

Web2Train: a Design Model for Corporate e-Learning Systems

Katerina Papanikolaou and Stephanos Mavromoustakos

European University Cyprus, Department of Computer Science,
1516 Nicosia, Cyprus

[k.papanikolaou, s.mavromoustakos}@euc.ac.cy](mailto:{k.papanikolaou, s.mavromoustakos}@euc.ac.cy)

Abstract. Web2.0 has revolutionized the way we use the Web by opening the doors of collaborative learning and direct communication and making the web an open source for learning and exchanging ideas. The aim of this paper is to give Web2.0 its prominent aspect into e-Learning. We present a design model for e-Learning corporate environments that incorporates the social and collaborative aspect of the knowledge transfer process, the quality peculiarities and the training requirements. The introduction of the use of social networks in e-Learning will help improve the effectiveness of e-Learning in reaching its training objectives something that is currently lacking.

Keywords: Web2Train, e-Learning system design, Web2.0 e-Learning, design model.

1 Introduction

In the past few years we have experienced the ever increasing use of e-Learning platforms for business training purposes. The use of e-Learning for business training offers numerous advantages such as ease to set-up, better use of employee time, cost savings, cross-country collaborations, directness and efficiency.

As e-Learning technology is progressing, so should the effectiveness achieved by its use. The virtual environment in order to be effective should find new ways and methods in order to achieve the training objectives. The new medium lacks in certain aspects compared to the traditional training room. It lacks in perceived degree of interactivity, it lacks in communication means, it lacks in creating a sense of community and communication among learners. The employee usually feels isolated behind a screen where hiding and avoiding communication is easy. Learners often lose motivation and self-discipline resulting in lagging behind in their training and failure.

In this paper, we present a design model for corporate e-Learning environments, namely Web2Train. Web2Train incorporates Web 2.0 Tools and is based on three axes; the social and collaborative aspect of the knowledge transfer process, the quality peculiarities and the training requirements.

Our design model is based on our previous work on the inclusion of socio-cultural differentiation in quality-based design and implementation of e-Learning platforms [1, 2].

The use of Web 2.0 tools, such as Blogs and Wikis allow users to express their opinions, communicate and learn from one another in a separate channel than the official e-Learning platform. The learners can use the collectiveness of these tools in order to share information, exchange experiences, monitor theirs and their co-workers progress and address issues of their field. The formulation, use and implementation of these tools follow the quality standards and are diversified according to the learner requirements of age, gender, socio-cultural factors, educational background and intended training objectives. The effectiveness of the tools is evaluated for both trainers and learners at the evaluation phase in terms of achieving the set goals. The learners as part of the learning process should be involved in all phases contributing to the final formulation of the platform. The process is engineered so as to control and vary the degree of involvement of the partners of this learning process according to the intended objective and the skills and competences of the learners.

The rest of the paper is organized as follows: Section 2 describes common Web 2.0 Tools, while section 3 explains the Web2Train model. Finally, section 4 draws the concluding remarks and presents some future work.

2 Web2.0 Tools

One of key factors affecting e-Learning effectiveness was identified to be the lack of interactivity [3, 4, 5]. The isolation of the learner behind a screen leads to declining motivation, loss of interest and failure. In parallel the same need for user interactivity has its effects on the Internet and its use. Internet users realized the asymmetrical flow of information most of them were content consumers rather than content providers. But the Internet can inherently provide access to users both as content consumers and as content creators. The realization of this fact led to the establishment of Web2.0. Web2.0 is harnessing the Web in a more interactive and collaborative manner, emphasizing peers' social interaction and collective intelligence, and presents new opportunities for leveraging the web and engaging its users more effectively. Within the last three years, Web2.0 ignited by successful Web2.0 based social applications such as wikis and blogs and application specific software such as my MySpace, Flickr and YouTube, has been forging new applications that were previously unimaginable. In the next section, we present the basic applications enabling social networking and in e-Learning interactivity (Fig. 1).

