

# Web 2.0 Technology: Future Interfaces for Technology Enhanced Learning?

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**Abstract.** Web 2.0 is an emerging catch phrase and the applications associated with it shocked the traditional eLearning world. However, is this really all new and can it be considered suitable for future interfaces for technology enhanced learning? In this paper, we present some experiences with *LearnLand*. This is an application designed and developed at Graz University of Technology and which has been running there since October 2006. It is based on the open-source software ELGG, which is a social software offering a high degree of choice, flexibility and openness and is considered as a system that places people at the hub of the activities. Our experimental research demonstrated that exactly this *ease of use* aspect is an absolute necessity for successful Web 2.0 learning applications. The tools of Web 2.0 have crossed Moore's chasm and reached the early majority, where they are evolving rapidly. However, the idea of *social software* itself, especially in learning scenarios, is not as far developed as we may imagine. It is necessary to take into account the fact that too few innovators and early adopters are actually using Web 2.0 technology to enhance existing learning behaviors. Insufficient educational concepts with Web 2.0 technologies require much future work.

**Keywords:** Technology Enhanced Learning, Web 2.0, e-Learning.

*"Web 2.0 is an attitude – not a technology; this means there is no technological revolution, it is a social revolution."* Stephen Downes (2006), [1]

## 1 Introduction

The buzzword Web 2.0 and all its applications shocked the traditional eLearning World [2]. Blogs, Wikis, Podcasts, RSS, etc. seem to be the future of learning [3].

During this evolution also a new name emerged: *E-learning 2.0* [1]. However, all those technologies are *not new*. Old technology shall lead to an impact in teaching and

learning behavior? What is the reason for such a revolution? A lot of questions appear. Especially in higher education experiences in using such new technologies are lacking and the often propagated *social learning* happens rarely; taking into consideration that social learning basically results from a number of social phenomena, the most important of which is *social facilitation* [4].

According to Berners-Lee (1989) [5], three major components changed the use of the Internet:

**Accessibility for all:** Today broadband access to the internet is provided area wide in all Western countries and it is *affordable* for nearly everybody. People can use it for any kind of information collecting, shopping, selling etc.

**Devices:** Similarly, technological devices are both available and affordable and it is possible to connect with the internet with these mobile and pervasive devices. Although, Personal Computer (PC) is still the main access point to the Internet, WLAN, GPRS etc. are considerably increasing. Pervasive computing is an emerging area, where technology more and more disappears, as Mark Weiser suggested already in 1991 [6].

**Usability:** Concerning the issues above, the *ease of use* factor is definitely the most important one [7]. In the past, only expert knowledge guaranteed the contribution to the Web. A typical end user without any HTML skills was unable to contribute.

It is interesting to note, that within education the use of computers has mostly been focused on enhancing learning in formal settings, typically in the traditional classroom or computer lab [8]. However, learning does not always take place within such formal learning settings and much learning does not happen in the traditional way, which means that e.g. incidental learning, which is often ignored, is of vital importance [9]. The use of mobile devices could even expand learning possibilities and solve the problem of being tied to a particular location [10]. Generally, the combination of e-learning and mobile computing is called mobile learning (m-learning) and promises the access to applications that support learning anywhere, anytime. Today, sophisticated and functioning hardware is available, whereas innovative, affordable, adaptable and most of all *usable interfaces* remains still the greatest challenge [10], [11].

In 2004 O'Reilly organized the first Web 2.0 Conference and the following slogans emerged: "The user is the content", "Internet is about people", "Social revolution", "Social Networking" etc.; Flickr, YouTube or MySpace were presented as *the* platforms of the next generation Web. It is amazing how fast the use of the Web changed and it is remarkable that all involved research fields, including education, are currently struggling with the incredible speed of technological development.

## 2 Theoretical Background

Discoveries about learning, including learning conditions and learning success, can be systematically and analytically combined into so called *Theories of Learning*. These contain the basic concepts, according to which educational software functions. It is interesting that mostly these theories are not taken into consideration, due to the fact that many technologists are unaware, or even not interested in those. However, at the same time, educational experts, psychologists and pedagogists, are often disinterested

in computer science and/or lack the necessary basic technological knowledge, hence interdisciplinary thinking is of greatest importance in this field [12].

Before discussing, what Web 2.0 probably can change, it must be pointed out that learning will not be easier as before, because learning is an active cognitive process on the part of the learner, where knowledge and understanding is constructed by the learner [13], [14], [12]. However, learning is also a *social process* and proceeds by and through conversation [15] and interaction [16]. Exactly these issues could be a big advantage of Web 2.0 technologies in the future. A large number of didactical scenarios and technical tools have been developed [17]. However, many projects showed lacks concerning successful interaction between the learners and an increasing learning outcome [16]. This implicates that the application of learning theories (behavioristic, cognitive and constructivistic) is necessary in order to strengthen the educational design.

There is some evidence that learners perform better in teams [18], [19], and if learners are part of the educational process and have the possibility to interact and to communicate [20]. However, it is necessary that facilitators engage learners into meaningful interaction and to overcome the transactional distance of online learning [21].

