

# Applying Virtual Learning Environments in a Portuguese High School Context

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**Abstract.** This paper reflects my two year's PhD research in learning environments and web 2.0, namely Ajax usage, in developing a user interface around different web systems. Our approach consisted in an explorative research in the learning theories and web tools available and the integration of different participative systems. It will be interesting to provide with a simple user interface multiple web 2.0 features . With that we are trying to develop a hybrid system and apply it a Portuguese high school scenario, in a b-learning approach, breaking the classroom walls and enabling the learner to study in different places and at any time, as a complement of real class. I expect to end my PhD in September 2009.

**Keywords:** Virtual Learning Environment, Interaction, Social Communities, Ubiquitous, interoperable.

## 1 Introduction

A second generation of e-learning systems is emerging, where all actors (namely teachers and students) will actively get involved [1]. This is happening because of the fast changes on the web technologies, which are commonly called Web 2.0 [2], and also to the appearance of Multi-User Virtual Environments (MUVE), or virtual worlds, such as: Second Life [3] or ActiveWorlds [4].

Despite the technologies breakthroughs, our research has explored some pedagogical approaches which might be considered behind these learning environments. But beforehand we analyzed what were the most important characteristics these systems should have. To synthesize, we consider integration, interaction, social activities, visualization and simplicity as the most important ones. Integration because we are assisting to the appearance of multiple web sites where user participation is possible but only to a particular issue (for instances: movies, pictures, text, and links). Interaction and social activities because of our acceptance of what education might be. A place where students and teachers can work together constructing knowledge through practical activities, namely laboratories. Visualization and simplicity because the learning system should provide an integrative perspective of knowledge, always

associated with a particular topic given in class, and the additional time effort required spending around the system design by teachers should be low.

Therefore the learning space should be seen as a class complement, breaking the classroom walls and providing an additional resource for learning. By increasing the time students have in contact with the subjects, we are enabling them to achieve knowledge more rapidly, or at least to have another perspective of it. Of course the teacher role is important; therefore he or she must be present when students are working around the learning objects.

To sum up, with a web solution, available everywhere and at anytime, students and teachers could work together between classes in a blended learning system [5].

Making the bridge to pedagogical approaches, John Dewey one of the founders of the philosophical school of Pragmatism, considered knowledge should be constructed in our search for certainty in an argumentative base with a social context environment behind it. Rephrasing it, one might say that in a dynamic social environment, where several people are involved, the best way to learn or deal with some subfield of a specific knowledge domain is to establish dialogue bridges among all participants. In addition Siemens [6] claims with his Connectivism approach that learner is supposed to make links or bridges in a social network, which allow short connections between information. Interesting, though, is realizing that people with similar interests and knowledge aggregate themselves in small networks. The chaos starts to give way to organization units.

Picking the ideas of both authors and our requisites for the system (integration, interaction, social activities, visualization and simplicity), we came up to a research hypothesis: Can web learning environments improve social participation, where students and teachers, actively work towards wisdom?

Several research questions were presented at e-learning 2007 [7], but the one which seemed more important to follow is: How web systems might improve the computer's usability in learning processes.

In order to validate our question, we must have an education context to perform some studies. Of course the conclusions will be valid only to that particular context; however the approach method can be applied later on to a similar or other contexts and compare results.

For now the Portuguese high school context was chosen mainly because of two particular reasons. The first is that the Portuguese government is going to provide to all students, who are enrolling the high school, a laptop with mobile internet connection. This measure is expected to begin in September 2007, where any student can apply for this programme and must have success on the studies, in order to maintain the equipment. The second reason is that one of the authors has being a teacher in a high school for at least ten years, is keen on this particular education scenario. These two reasons seemed the right conjecture for a case study on Web Learning environments in a high school.

The technological solution followed is based on a Hybrid system applied to a learning environment. Hybrid systems have the advantage to merge distinct software tools and the integrated package provides an added valued solution. But which hybrid model to follow? That was our quest some time ago. After presented a solution [7], we considered that the hybrid Sloodle [8], based on Moodle [9] and Second Life [3] will

be quite interesting to use. Regrettably it is not quite available to be used, but we are following its development and focusing in these two same systems.

The result of our two years research is synthesized next, and the next two years of research will be presented after.