Weblogs
Wikis

Mashups
Podcasts

Fig. 1. Corporate e-Learning environment

2.1 Weblogs

The Web offered the perfect medium for immediate press releases and quick dissemination of news and information. The publishing on the Web of an individual's diary, with the thoughts, views, comments and positions created the revolution of Web-Logging or Blogging. The term was initially coined by Jorn Barger in 1997 and in its simplest form is a website with data entries, presented in reverse chronological order [6]. This is the outcome of a common need for the sharing and expression of thoughts, criticism and experiences by individuals and was from the beginning one of the strongest tools of the Internet. Blogger is the owner of the Blog and contributing to the Blog is blogging. Each Weblog is part of the Blog-o-sphere. The number of existing blogs is rapidly growing and there seems to be no end in the near future. The new found "democracy" has many supporters but there are concerns regarding the extend of the freedom of speech. Although, the concept of an on-line diary is far from new, despite this their popularity is increasing rapidly. Two are the main reasons for their success as also identified by other researchers [11]:

1. Personalization: the Blog is personal with the authors' views and ideas but others can contribute too. Directness of communication and the ground for discussions, exchange of ideas.
2. Usability: The crucial factor for the success of Web2.0 applications is the ease of use. They are not addressed to people with technical computer programming skills. Everyone is able to contribute to the WWW and become a content creator by clicking on his/her weblog, register and writing with the help of a WYSIWYG-Editor.

The amount of information trafficking in Blogs can be enormous, to avoid this a personal overflow RSS (Really Simple Syndication) technology is used. With the help of XML structure, so called RSS-Reader can provide feeds of subscribed Blogs or other applications. The big advantage is that new information can be read without opening a site. Further, the possibility of using Aggregators and Search functions help to make the information consumption more efficient. The popularity of blogs has raised concerns and legal liabilities regarding the release of confidential information, use of language etc.

2.2 Wikis

A *wiki* is a simple yet powerful Web-based collaborative-authoring (or content-management) system for creating and editing content was introduced by Bo Leuf and Ward Cunningham in 1995 [7]. It lets anyone add a new article or revise an existing article through a Web browser. Users can also track changes made to an article. The term wiki is derived from the Hawaiian word *wikiwiki*, which means fast or quick. The

user-generated online encyclopaedia Wikipedia (<http://en.wikipedia.org>) is a wiki. Wiki features include:

- *A wiki markup language.* “Wikitext” provides a shorthand way of formatting text and linking external documents and contents.
- *Simple site structure and navigation.* Contributors can create new pages and easily link one page to another. Because a blog site’s hierarchy and structure is flat, the navigation is simple.
- *Simple templating.* When a page of wikitext is requested, wiki software converts the wiki markup to HTML and creates links between pages, and wraps this converted content in a template to provide a consistent look to all pages in the wiki.
- *Support for multiple users.* Hyperlinks to pages within the wiki are created automatically. Wiki software makes links based on the page’s title, so the author doesn’t need to use, remember, or type long URLs to link one page to another within a wiki.
- *Simple workflow.* You can write or edit and publish without editorial oversight or approval. Content in a wiki is managed through change monitoring and the wiki’s ability to roll back to a previous version and prevent spam. You can also control user access and privileges, if required.
- *A built-in search feature.* You can search for specific information or topic within a wiki using associated keywords.

Wikis facilitate collaborative work and this is their main difference from Blogs. Due to this collaborative ability wikis can significantly enhance the learning environment.

2.3 Mashups

A Web mashup is a Web page or Web site that combines information and services from multiple sources on the Web. Web mashups can combine information and/or complementary functionality from multiple Web sites or Web applications. A Web mashup server lets you connect, collect, and mash up anything on the Web as well as data on some backend systems. Seven are the major categories: mapping, search, mobile, messaging, sports, shopping, and movies. More than 40 percent of mashups are mapping mashups [8] Several other new-breed Web applications similarly integrate multiple services under a rich user interface.

Typical applications are HousingMaps (<http://www.housingmaps.com>), that display sales and rental information from a classified ads Web site into Google Maps. The Users can view the map enhanced with information on what property is available for rent or sale in the area. Another example is, Fishing Solutions (<http://www.fishingsolutions.com.au>) that uses Google Maps and information from anglers to help users find fish.

It is easier and quicker to create a mashup than to code an application from scratch in a traditional way. This capability is one of Web2.0’s most important and valuable features.