According to Moore, it is necessary to 1) interact with the *content*, 2) interact with the *instructor* and to interact with *other learners* [22]. However, it is necessary to include a fourth type of interaction: to interact with (*new*) *technologies* [23]. Consequently, good Usability is a central concern of these new technologies, in order to be helpful for the learners.

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Fig. 1. Screenshot of LearnLand

### 3 The Project LearnLand

LearnLand is in operation since October 2006 at Graz University of Technology and is accessible to every students and teachers university wide (a screenshot of the start page can be seen in figure 1). LearnLand is based on the open source software ELGG (http://elgg.org – last visited: 22.12.2006) and is described by the developers as “open source software platform designed to allow people to easily connect and share resources”. ELGG is comparable with a blogosphere for example as blogger.com, however, it provides more possibilities with have a strong focus on learning and learning in communities [24].

### 4 LearnLand Technical Background

Both ELGG and LearnLand are based on a modular PHP structure, however, the architecture is not object orientated, due to the fact that modifications can also be done by people who are not experts in PHP programming. The main benefits of this system are the *ease of use* and *easy extensibility* by the administrators. Technically, XML files (RSS, FOAF, Atom) – which form a fundamental basis of Web 2.0 – are funneled through the template-engine; this enables an easy modification of the design.

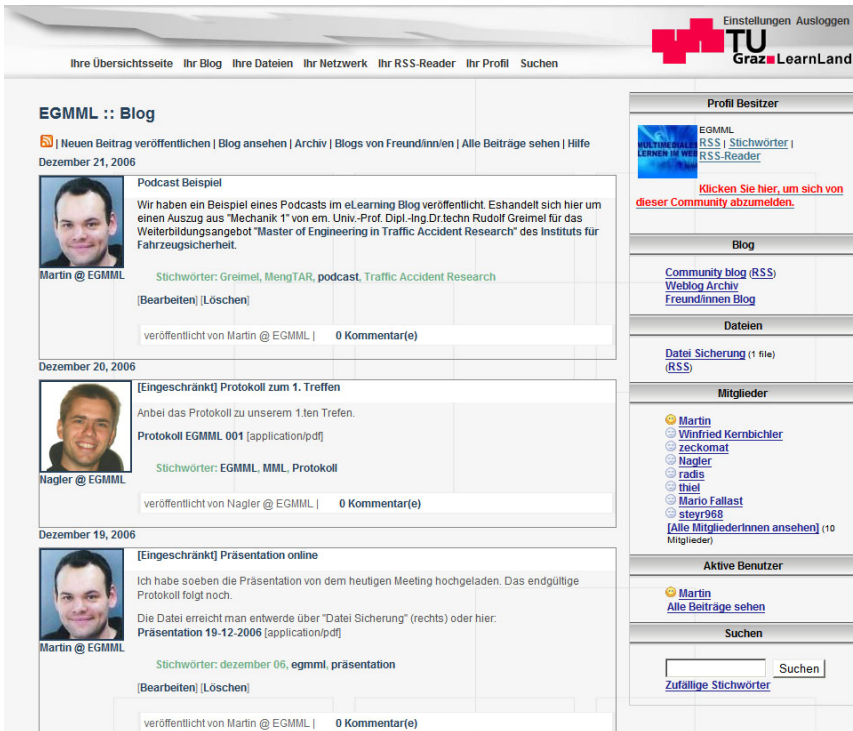


Fig. 2. Example of LearnLand: Community Weblog

A MySQL database is used for storage of all contributions and the user specific data. The hardware requirements are low. An advanced feature of LearnLand is the synchronization of username and password with the central administration system of the University. Security is guaranteed by using LDAP connections and SSH protocols.

The following components are part of the standard installation of LearnLand:

**Weblog.** Every user gets his or her individual and personal Weblog (see figure 2). End users can provide their personal content by assistance of a simple WYSIWYG-Editor. The view of each contribution can be restricted, in order to make accessible the content only to selected end users; only selected end users can read and comment the content. The use of keywords allows easy search, which is also part of the so called tagged clouds. The use of HTML is possible and the use of hyperlinks or data files from the data pool is in the same way possible as embedding external objects with the object-tag. All things which can be done with usual homepages are possible.

**Data pool for the end users.** Every end user is provided with the possibility to upload files which they would like to save or share with other end users. Implementing user rights or to admit keywords is comparable to the Weblog. Each file can be connected with a blog contribution or shared with specific users or communities.

**Personal Information.** The Blogosphere can also be used to provide a short presentation of the end user. This is the main idea of ePortfolios ; in combination with blog contribution this is a core functionality of the future.

**Community building.** Each user can create his or her individual community. For this community an individual Weblog is created, in order to present the results of teamwork and to share.

**Keyword Tagging.** One of the most important features is the implemented keyword tagging. This means if a keyword is used once more, independently from the end user, the software automatically links all matching contributions. Consequently, end users with similar interests or similar problems can match easily (community building).

