

## E-Learning practices and Web 2.0

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### Abstract:

*In September 2005, more than 2 years ago O'Reilly published the original definition of the idea of Web 2.0. In the wake of this hype the similar changes in E-Learning have been summarized in the term "E-Learning 2.0". This paper aims to give a consolidated review on the development in these two years; which technologies and trends proved to be enduring and how the concept of Web 2.0 has influenced E-Learning in this time. The basic concepts summarized in the term E-Learning 2.0 are presented as well as tangible examples of their implementation. Moreover answers on the question as to what extent these concepts already influence university level learning are presented.*

## 1 Introduction

Within the last decades our society has changed from a product-oriented economy to a service-oriented and knowledge-centered economy. Therefore, employees' knowledge and competences need to be adapted adequately. Consequently, educational goals have also changed significantly, as outlined in [1]. Our modern, knowledge-based society expects much more from students and teachers than ever before. Various learning and teaching styles have become increasingly important; see for example [2] and [3]. Learning experiences in modern learning processes include collaborative aspects and active contributions to learning content. In order to enable contextualized learning, the provision of additional pre-existing content supports students to link newly acquired knowledge to already well known problem domains. Moreover, the integration of students' and teachers' preferred tools and platforms into a tailored learning process has become increasingly interesting, as for example outlined in [4] and [5].

In general, a great variety of information and communication technologies (ICT) can foster above stated learning activities in many ways, such as technical support in traditional learning or in e-learning, see [1] and [6]. By focusing on Web-based technologies, comparable to the changes outlined in the paragraph above, the World Wide Web has changed since its invention in 1989 from a static to a highly dynamic media in the recent years. In 2005 Tim O'Reilly has coined the term "Web 2.0" for collaborative, user-centric content production and interactive content access [7]. In literature Web 2.0 includes (1) social phenomena such as the Web for participation, (2) technology for significant change in web usage, and (3) design guidelines for loosely coupled services. As in many other application domains, Web 2.0 has also merged into the e-learning domain; see for example [8]. The application of the Web 2.0 idea in both e-learning technology and methodology is denoted as E-Learning 2.0 by Stephen Downes, see [9].

The aim of this paper is to give a consolidated review on how the concept of Web 2.0 has influenced E-Learning. The remainder of this paper is organized as follows: First of all a number of those Web 2.0 concepts, which impact E-Learning 2.0, are explained. In the next part the application of these principles in tangible implementations is presented. In a final step, the impact of E-Learning 2.0 concepts on learning is examined by taking a closer look at related surveys. Finally the conclusions are summarized.

## 2 Web 2.0 Concepts and Technology for Learning Activities

The observed change of E-Learning from medium to a platform [9] leads to the fact that several Web 2.0 concepts and technologies take influence on contemporary E-Learning. On the one hand there are several core technologies which are likewise associated with Web 2.0 and E-Learning 2.0. On the other hand the important role of social interaction and collaborative work results in online community applications which must be considered in the context of learning.

### 2.1 Technological Viewpoint

As far as the technological viewpoint is concerned, several points of intersection between E-Learning practices and Web 2.0 philosophy can be identified. For each of these points of intersection corresponding Web 2.0 technologies will be presented in this section.

First of all there are E-Learning approaches which support communities of practice, i.e. socio-constructivist pedagogical strategy where learners interact and learn together. Interaction typically occurs through discussion, commenting, collaborative writing, or working together on projects [10; 11]. Recently, tools such as wikis are being used to support such community aspects in E-Learning [12].

Wikis are a technology introduced by Leuf and Cunningham in 1995 [13]. The term itself is derived from the Hawaiian word *wikiwiki*, meaning *quick*. The technology is designed to provide a simple tool for knowledge management. Wikis allow all users to create and edit content online. All changes can be retraced by the other users and older versions of documents are available in a revision history. As such wikis are an easy to use application for collaboratively creating content.

Wikipedia is the best known wiki system. Originating from the Nupedia project it provides a large online encyclopedia with all of its content published under the GNU free Documentation License or similar. It consists of more than 4 million articles, which are provided in more than 190 languages, with the English version being the largest one. Around 10.000 of Wikipedia's users regularly edit or contribute content [14]. Due to its popularity Wikipedia has become a popular source in the search for information.

