodle in the customization process of the new platform: the format of the courses according to the definition of the learning cycle and competency assessment.

A. Format and Structure of Courses

The previously stated Learning Cycle makes up the different learning units, so the five phases described before define the structure of each learning unit. To accomplish to the model, Moodle Themes were used to support the learning units.

In this way, every instructor could use the new LMS platform without having to renounce to any characteristic of the Deusto´s pedagogical framework. Another aspect that was no of less importance was the fact that, achieving a structured model, it would give higher coherence and solidity to the

whole educational system as everybody would have to adopt the same strategy in the teaching-learning process.

Besides of that, the use of Moodle for the new ALUD 2.0 platform offers educators a variety of compatible resources through the incipient/vast community of teachers that are developing courses with it, so that they can exchange units, courses and, even, teaching strategies with the rest of the users of Moodle based LMS.

A special effort had to be made in order that all the previous educational material, the one designed under the first proprietary platform, could be automatically migrated to the new one as no teacher wanted to lose her work. This was a key issue for the success in the adoption of the new platform.

B. Competence-based Assessment

As Delors´ report proposed [7], during the last years, a special attempt has been made to redefine education as a process to acquire and develop some general and specific competences instead of following with the old paradigm which defended to learn (memorize) a lot of different contents. As explained before, this is the main foundation of MAUD.

Competences are the cornerstone of Deusto´s pedagogical model. By competence, MAUD understands: "the set of acquired knowledge, capacities, abilities and skills leading to a good level of development and action" [8].

Twenty one competences comprise MAUD´s framework, each of them split in three progressive levels of achievement and for every level several indicators and descriptors have been established to offer a complete vision of students´ performance.

Being the development of these competences the main goal of the MAUD, assessment plays a fundamental role in the whole model. As most users know, Moodle contains a special module to assess outcomes which could be used, if not as it was, for this purpose.

Moodle´s "standards" offer some sort of indicators and descriptors to define somehow competences. Nevertheless, these resources were not sufficient to back competences as they are defined in MAUD up.

So it was necessary to adapt the new LMS to MAUD´s requirements. To accomplish it, the arranged module allows to structure competences in different levels, indicators and descriptors. It is platform administrator's or each educators job to define and concrete each of those aspects for the given competence or competences that should be developed through the particular subject. After this work of systematization, evaluation could be done to know the real level achieved by each student related to every worked competence.

The result of this work has been a new platform that has integrated the knowledge accumulated in a decade of research and experimentation in a competency-based model over an Open Source platform widespread in the educational community.

Currently a pilot experience is been developed for a score of ALUD experienced teachers who are evaluating the functionality of the new platform, its adaptation to the latest innovations in the model as well as the migration process.

First impressions are excellent and the experience has been so positive that some of the technicians who have been involved in the adaptation of Moodle have decided, encouraged by the university itself, to create a startup to use the knowledge gained in the project and, in this way, to extend it to the broader community of Moodle users.

In this process, there has been an important contribution of some professors associated with the Chair of Telefónica not only through their technological knowledge of Moodle developments but the experience in applying Moodle and The Pedagogical Framework of University of Deusto. Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

VI. LMS VS WEB 2.0 : TWO OPPOSING POINTS OF VIEW

During the last decade, LMS deployments have been consolidated in most of the traditional educational institutions [9], not only to replace face-to-face instruction (e-learning), but also to combine it with computermediated instruction (b-learning or "blended learning") [10]. No problems have been found by teachers and students adapting to this change -apart from the usual technical difficulties- because these systems mimic most of the concepts used by traditional education: order, arrangement, standardized evaluation, etc.

At the same time, the popularity of Web 2.0 [11] has brought a slew of new interaction styles, boosting participation (collaboration), customization (flexibility) and immediacy (real-time). Such a radical shift has determined the development roadmap for other available platforms, forcing their adaptation to the new communication demands.

Unfortunately, traditional e-learning platforms are too lined up with the conventional education structure. They haven't been able to follow flexible 2.0 applications' fast pace. Some teachers, fascinated with this new conception of the web, have decided to rebel against the imposed LMS and embrace the Edupunk movement [12]. Edupunks criticize the stifling rigidity of the archaic and closed LMS systems, reclaiming more open, agile and flexible platforms, focused on the learner instead of the content, by using a DIY ("Do It Yourself") approach. Despite the critics, Edupunks are not alone in the crusade against LMS.