**RSS-Reader.** Every Weblog gets its individual RSS-Feed and each RSS-Feed from any other webpage can be displayed within. Additionally, it is possible to embed a RSS-Feed in a LearnLand Blog directly. Consequently, external Weblogs (for example a typical Wordpress Blog) can be shown within the environment; the blogger have to blog only once – in their private blog – therefore the contribution is shown in multiple ways (both in their private blog and in the learning environment).

**Personal Information.** Every participant is able to edit and publish any kind of private data. Of course, they can check if and when some entries are provided and accordingly they can change and adapt the visibility to other end users.

## 5 Usability Tests

**Experimental Setting.** Keeping in mind, that one of the crucial factors of Web 2.0 applications is the *ease of use*, we performed a series of usability tests. To gain first experiences with typical end users, we applied standard inspection methods including thinking aloud tests and video analysis of end user behavior [25]. Together with the

programmers and administrators we performed three evaluation rounds with five different end users each (N=15). After every evaluation round the design was adapted according to the findings and the new version was evaluated within the next evaluation round.

## 5.1 Results

First round: Ten tasks were presented to each of the five end users. Typical tasks included log on, produce a blog contribution, search for a person etc.; the given time to accomplish these tasks was 30 minutes. All tasks were part of the core functionality, however, on average, only 4 out of 10 tasks (40%) were fulfilled.

Second round: The second group got exactly the same tasks as the first group. The only difference was that meanwhile the interface was adapted, according to the lessons learned within the first round, consequently to make the tasks more usable. On average 9 out of 10 tasks (90%) were fulfilled.

Third round: Due to the high rate of improvement during the second round, we decided to provide the end users within this round with ten *new* tasks; these included advanced functionalities, for example file sharing with particular other end users. The gained results provided insights into end user behavior and resulted in revised version of the interface.

## 6 Discussion

The rapid usability tests showed that the *ease of use* aspect is absolutely necessary for successful use of a Web2.0 application interface. Immediate fixing the problems and rapid reiteration of the interface improved the interface of LearnLand significantly.

Based on the lessons learned with end user behavior during the usability tests, the following additional implementations were made:

Improvement of the community feeling: Online end users are displayed in the sidebar and also their contributions are now displayed immediately after their log in.

Improvement of the search function: One of the disadvantages of the folksonomy, which is, however, also an advantage in our specific case, is the missing hierarchy; end users felt very comfortable that other end users can allocate individual keywords without thinking about (often difficult) categories; if the pool of data increases and in relation to the learning context it is easier to have pre-selected data. Consequently, we implemented categories in order to allow a certain classification.

Improvement of data collection: It was perceived as useful to save hyperlinks of the end users and to share with other end users. Supported by a ranking system, the quality of the bookmarks can be ensured. This feature is comparable to common social bookmarking tools as del.icio.us, but focused on educational requirements.

Concerning the future of learning in combination with Web 2.0 applications, we emphasize that the technological developments are quite advanced, however, the key for designing future interfaces for technology enhanced learning is *ease of use*. This needs the concentration of research on the end users, however, the findings must be



integrated at technological level [26]. The challenge of our work is to think about **which** and **how** the combination must be done, in order to address the usability aspects.

Finally, it must be pointed out that the interviews after the usability tests turned out one very interesting point: Whether or not the participants were able to fulfill nearly all tasks in the end of the series, they did not totally understand how they can apply LearnLand in order to support their learning processes, i.e. using Web 2.0 technologies for learning purposes is not as logical as we might believe. This leads us to take into consideration the famous Technology Adoption Life Cycle (compare with figure 4) by Moore [27]. He distinguished between Innovators, Early Adopters, Early Majority, Late Majority and Laggards relating to high-tech products. We expand this view to Web 2.0 technologies, especially to *social software* tools (see figure 4).

Web 2.0 technologies have crossed the chasm or reached the Early Majority. The increasing importance and availability of the applications are evident, however, the idea of social software itself, especially in learning scenarios, is not yet as far as we might believe. Some innovators and early adopters are actually using Web 2.0 technologies to enhance existing learning behaviors, however, insufficient educational concepts with Web 2.0 technologies require much future work.

## 7 Conclusion and Future Work

We can see two major directions for the future – a technological and a social. Without doubt, developing *future interfaces* will be a necessity; however the typical end user – the learner – must be in the centre of all our work. The *ease of use* aspect, which includes the *accessibility*, is one of the strengths of Web 2.0 technologies. Nowadays, we need to think about **what** we write and not **how** we write, the content is the most important issue. This would be the true revolution in Web 2.0 work. Bearing in mind that only hard usability work leads to user acceptance, Graz University of Technology has strongly focused on this area [28].

A further issue is the contrast between the technological growth of Web 2.0 and the evidently slower increase in tool usage and acceptance. This is the so called social component. One chance of proper use of these technologies is to fight information overload, consequently our future work must concentrate on **integrating** technology with modern and psychological sound didactic principles.

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