2.4 Podcast

A Podcast as defined in Wikipedia is: “A Podcast is a multimedia file that is distributed by subscription (paid or unpaid) over the Internet using syndication feeds, for playback on mobile devices and personal computers”. At the beginning the multimedia files were equal to audio files (.mp3). Nowadays also Video Files are distributed via Podcasts. Similar to Weblogs the technology behind is rather simple. With the help of RSS, the easy production of my own Podcast and the widespread bandwidth of the internet connection (which make bigger downloads possible) together with the availability of mobile devices Podcasts get their popularity. Some examples that describe the use of Podcast in Education can be found in [9, 10]. It seems that this technology is gaining in popularity.

The need for including social and collaborative elements in e-learning academic environment has already been identified. An example includes the University of Technology of Graz [11].

3 Web2Train Framework

The advent of Web2.0 and the interactivity introduced by its tools cannot be ignored by e-Learning and will be the medium to make on-line learning an efficient and productive process reaching its training goals. The lack of interactivity and the learner isolation this entails has been identified as one of the key reasons for e-Learning failing to reach its objectives. The learning process does not only depend on the instructor delivering the material to the trainee, there is also a social and collaborative element where learners exchange ideas, share resources even help one another that is vital to the success of the process. Up to now it has been very hard to transfer this collaborative element to the electronic environment due to the immaturity and lack of user-friendliness of the existing technology. Web2.0 technology comes to fill the gap with user-friendly applications promoting collaborative corporate training.

This leads us to propose a novel design model for e-Learning corporate environments that incorporates the social and collaborative aspect of the knowledge transfer process, the quality issues as identified by ISO9126 and W3C and training requirements.

3.1 Social and Collaborative Aspects

The importance of the development of e-Learning methods and resources addressing these aspects is proving more and more important every day. A number of e-Learning systems are currently available serving the purpose of knowledge transfer and dissemination. These systems however, have been mainly developed and produced for the Anglo-Saxon corporate environment. Large corporations' personnel usually include employees from different backgrounds and nationalities, while in the same respect these companies may have offices around the world. Human, social and cultural factors such as the learning background, the training needs, the availability and acceptability of the use of various resources change from country to country even

from area to area within the same country and make the need for differentiation even for the same application imperative if we are to support a successful corporate e-Learning environment.

An e-Learning application must be tailored-made for each country, regions in the same country and groups of countries located in the same geographical area. In requirements analysis phase the emphasis should be placed on the specific characteristics of the countries targeted by the e-Learning application. These characteristics include [12]:

- Demographics - It is well known that human behavior varies according to gender and age. Therefore, these issues can significantly affect system design and performance. The Web engineer or project manager must specify and design the e-Learning application based on the targeted population.
- Social characteristics - The analyst/developer must examine the educational system, the literacy level, as well as the languages spoken within the population, in order for the e-Learning application to be designed in such a way that will accommodate diverged features.
- Technical characteristics - Identifying the technology level of each targeted country will help the Web engineer to decide on the type of technology and resources to use. Countries with advanced technologies and high Web usage are excellent candidates for an e-Learning application utilizing the full potential of the technology. On the other hand, countries new to the Internet arena with primitive or basic technologies may need to design e-Learning systems, for low bandwidth networks and reduced communication capabilities.

3.2 Quality Components

Quality factors such as usability, functionality, efficiency, reliability and maintainability as defined in the ISO 9126 standard [13] together with W3C's recommendations and other web engineering quality components as presented in the research arena [14, 15] need to be addressed and incorporated into the framework proposed leading to the successful design and development of quality corporate e-learning systems. Each component is decomposed into several features that must be separately addressed to fulfill specific user needs:

- Usability - Issues like understandability, learnability, friendliness, operability, and ethics are vital design factors that Web engineers cannot afford to miss. The system must be implemented in such a way to allow for easy understanding of its functioning and behavior even by the non-expert Internet employees. Aesthetics of user-interface, consistency and ease-of-use are attributes of easy-to-learn systems with rapid learning curve. E-Learning corporate systems, by keeping a user profile and taking into consideration human emotions, can provide related messages to the user, whether this is a welcome message or a trainee customization page, thus enhancing the friendliness of the system. These training systems must reflect useful knowledge looking at human interactions and decisions.
- Functionality - The system must include all the necessary features to accomplish the required task(s). Accuracy, suitability, compliance, interoperability and privacy are issues that must be investigated in designing an e-Learning corporate system to

ensure that the system will perform as it is expected to. The system must have all the capabilities encountered in the traditional learning process enhanced by the latest high technology features.

