

TOWARDS WEB 2.0 DRIVEN LEARNING ENVIRONMENTS

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Keywords: Web 2.0, E-Learning 2.0, Communities.

Abstract: Over the last decade, it has been widely argued that technology-enhanced learning could respond to the needs of the new knowledge society and transform the way we learn. However, despite isolated achievements, technology-enhanced learning has not really succeeded yet in revolutionizing our education and learning processes. In fact, most current initiatives do not focus on the social aspect of learning and learning content is still pushed to a pre-defined group of learners in closed environments. Recently, Web 2.0 concepts have started to open new doors for more effective learning and have the potential to overcome many of the limitations of traditional learning models. In this paper we show in which way the community-driven platform Learnr, under development at the University of Münster, puts crucial success factors for future technology enhanced learning into practice, applying well known concepts like networking and social tagging. As a consequence, a Web 2.0 perspective on learners, learning content and learning communities can be derived.

1 INTRODUCTION

Peter Drucker argues that in the emerging economy, knowledge is the primary resource for individuals and for the economy overall; land, labor, and capital. He further argues that improving knowledge worker productivity is the greatest challenge of the 21st century (Drucker, 1994). In the new knowledge society, similar to a knowledge worker, a learner is a person who does not just consume knowledge but who is also able to create it. Over the past few years, the Web has been shifting from being a medium in which information is transmitted and consumed into a platform in which content is created, shared, remixed, repurposed, and passed along (Downes, 2005). We are entering a new phase of Web evolution: the read-write Web, i.e., a new generation of the Web where everyone can be a consumer as well as a producer of knowledge in new settings that place a significant value on collaboration. Applied technologies, often collectively termed Web 2.0 technologies (O'Reilly, 2005; Vossen and Hagemann, 2007), have been opening new doors to the learner for more dynamic and social learning. The new Web trends have offered new means to connect people not only to digital knowledge repositories but also to other

people, in order to share ideas, collaboratively create new forms of dynamic learning content, get effective support, and learn with and from peers.

Since learning is social, personal, distributed, flexible, dynamic, and complex in nature, a fundamental shift is needed towards a more social, personalized, open, dynamic, emergent and knowledge-pull model for learning, as opposed to the one-size-fits-all, centralized, static, top-down, and knowledge-push models of traditional learning solutions (Chatti et al., 2007).

Web 2.0 concepts can lead the way to this new generation of technology enhanced learning. To give an example, teachers can use blogs instead of mailing lists to keep in contact with their students; instead of pushing information to the learners, blog feeds of relevance can be subscribed to by the target group, which in turn can be an open community. Speaking of the social Web, the concept of tagging and folksonomies (Vanderwal, 2005) offers a high potential for learners to express their own vocabulary in bottom-up built structures. Indeed, so called tag clouds give a holistic view picking up terms accumulated within a community in an appropriate way.

The Web platform Learnr, under development and prototypical in use at the University of Münster, Germany, shows the way to a more learner-focused,

Web 2.0 driven approach of technology enhanced learning. Adopting concepts like networking and social tagging in a desktop-like environment, independent learning communities arise in a bottom-up way; learning content is provided by the crowd and accessed and annotated instantly in a Web browser. Realizing the shift to a more social and flexible model, Learnr gives a first outlook on what future Web 2.0 driven learning might look like.

The remainder of this paper is structured as follows: Section 2 stresses the deficiencies in current technology-enhanced learning implementations and discusses critical factors needed for the success of future initiatives. Section 3 points out the potential use of Web 2.0 concepts in learning environments. Section 4 briefly surveys the Learnr system, a learning environment build around those new technologies that is described in more detail elsewhere (Dahl and Vossen 2007). As a result, a new Web 2.0 driven perspective on learners and learning communities as well as learning content is derived. Finally, Section 5 gives a summary of the paper and outlines perspectives for future work.

2 PRESENT AND FUTURE OF TECHNOLOGY-ENHANCED LEARNING

Learning and knowledge can be viewed as two sides of the same coin and are fundamentally social in nature, as has been emphasized by many researchers (Polanyi, 1967; Lave and Wenger, 1991; Nonaka and Takeuchi, 1995; Siemens, 2006). Despite the wide agreement that learning occurs within a social context, current technology-enhanced learning (TEL) efforts continue to put a heavy emphasis on content delivery and technology. In fact, most TEL content today is designed, authored, delivered, and managed via centralized Virtual Learning Environments (VLE) as statically packaged online courses and modules without focusing on the social aspects of learning. Examples include learning management systems (LMS), learning content management systems (LCMS), course management systems (CMS), or content management systems (CMS) such as CLIX, WebCT, Blackboard, Moodle, ATutor, ILIAS, Plone, or Drupal (Baumgartner et al., 2004; Kristöfl, 2005). Obviously, the content/technology-centric model of learning has failed to achieve performance improvement and innovation. A major reason of the failure is that learning is more than static content, and technology

is only a secondary issue. Learning is basically about people. This requires a change in focus from technology-driven to people-driven models of learning and would imply a shift from e-Learning to “we-Learning,” a collaboration culture that could foster knowledge networking and community building. With technology as an enabler, the new learning model is characterized by the combination of formal and informal learning within a social context. New social skills become increasingly important for better performance and thus have to be learned and continuously improved. *Learn-what* referring to the high-quality learning resource that has to be acquired has to be supplemented with *learn-who* referring to the person or the entire community with the required know-how that can help achieving better results. Learn-who also involves the ability to navigate and learn across different communities.