This paper is organized in two sections. The next three chapters are addressed to our topic, Web based learning environments, interfaces and knowledge communities, in particular the expected scenario to validate our conclusions. The second section, the other three chapters, is related to our work programme for the next two years.

## **2 Web based learning environments**

We tried to synthesize the important ingredients we consider in Web learning environments, especially some prerequisites. This is a very difficult task because different authors have distinguished perspectives. We present next some ideas, or learning theories we consider interesting to refer.

Learning can be seen with a socio-cultural perspective, where the process of learning incorporates different forms of signs, symbols and tools in social activities [10]. Furthermore, learning and intellectual developments are undoubtedly related to social interactions: the learner constructs knowledge due to interaction with others [11].

Dewey brought into discussion the issue of inquiry learning and prior knowledge of the student in contrast to curriculum's desired knowledge. Also Vygostky studies were further way when he considered that concepts appear first in social interaction and not at the individual level. Therefore the role of social interaction is crucial for the transformation of prior knowledge. He also considers the Zone of Proximal Development [10] as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers". In other words, a learner can perform a task with teacher tutoring or with peer collaboration that could not achieve alone.

Making a mapping with these theoretical learning theories, we find in a networked world, where the participation effect of internet users is increasing and the way information is explored as interesting ingredients to analyze. An entirely new approach is needed and it includes technology applied on new learning activities, making learning theories move towards into a digital age. This approach goes beyond constructivism itself and even the latest modifications of social constructivism for including social interactions without avoiding the same inside-out limitations of the original theory.

The conectivism theory, in an educative perspective, argues that through the disperse meaning; the learner's must recognize the patterns, which appear to be beneath it. Therefore, meaning-making and forming connections between specialized communities are important activities. This capacity to form connections between sources of information, and thereby create useful information patterns can have echo in many fields, such us economics, mathematics or computer science. They are supposed to achieve knowledge by connecting the nodes where it is located. These

nodes can be fields, ideas, communities that specialize and gain recognition for their expertise.

Marchiory [12] also claims, now in a technology perspective, there are in learning systems cost relations between technological and social aspects. To enable computers to play a key role in collaboration environments, one must combine computers with people. Therefore, learning systems should have:

- More interaction like the Digg swarm [13],
- More connection between social space and data space, associated with the semantic web usage.
- Go social with social software where by spreading the load we multiply the benefit,
- Go visual creating interactive systems enticing the user like in [14] environments,
- Maintain the social cost low by using poor semantics and reasoning, like old keywords approach, rather than precise semantics and exact reasoning from semantic web. With that, e-learning has the potential to become more personal, social and flexible with new web services, empowering students in a truly learning environment.

In order to synthesize all these authors claims, we consider that a Web learning system, must focus on the social interactions, the prior knowledge of each user is important to take into account, the learner must be coached by a tutor, or have some scaffold to guide. Because of the Web platform has changed to a participation paradigm, the learning environment must also contemplate it, but also the connection among different resources and the information patterns. Finally the aspects referenced by Marchiory, they all are very important to consider.

### **3 E-learning 2.0 and Web 2.0 Technologies**

The abrupt spin-of web 2.0 technologies don't have an immediate echo on the schools practices, especially at the high school level. Learning itself must modify, adapt and incorporate these technologies push-ups. But what are these Web 2.0 technologies? Web 2.0 has emerged, with its characteristic architecture of participation, where users contribute to growing pools of information, becoming co-developers of web sites and citizen-producers and publishers, working in a range of media. Web 2.0 is manifesting in a number of very popular sites and massively distributed on online applications. It is much more about change in people and society than about technology. Sites like Myspace [15], Youtube [16], Digg [17], Bebo [18], and Flickr [19] clearly represent this recent web strand [2].

In order to develop a brand-new pedagogical model and implement it for the next generation web, we must consider profound implications for learners, and for society, with the emergence of web 2.0.

Additionally, learning applications written in open source code are also contributing to the development of participatory and collaborative e-learning environments. Open source standards such as the [20], [21] allow data to move easily between courseware applications, while open source course management systems such as [9], [22], [23], [24], [25], and others, are highly modularized, allowing teachers and learners to select, edit, or extend learning components most appropriate

for their purposes. Moreover, with open source code, instructors, designers, and students can readily develop new modules and add them to catalogs of available educational components, allowing the learning platform itself to evolve collaboratively according to the needs and imaginations of the participants.