Secondly some approaches involve learners in the direct process of production of learning content. This notion is one of the most outstanding changes from more learning object oriented approaches. Typically, these approaches are based on tools such as weblogs and podcasts. [9]

A weblog, or blog, is a "log of the web", a term coined by Barger in 1997 [15]. The key feature of a blog is the presentation of the content in reverse chronological order. Blog software usually provides the possibility for comments and trackbacks, links back from other sites. In such a way a distributed, collective and interlinked *blogosphere* is created. While wikis are used for collaborative work, blogs are a personal form of publishing content. As far as the educational benefit is concerned a number of possible uses can be identified [16]. These are:

- promote critical and analytical thinking

- promote creative, intuitive and associational thinking
- promote analogical thinking
- provide potential for increased access
- exposure to quality information, and to have combination of solitary and social interaction..

A podcast is “audio content available on the Internet that can be automatically delivered to your computer or MP3 player” [17]. In the meantime the delivery of video with the same technology as a video-podcast or vodcast has also become usual. As far as education is concerned this technology can be used to deliver course content or course recordings to students. Apple implemented the iTunes U<sup>1</sup> in its iTunes Store, which provides access to lecture recordings from several large universities. The Graz University of Technology likewise provides recordings of several large lectures for its students [18].

The basic technology of podcasting and also a feature of most blog software is RSS. The abbreviation stands for “Rich Site Summary” or “Real Simple Syndication”. The technology allows the user to subscribe to a site and thus be informed about new content in a push approach rather than scanning for changes manually. The RSS information available on such a site is called RSS feed [19]. In education, the students might syndicate their content by using for example RSS feeds. [20]

Lastly there are approaches such as e-portfolio where learners have their own place to create, reflect on and showcase their work [9]. Systems like ELGG<sup>2</sup> provide a possibility for students to present themselves and their ability.

## 2.2 Social Aspects

While E-Learning initially was very focused on the content the social interaction, assisting informal learning, has gained an important role. Instead of a limitation of social interaction on topics for a given course, interaction with students worldwide on a wide range of topics has become usual [9]. While social aspects of existing E-Learning software like messaging and forums are still important, other possibilities also require consideration.

Several online community sites like Facebook<sup>3</sup> or StudiVZ<sup>4</sup> focus on articulating social networks and the interlinking of users. StudiVZ especially targets as students as users and, for example, offers the possibility to find other students enrolled to the same lectures.

Another aspect of Web 2.0 concepts interesting in the context of E-Learning are Web Sharing Applications [18]. On the one hand this involves social bookmarking tools like del.icio.us<sup>5</sup>, which allow users to share their bookmarks and tag websites. On the other hand media sharing like Flickr<sup>6</sup> or Youtube<sup>7</sup> provide the possibility to share multimedia files. Beside the more general use of this system, the use for course related content is also possible.

## 3 E-Learning 2.0 Examples

As stated above, the majority of Web 2.0 applications encourage active user participation in creating, sharing and structuring data. In particular, collaboration and social interactions between the users are the basic means supported by modern Web 2.0 applications to meet

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<sup>1</sup> <http://www.apple.com/education/itunesu/>

<sup>2</sup> <http://elgg.org/>

<sup>3</sup> <http://www.facebook.com>

<sup>4</sup> <http://www.studivz.net>

<sup>5</sup> <http://del.icio.us/>

<sup>6</sup> <http://www.flickr.com>

<sup>7</sup> <http://www.youtube.com>

these goals. Although the definition of the term “Web 2.0” [7] concisely summarized the basic design principles and motivation behind the Web 2.0 movement, there have been numerous attempts in the past to follow similar approaches in implementing E-Learning tools – for instance, to support users in collaborative creation of learning content and structures. In this chapter two such examples - dating back two years before the initial definition of “Web 2.0” - are shortly presented. The examples have been developed at IICM as a part of the WBT-Master system [21].

The first example is a tool called Virtual Project-Management Room that supports so-called project-based pedagogical approach where learners work on real-life projects [22]. Typically, projects are complex tasks, based on challenging questions or problems, that involve learners in design, problem-solving, decision making, investigative activities, and culminate in realistic products or presentations. Other defining features found of project-based learning paradigm include authentic content, authentic assessment, teacher facilitation but not direction, explicit educational goals, cooperative and collaborative learning, and reflection. The developed tool integrated the following components into a single tool to meet such sophisticated pedagogical requirements:

- Description the course and project motivation, problems that need to be solved, goals, etc.
- Discussion folder providing a sample project with the definition of project plan, e.g. number of project steps and the time table for these steps.
- A number of project discussion folders, which provide project alternatives for learners to chose from. These folders hold also all learner contributions.
- A number of collaboration and communication tools, such as online presence lists, chat rooms, annotation tools, discussion forums, etc.
- Evaluation tool for teachers evaluating learners work.