- **System Reliability** - Producing a reliable system involves understanding issues such as fault tolerance, crash frequency, recoverability and maturity. The system must maintain a specified level of performance in case of software faults with the minimum crashes possible. It must also have the ability to re-establish its level of performance. A system must consistently produce the same results, and meet or even exceed users' expectations. The e-Learning corporate system must have correct link recognition, user input validation and recovery mechanisms.
- **Efficiency** – Trainees expect the system to run in an efficient manner when utilizing an e-Learning environment. System response-time performance, as well as page and graphics generation speed, must be high enough to satisfy learner's needs. Fast access to information must be examined also throughout the system life to ensure that user requirements are continuously met on one hand, and that the system remains competitive and useful on the other.
- **Maintainability** - Some crucial features related to maintaining such a training system are its analyzability, changeability, stability, and testability. The primary target here is to collect data that will assist designers to conceive the overall system in its best architectural and modular form, for a future maintenance point of view. With the rapid technological changes especially in the area of Web engineering, as well as the rigorous user requirements for continuous Web site updates, easy system modifications and enhancements, both in content and in the way this content is presented, are also success factors for the development and improvement of such system.

3.3 Training Requirements

Transferring the dynamic nature of learning to the new e-Learning environment, maintaining learners' individuality and differentiation according to personal preferences and abilities, as well as motivating and inspiring learners are key factors for the acceptance of the new learning environment [16, 17]. The key factors are identified as follows:

- **The identification of learners' needs** – The e-Learning environment should be shaped according to the predefined learners' needs and course required pedagogical outcome.
- **The structuring of the learning material** – The material should be constructed in a way that facilitates the successful transfer of the required knowledge.
- **The enhancement of the e-Learning environment** – The e-Learning environment can be used either complimentary or in parallel to the real training environment. In either case the e-Learning environment should adhere to the basic mechanisms and functions of the real environment. In the pure distance learning case this enhancement is even more imperative.
- **The motivation for trainees' participation** – The transferring to the virtual environment is not always straight forward and easy. Trainees are not always willing to use the virtual environment for a number of reasons, such as the

difficulty of the e-Learning tool, the non-intuitive nature of the environment, the provision of reduced interactivity, etc.

- The ability of the e-Learning environment to answer and solve questions and problems. – The e-Learning environment should be able to offer learners a basic problem solving mechanism. Mechanisms such as on-line tutorials, contact with the instructor, reference to useful resources and even access to a technical helpdesk would offer learners support and help.
- The establishment of collaborative mechanisms among trainees – In the virtual environment the trainee can be easily isolated and separated from the rest of the class. This is usually avoided in the real classroom and should be avoided in the virtual classroom too, by organizing and operating in a collaborative basis so that learners can interact and communicate.
- The utilization of the relevant tools (e.g. Web 2.0) for the support of any specific solution – Depending on the targeted audience and the required learning outcome the appropriate tools should be implemented and differentiated accordingly. Tools and components can be utilized to enhance the e-Learning environment more efficiently.
- The right mix of the learning processes implemented – The most important learning processes are identified as follows: analysis, synthesis, reasoning, judging, problem solving, collaboration, simulation, evaluation, presentation and relation. These processes should be used dynamically for constructing the learning scene for each course and trainee.

4 Conclusions

The proposed design model, namely Web2Train incorporates Web 2.0 Tools and is based on three axes; the social and collaborative aspect of the knowledge transfer process, the quality peculiarities and the training requirements. The use of Web 2.0 tools are incorporated in the model in order to facilitate learner-to-learner interaction as well as learner-to-instructor interaction achieving the learning objectives, through collaborative learning. The use these tools will also improve the effectiveness of e-Learning by distilling real classroom practices in the electronic environment. The learners can achieve a sense of belonging, creating a collaborative environment and facilitating the exchange of information and ideas. The learners are also involved in cross-discussion groups to cross-fertilize ideas and build relationships; the idea is to facilitate interactivity and reduce isolation of the learner that is often associated with e-learning.

Future work includes the development of a quality e-learning corporate environment based on the Web2Train model. The system will be implemented in different corporate environments to proof its effectiveness in reaching training objectives.

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