This cultural shift from the static presentational forms of web 1.0 to the dynamic participatory architecture of web 2.0 – requires a parallel conceptual shift from what we call Learning 1.0 to Learning 2.0. This shift is fundamental for e-learning, which is being shaped by the power of the new information and communications technology. The N-gen users now accustomed to the give and take process of media sources of communication and entertainment will feel at home in the context of self-directed learning, acquiring and contributing as natural parts of the learning process.

The following table presents the differences between traditional and innovative e-learning systems.

In Learning 2.0, learners and teachers are in a cooperative relationship. Learners play an active, participating role in the learning process. In this context, the learners shape the learning environment as much as they are shaped by it.

The fundamental difference of Learning 1.0 to Learning 2.0 is the shift from architecture of presentation to architecture of participation. This change would enable learners to take an active, collaborative role in shaping their learning programs. This shift would be exemplified in specific environments, which draw the students into the processes of communication and creativity [26].

**Table 1.** E-learning Comparison

<b>E-learning 1.0</b>	<b>E-Learning 2.0</b>
Focus on Content Presentation	Focus on Learning Processes
Focus on Access & Download	Focus on Communication & Interactions
Fixed or Static Design	Co-developed with Learners & Instructors shaping Design
Individualized	Customized/Personalized
Teacher-Directed	Cooperatively Activated
Static	Evolving
Information/Content	Knowledge & Understanding
System-paced	Learning-paced
1:many	Collaborative & 1:1, many:many
Search and Retain	Contribute, Tag, and Share (Folksonomy)
Tests and Examinations	Demonstrations and Prototypes
Prescribed	Negotiated and Contracted
Web of documents	Web of data
Web as Media	Web as platform
Communities of Practice	Social-Networking
Pre-defined learning architecture	Open learning environment
Feedback limited	Feedback rich

#### **4 Portuguese High School**

In this particular context, we are focusing on teenagers with ages between sixteen and eighteen years old. They are in the Secondary level, which precedes a university entrance. There are different courses, divided accordingly to specific matters and they all are divided in classes. Each class has different teachers, accordingly to a particular

domain. For instances all classes have Portuguese, English, Philosophy, whereas some have Mathematic, or Biology. Only in the third and last year on the secondary course they have a discipline called Project Area, where students in an integrative perspective have to develop a project. Therefore we assist today, in this education level, a segmentation of domains, which in many cases is understandable. However, on the students perspective sometimes is very difficult to see the school as all and not as a three year course, divided in disciplines with a Project Area in the last year.

With this scenario, if we plan to use a web learning environment we will have to use this segmentation, but should it be possible to use another approach? What are the common aspects between different disciplines? The school must be seen as an aggregator and not segmenting knowledge. Later on I will come back to these issues. Fortunately students have at school other interests besides, having classes. They can join clubs, for instances History, Theater, Music, they have a place called center of educative resources, which is a mixture of library with multimedia center, and of course the student's room. Besides that they have the playground, where they can play some sport (football, basketball, or volleyball) or just chat with one another.

I believe all these and other places contribute directly or indirectly for learning, and its subsequent success in finishing the studies in three years, with the approval of all disciplines, as well as, achieving some knowledge.

Unfortunately very few students are highly motivated for the completion of studies with success. Almost all like school or being at school, because of its social environment. That is, the school is a place where they can socialize and meet interesting people with the same age. Of course some have difficulties in socializing and the playground is seen as a jungle. But in general terms they like school. So what are the main issues, in this context, we must pay attention in order to motivate students? Recently in a real situation an applied student was not motivated and was saying he wanted to quit. Due to the intervention of the teachers and the psychologist of the school he managed to overcome his personal problems which were interfering between his studies. This is just one case but is sufficient to illustrate that the school cannot be analyzed without its social involvement.