In the future, people-driven implementations of learning models need to be the norm rather than the exception. Chatti et al. (2007) stress that a radical revision of the traditional pedagogical principles and policies imposed by formal educational institutions is required. In the modern media and knowledge-intensive era of collaboration culture, the one-size-fits-all, centralized, static, top-down, and knowledge-push models of traditional learning initiatives need to be replaced with a more social, personalized, open, dynamic, emergent, and knowledge-pull model for learning. The authors discuss seven critical factors needed for the success of learning initiatives:

- Knowledge networking and community building: TEL models need to recognize the social aspect of learning and, as a consequence, place strong emphasis on knowledge networking and community building to leverage, sustain, and share knowledge in a collaborative way.
- Content-centric vs. user-centric: Recognizing that learning and knowledge are personal, approaches requires a move away from one-size-fits-all content-centric models, and towards a user-centric model that puts the learner at the centre and gives her the control over the learning experience.
- Centralized vs. distributed: TEL solutions need to operate with a more decentralized and socially open approach, based on small pieces of learning content, loosely joined and distributed control.
- Top-down vs. bottom-up: TEL solutions need to follow an emergent bottom-up approach, driven

by the learner and based on sharing rather than controlling.

- Knowledge-push vs. knowledge-pull: Recognizing that learning and knowledge are dynamic and flexible in nature, TEL approaches require a shift in emphasis from a knowledge-push to a knowledge-pull model.
- Adoption: For TEL approaches to be adopted, their systems need to be both simple and useful.
- Knowledge sharing culture and trust: A bottom-up approach and distributed control build a base for successful knowledge sharing and trust. Encouraging people to build their personal social networks and join communities based on their needs helps to ensure trust and motivates them to share.

Recognizing the social aspect of learning, several TEL initiatives, such as Elgg, Moodle, CLIX, Plone, and Drupal are starting to integrate social modules into their solutions (Bryant, 2006). However, these initiatives still employ centrally managed systems that are driven by the needs of the institution and consequently often not adopted by the learners. Dalsgaard (2006) points out that a common idea behind current systems is that different tools, e.g., discussion forums, chat, file sharing, video conferences, shared whiteboards, and e-portfolios are integrated in a single system which offers all necessary tools to run and manage a learning course. All learning activities and materials in a course are organized and managed by and within the system. To meet the requirements discussed above, we would, however, need new learning models that take a small-pieces, loosely joined approach characterized by the freeform use of a set of learner-controlled tools and the bottom-up creation of learning communities.

3 WEB 2.0 MEETS TEL

We are entering a new generation of user-centric, open, dynamic Web, with peer production, sharing, collaboration, distributed content, and decentralized authority in the foreground. This new Web generation is often termed “Web 2.0.” The people-driven approach to learning can be implemented around Web 2.0 concepts. The rise of Web 2.0 technologies with more support for collaboration and networking provides new opportunities to overcome many of the failings of traditional TEL solutions. Recently, researchers have been focusing on how to incorporate the new Web trends into the

learning process and how to harness and apply Web 2.0 concepts to create new learning experiences and learn across communities. E-Learning via Web 2.0 technologies has been referred to as E-Learning 2.0 (Downes, 2005). Harnessing collective intelligence has become the driving force behind Web 2.0 and social software, also called social media, has emerged as a key component of the new Web. In a learning context, social software have become a means to connect people not only to digital knowledge repositories but also to other people, in order to share ideas, collaboratively create new forms of dynamic learning content, get effective support, and learn with and from peers. Rapidly evolving examples of social software include wikis, blogs, RSS, pod/vodcasting, and social tagging/folksonomies. Social software is, however, not restricted to these technologies.

Social software has the potential to change the way we learn. For example, instead of generating lexical entries in Wikipedia, learners could collaboratively create learning content (learner-generated content) in an open environment. Networking as it can be found in OpenBC/Xing with a business background also makes sense in the context of learning (open learning networks). Similar to tagging photos in Flickr or videos in Youtube, learning content in form of slideshows or exercises could be annotated in a similar way. The concept of blogging could abandon mailing lists which are explicitly created by teachers; instead, teachers as well as learners simply blog their topics of interest, and anybody who is interested subscribes to the corresponding RSS feed to keep herself or himself up-to-date.