Recently, Bush and Mott stressed this point [13] with a "Post-LMS Manifesto". Are we witnessing a shift from formal to non-formal education? From education institutions to education experiences? In the late 90's Gatto complained about many absurd and anti-life situations related to traditional education systems [14]. Nowadays, many authors reclaim a ubiquitous education [15][16], on-request and nonformal[17], an "expanded education" [18]. As Stephen Downes stated [19], "learning is not based on objects and contents that are stored, as though in a library. Rather, the idea is that learning is like a utility -like water or electricity- that flows in a network or a grip that we tap into when we want". Is this just another top-down versus bottom-up endless debate? The Cathedral versus the Bazaar? [20] Or an intergenerational conflict caused by different views of the world and the learning process? [21] It remains to be seen whether the Web 2.0 Connectivism will oust the Constructivism, theoretical principles of popular LMS like Moodle.

VII. EDUCATION 2.0: A POSITIVE EXPERIENCE

Despite the successful experience of the University of Deusto in the use of an LMS as a tool in which support their learning methodology, the Chair of Telefónica, true to its goal of exploring the opportunities offered by new technologies applied to education, could not stop the implementation of 2.0 technology in the classroom.

That is why we chose to prepare and offer students a course based on knowledge of these technologies and, in turn, developed the intensive use of them as an educational tool.

After two years promoting them, we could conclude that using Web 2.0 applications at classroom has been a very positive experience. The main advantages of this change are the following:

A. Less lectures, more collaborative work

Unidirectional communication and the lack of spontaneous interaction are common situations when teaching large classes (above 50-60 students). This trend can be broken easily with social software: prompting students to comment their opinions in blogs, following each other in microblogging networks or using them to interact with teachers. Education 2.0 is more than just adding technology to education. Teachers have to become DJs [22], combining miscellaneous sources and keeping their students on the dance floor. Content can be self-made, remixed -using someone else's material- [23], or even created by the students themselves.

B. No textbook

Instead of working with just a sole information source, several diverse resources are used: blogs for group work, microblogs for communication, RSS feeds, multimedia clips linked from a wide range of platforms (e.g. Youtube, Flickr, SlideShare) and a wiki to gather them all in a common place and support collaborative work (see Fig. 2).
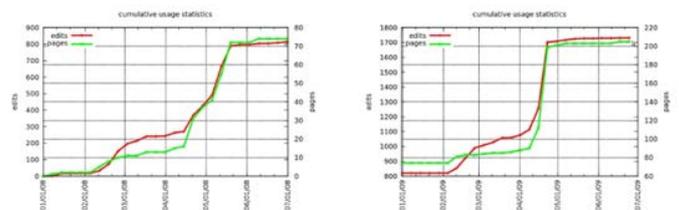

Fig.2 Wiki use during Spring Semester 2008 and Spring Semester 2009

Personal blogs or tumblelogs are used as virtual portfolios to store all subject-related resources created by teachers, students or any other online content service provider. Students can organize these Personal Learning Environments (PLE) freely, without being evaluated.

C. Beyond physical boundaries

Education extends beyond the spatial and temporal boundaries of the classroom. Interaction is not limited to teachers and students, it is virtually global. This new scenario brings back the old question quoted by McLuhan and Leonard

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[24]: "Why should I go back to school and interrupt my education?". Forty years later, we can solve this problem.

Moreover, two interesting consequences arise:

- The teacher is not the only yardstick anymore: aside from their evaluation within the classroom, students also receive feedback from other users interacting with the contents.

- The teacher is not the only available data source anymore: collective intelligence of social networks [25] replaces the expert's role. Not only students are the subjects of their own learning, but also the sources of learning, functioning as the perceptual input for the wider network.

D. Non-formal communication, non-formal learning

Not every student is able to discuss a topic in public, but they are usually experts on texting and sending thoughts by mobile phones. Microblogging platforms such as Twitter are based on a similar idea. Therefore, not much training is needed to use them and increase spontaneous interaction. Microposts can be shown during the class, in a less formal way of real-time participation. If lack of privacy is a problem, less public services like Yammer or EdModo can be used instead.

As we can see, it is not casual that many teachers are gradually introducing Web 2.0 tools in their learning processes [26], due to their multiple advantages.

VIII. NOT EVERYTHING IS SO POSITIVE

Web 2.0 features can also be considered problems in certain contexts. Where some see flexibility, others see lack of control; where some see cooperation, collaboration and syndication of several sources, others see confusion.

These are the main problems detected during our experience:

A. Lack of order

Course content is not stored in a centralized and static location anymore. Instead, the content generated by teachers and students is scattered over the Internet, and may be compiled. Not being able to find and organize these resources will result in a limited vision of the whole working material. Therefore, developing this digital competency becomes mandatory [27], mastering RSS aggregation and social bookmarking platforms. In our case, we consumed RSS feeds created with Yahoo! Pipes, using blog widgets as clients, for aggregating all subject-related content.