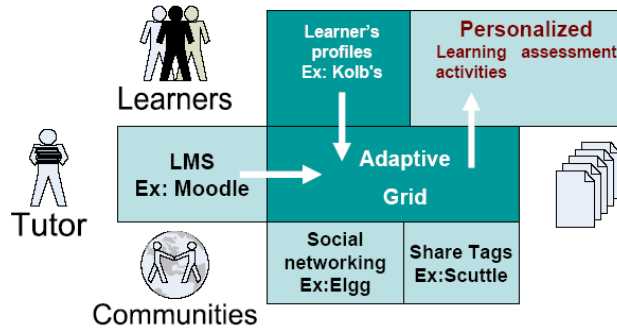
Despite all external and internal influences a Portuguese high school is a place where distinct actors (students, teachers, parents) interact and have different levels of commitment towards and responsibilities for the success of student's literacy. The improvement of our society and in particular of Portugal depends on the level of involvement all these actors, specially the students.

Said this, I must focus my effort in helping students to like even more school and increase the levels of motivation and participation. However the brilliant results we might obtain in our research cannot be generalized for all students and each school has its own reality.

## **5 Approach Method**

Going back on the importance of aggregating segmented fragments of knowledge dispersed on all disciplines, we considered to develop a virtual learning environment around school and not only centered in disciplines. In fact some teachers already use a LMS system, usually Moodle, in their classes, but the social aspects of school are left

behind. That's why we plan to use a social networking tool, such as Elgg [27] in our system.



**Fig. 1.** Learning platform model

Of course the teacher will still have the Moodle has reference, but the user interface, and the all learning system will occur in a different platform, where Moodle will only be an item to consider. In fact the integration of different web software tools is our core issue, as well as, the possibility to provide additional features available to users. Our goal is to provide a ubiquitous system in order to enable learning in different contexts. The only prerequisite for our system is the existence of Web.

The method used up to now can be synthesised to an exploratory research on learning theories and web software tools, in order to find a model for our learning platform. Now we are developing this system, putting our hands in Web 2.0 technology, namely Ajax [28]. After that we will test it and validate our research hypothesis.

### 5.1. Research Question

This research is deeply concerned in understanding how people can use computers in collaborative learning environments, bringing people together, while constructing knowledge. Therefore, the question of how web systems might change the computer's usability in learning processes is very important. The complex brain activity can find a link to social networks in web systems and trigger the learning action. It would be possible for students and teachers to interact in learning environments and dynamically participate in the learning process. These systems should add some value to traditional systems, instead of simply mapping them, as a single copy without anything different.

The importance of complementing real class dynamics with web supported learning environments is my hypothesis. Will we reach any benefit by using both systems? Will the active participation of students increase in an environment that has some levels of freedom in exploring the matters to learn? Or will they disperse more, not building bridges between subjects and not profiting with co-working, which will

result in a waste of time? These are my starting point issues I hopefully can have an answer at the end of my PhD research.

## **5.2. Study material**

In order to test the system we have to use some learning content. We are considering in using some Portuguese learning material, which is already being collected, by a group of two teachers. The content is essentially put in the Moodle platform. The idea is to use two classes. One will only use Moodle, while the other will have access to our learning platform, which has more features besides Moodle.

We will give emphasis especially to social networks with tagging, but also to feedback to the teacher, namely which items the learner liked most. Also the learner can contribute with content to the platform, because it is possible to aggregate other types of information, namely, links to blogs, pictures, texts and other things.

## **5.3. Qualitative Analysis**

This platform will have an increased proposal of value in the form of interaction between people. I am sure that joining efforts of the users in a collaborative environment will have best results on learning in an integrating manner. Because instead of duplicating existing classroom activities, we are rather creating new, richer, more contextual learning experiences, into a socially mediated, technology-enabled environment. With this tool we can enable users explore personal ideas and interests in a learning environment with visual information around key words

## **6. Discussion**

The expected system is expected to be used in different contexts besides learning environments, therefore the system will have a web site where anyone can download it, use it and put their comments. The idea is to see the system as an interoperable solution with different available web system beneath it, and its performance in a real learning scenario.

The idea to develop a tool which supports social communities around learning activities, and actively improve user's social learning capabilities in a high school context is not new, but its implementation in a real context and explore its usefulness seems of extreme importance. The students have unpredictable behaviours and teachers are adverse to change. Moreover making the link between different available web systems and providing a web place where other tools are provided seems interesting though. We might it call a web tool portal, where my blogs, my forums, my room chats, my Wikis, my avatars from second life, my Moodle classes, my network of friends, my web page or portfolio, my favourite links, my feeds, and other issues of my web presence are available.

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