In principles, learners are supposed to get acquainted with the sample project in order to learn about the project plan and the steps they need to accomplish. After that the learners work in small groups by following the project plan. Typically, each project step requires that learners create content in collaboration, share that content with the group members and/or with other learner groups. Additionally, the content might be annotated or commented by other learners facilitating in this way important discussion about the course topics, the task at hand, and the user-created content itself. To ensure that learners' work stays focused the teacher monitors the progress and provides guidance if needed.

The second example deals with enriching of discussion contributions with structured metadata to improve information retrieval possibilities in educational discussion forums [23]. Discussion boards have been recognized in E-Learning not only as a means for asynchronous communication but also as a tool to collaboratively create content and as a tool for experts' knowledge extraction. However, searching for a particular contribution or navigating to a specific thread of discussion is typically tedious and time-consuming task.

Therefore, we developed a tool that allows users to structure the contributions from a discussion forum in a collaborative manner, i.e. by assigning contributions to one or more categories from a predefined taxonomy. To leverage collective interactions a voting mechanism has been implemented. Thus, whenever a contribution is assigned to a particular category the users can vote on that assignment, i.e. they can vote “pro” or “contra” that assignment. If an assignment gets more “contra” votes than the contribution is removed from that category. Otherwise, the number of “pro” votes is a simple “collective” measure of a particular contribution belonging to a specific category (see Fig. 1).

The category structure and the contribution assignments are then utilized to improve search and navigation facilities. In addition, the predefined taxonomy might be altered on-the-fly, i.e. the taxonomy is flexible in the sense that it can be extended, the categories can be modified and deleted by the users of the system. In a sense it is a similar approach to the concept of “folksonomies” with the difference that it takes more of a top-down approach (a session is started with a predefined taxonomy) and the relations between categories are always hierarchical.



Figure 1: Voting mechanism for classification of contributions

## 4 E-Learning 2.0: Hype or another Bubble

Having taken a closer look at the basic principles and some examples of E-Learning 2.0 it is necessary to consider the impact that these concepts have on learning today. Several experts predict further rise in the importance of collaboratively created content and other Web 2.0 concepts in the context of E-Learning for 2007 [24]. The most interesting question is, however, to what extent the technologies and concepts of E-Learning 2.0 are already used in learning environments.

Generally the knowledge about Web 2.0 and its concepts seems to be still relatively low in the general population. A survey by the PR Agency ZPR<sup>8</sup> showed that only 6% of the Germans aged between 16 and 65 know the term *Web 2.0*. 16% are member of an online community, 14% use podcasts and only 9% read weblogs regularly. The results were higher for those users aged 16 to 20, in which case 42% are member of an online community and 35% read weblogs regularly.

A more detailed online survey conducted by the University of Oxford [25] from December 2006 to February 2007 aimed to analyze the use of online tools associated with the Web 2.0 concept. The two versions of this survey targeted students on the suite of online short courses

<sup>8</sup> [http://www.z-pr.de/images/downloads/zpr/061102\\_umfrage\\_web\\_2.0\\_pm.pdf](http://www.z-pr.de/images/downloads/zpr/061102_umfrage_web_2.0_pm.pdf)

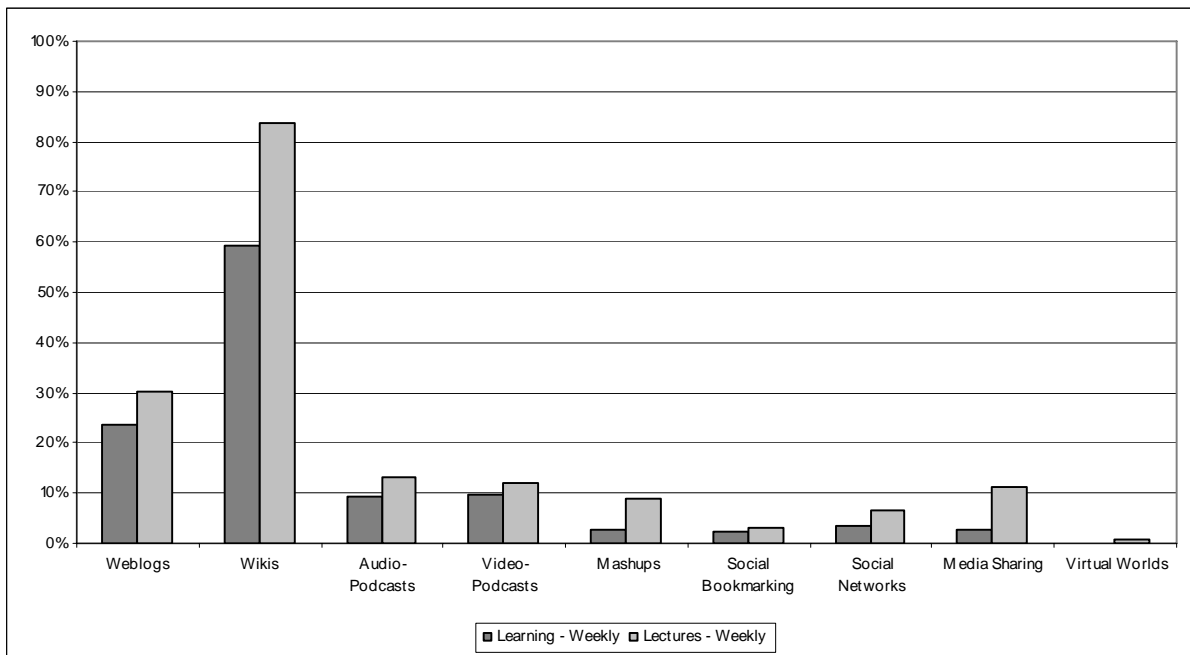
provided by the University of Oxford on the one hand and academics teaching in weekly classes on the other hand.