B. Lack of control

Teachers lose control at two different levels:

- Technical level: control over technical infrastructure is usually lost using Web 2.0 platforms, because most of them rely on "cloud computing" based free services. Although is possible to deploy them "in-house", both Google and Microsoft are offering free professional services to academic institutions (regarding email, IM, VoIP, blogs, microblogs, sites, documents, etc.). The bad news is that service providers disclaim any liability or responsibility for any loss. Recently, popular Web 2.0 services experienced temporary failures, being some of them fatal to their users. [28]

- Social level: the etiquette of the Internet cannot be controlled by teachers. Their authority means nothing outside the academic institution. Spam, Internet trolls or even cyber-bullying can disrupt teachers' efforts, without an easy solution.

C. Privacy and arbitrary limits

Web 2.0 platforms promote participation and new content publication, but they usually forget about privacy issues. Mediocre or incorrect information can remain accessible on the web for years, lasting after the end of the author's academic career, and becoming a problem during professional life. Out of context blended-learning activities or teenagers' opinions may lead to similar problems. Besides, these platforms can add arbitrary restrictions to their Terms of Service (TOS), blocking some uses that can be considered legitimate by teachers. A clear example of this problem is the arbitrary age limit for some social networks, preventing their use in lower grades.

D. Scope confusion

Analyzing students' preferred social networks (e.g. Facebook, MySpace) and using them to deploy educational content is very tempting for many teachers, but such strategy doesn't seem to be very effective for some reasons:

- Teachers are not students' best option to share spare time with. They may take it as an invasion of privacy, so it is not recommended to try to be best friends.[29]

- Such an environment specifically designed for leisure, hyperconnected with procrastinating friends, full of silly tests, chats, etc., is not the best place to work on educational content. Moreover, previously defined digital identities within each social network can alter online teacher-student relation.

IX. RECOMMENDATIONS FOR WEB 2.0 ADOPTION AS EDUCATION SUPPORT TOOLS

There is no specific solution for the problems mentioned before, but different tools can be combined to achieve a good trade-off among them. The solution we would like to propose is based in a combination of content-centered tools, typically managed by teachers, and learner-centered tools, managed by students:

- Course wiki: installed on a local web server, with restricted access for students (control, privacy). Teachers and students use them to support collaboratively generated content, in a structured way, compile links to remote resources and practice with wiki syntax (Wikipedia contributions sandbox).

- Group blogs: created in a public service and merged together in a blog planet. Students use them to create and share subject-related content.

- Personal blogs or tumblelogs: used as virtual portfolios or PLEs. Students freely choose their favourite service

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to develop them, and select the RSS feeds generated by the rest of the tools.

- Microblogs: mostly Twitter (public, universal) and Yammer (private, under control), to encourage spontaneous participation and real-time communication inside or outside the classroom. Generated microposts are easily added to blogs through RSS widgets.

Since there have been no previous similar experiences in our Faculty, some confusion is understandable at the beginning of the semester, but students should be able to understand the dynamics of the work after a few weeks.

The use of more homogeneous systems could be another solution to the problem. The structure of the content can be hold in a LMS supporting Web 2.0 features (e.g. Moodle), managed by teachers, and integrated with a virtual portfolio platform (e.g. Mahara). In such systems students can organize, discard or add resources in a relevant way to their own learning process, interacting with a wider community and adapting the structure of the network as their experience varies [30].

X. SOME CONCLUSIONS

As previously stated, there is a serious debate when it comes to selecting appropriate tools to improve the e-learning platforms.

From University of Deusto´s standpoint, there are some consequences that have come clear during our experiences. First of all, our efforts to develop our own pedagogical framework pay off; not only to improve the previous teaching-learning process, but to design the proper tools to implement it from the technological point of view.

From University of Deusto´s standpoint, there are some consequences that have come clear during our experiences.

First of all, our efforts to develop our own pedagogical framework pay off; not only to improve the previous teaching-learning process, but to design the proper tools to implement it from the technological point of view.

Secondly, Learning Management Systems still can provide a variety of good results for professors and pupils and keep things "structured". cbconc

Thirdly, Moodle –the Open Source Solution- has provided a proper environment for our LMS ALUD 2.0. It is flexible enough to be adapted to our own needs and requirements.

Fourthly, Web 2.00 tools have happened to be a good mate in this journey. Being clear about the objectives, one can use both approaches and tools instead of choosing between both of them.

Nevertheless, there is nothing that lasts forever. For us, it means that from the Chair of Telefónica and, of course, following the path we are building up, we will keep on experimenting, implementing, and fortunately, developing suitable tools and technologies to help education to be the process that any student deserve and every teachers need.

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