The survey covered the levels of usage and the application area of social bookmarking, calendaring, image sharing, collaborative authoring, video sharing, social networking, weblogs, file sharing, communication tools and social games / spaces distributed by age groups. Interesting features in the context of E-Learning 2.0 is the high number of people from all age groups using Wikipedia being between 70% and 80%, while only at about 20% of the participates stated to use other wikis. The number of people using social bookmarking is quite low with the highest amount of people being under 18 years of age. Weblogs are read by 50-60% of the participants from all age groups, while only a larger number of the under 18 year old and 18 to 24 year old participants write their own weblogs. A similar distribution can be seen for the use of social networking tools.

As far as the application area is concerned, the most interesting one in the context of this paper is the use for study. Wikipedia and Discussion Forums are the only two applications which are used to a large degree for study purposes. Other applications which are at least to some extent used for study purposes are weblogs, wikis, MSN Messenger and calendering software.

A related survey was conducted at the IICM aiming to analyze the use of Web 2.0 applications privately and for learning, taking into account the familiarity with Web technologies [26]. The survey was conducted in June 2007 and targeted the participants of one computer science course in the first and one in the third year of the bachelor program as well as one course for master level students.

In a first part of the survey the technical background knowledge and the familiarity with several Web technologies was asked for. In the second part of the survey the basic knowledge about and the frequency of use of several Web 2.0 applications was covered. The applications in question are weblogs, wikis, audio-podcasts, video-podcasts, mashups, social bookmarking, social networks, media sharing tools and virtual worlds.



**Figure 2: Use Frequencies in Learning and Lectures**

Wikis, media sharing and weblogs were known by a majority of the participants, while social bookmarks and social networks were known only by about 40% each. As far as general use is concerned, wikis are most frequently used with more than 80% accessing them weekly or

more often. Media sharing and weblogs are used by 70% respectively 50% in the same frequency, while all other applications are used only by less than 30% weekly or more often. The analysis of the use for learning has been split into two questions. The first is the use for individual learning on the student's own accord. The second is the question for the use in lectures, guided by teachers. The results showed that only wikis and weblogs are used regularly, as seen in Figure 2. All other applications are used by less than 15% on a weekly basis or more often.

These two surveys show that only a small number of applications connected to the concepts Web 2.0 and E-Learning 2.0 are already used by a large number of the participants. Wikipedia seems to have an important role in this context, dominating the general knowledge about the possibilities of wikis. Moreover both surveys showed the influence of weblogs, although it is lower than that of wikis. Finally most of the other applications are not widely used, according to both results.

## 5 Conclusions and Future Work

In the wake of Web 2.0 an adequate concept called E-Learning 2.0 has been denoted. These two concepts show many points of intersection, as several of the core applications associated to Web 2.0 are also important in E-Learning 2.0. On the one hand modern E-Learning systems implement several of these aspects already. On the other hand surveys showed that several aspects of Web 2.0 are still only used by a minority of students.

This fact has several implications. First of all the most important influence seems to emanate on the one side from Wikipedia respectively wikis in general and on the other side from blogs. Yet this also means that other applications still lack the importance on E-Learning that has been predicted. One reason may be that the age group most proficient with these technologies has not yet reached the university level, which both surveys aimed for as far as the participants are concerned. Another reason could be that there is still a long way to go in finding useful possibilities to integrate these applications in E-Learning.

In the coming year we are going to investigate the impact of the numerous Web 2.0 applications available to the students of the Graz University of Technology in the context of E-Learning by conducting a follow-up survey with first year students. In this survey we plan to detect the changes in attitude and familiarity with these applications through the course of the year, as the students are more and more involved in using them.

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