Moreover, social software supports a bottom-up building of communities and networks. Wikis, Blogs, social tagging and folksonomies are good examples of bottom-up social software in action. Wikis provide an opportunity for social interaction. Around blogs, a social knowledge network from people with similar practices or interests can be created and even enlarged by comments, trackbacks, and blogrolls. Social tagging and folksonomies also provide a powerful way to foster community building as users share, organize, discover, and look for what others have tagged and find people with the same – or similar – interests (Chatti et al., 2006; Dahl and Vossen, 2007). Especially the latter concept builds a base of the TEL platform presented in the following section.

4 LEARNR: WEB 2.0 DRIVEN LEARNING

At present, teachers as well as learners are supported by a number of electronic platforms enabling a combination of traditional on-site and distance learning. For example, teachers at the University of Münster use Web applications for distributing slideshows of lectures or additional literature and online systems to offer exercises with a high degree of automatic reviewing. Even computer-based exams are held in computer pools. In contrast, the actual process of learning, which is characterized by a summarization and recapitulation of information in the phase of intensive learning (e.g., prior to exams), is not supported to a higher degree yet; therefore, the pen-and-paper way, working with prints of digital learning content, is still the first and only choice. Personal comments are added on post-its, relevant paragraphs are highlighted with text-markers and additional artefacts like file-cards or summaries are created. This is where Learnr comes in.

4.1 Central Features of Learnr

The primary goal of the Web platform Learnr is an adoption of the traditional concepts for intensive learning to the digital world. On the one hand, based on the electronic representation of information an effective search (e.g., keyword search in slides or summaries) can be offered. Virtual artefacts like file-cards for recapitulation and notes can be exchanged easily and revised collaboratively. Offering a 24/7 (24 hours, 7 days a week) Web application, the learning content along with the personal additions can be accessed anytime and anywhere: from the computer pool of the university, the home office, the Internet café or even the hotel lobby on vacation. On the other hand, the process of learning achieves a social focus as learners publish personal information to a learning community, which is characterized by discussion, exchange and evaluation of the learners' knowledge.

Figure 1 gives an impression of the main Learnr work panel. Centred, learners can browse instantly through learning content in the form of slides, secondary literature or exercises. Virtual text markers help to highlight the personally relevant parts (1). Additionally, notes can be added just like post-its (2). Applying the concept of tagging, single slides can be marked and classified (3) which results in a structure, respectively a tag cloud, reflecting the learners' vocabulary.

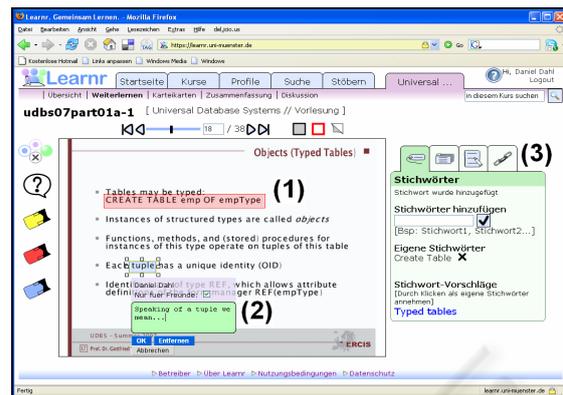


Figure 1: Annotating Learning Content.

The process of learning described so far is individual and isolated from other learners. With the adoption of networking as known from social software applications like MySpace or Facebook learners can affiliate in so called learning communities. Being part of these communities, summaries and file-cards are exchanged, notes are discussed, comments are rated and last but not least tagging becomes a social activity.

4.2 Evaluation of the Seven Success Factors for Future TEL Initiatives

Analyzing Learnr with respect to the critical success factors listed in Section 2 we can claim that a promising new TEL generation has already started. In the following section the criteria are brought into relation with their realization in Learnr, as the seven factors are broken down into a 2-dimensional view: a user- and a content-perspective.

4.2.1 User-Perspective

In Learnr users actively build learning communities. This means, learners decide whom to learn and to share knowledge with (*Knowledge Networking and Community Building*). In contrast to classical top-down approaches, where learning groups are defined by teachers within organisational boundaries (like universities or even single university lectures), learners from different universities, schools or companies can affiliate (see Figure 2). Private education in sense of lifelong learning participates as well. The different opinions are expressed with annotations, tags and within discussions. Learnr facilitates the concept of self-guided learning (*User-centralization*). With the learner being the centre of the system, he or she decides which content to consume, which person to learn with and

at which time to do so. Basically, every learner can provide learning content, as long as the respective property rights are respected. The process of learning, making knowledge in the form of annotations or tags explicit, firstly is executed in a private workspace; the learner decides when to publish certain information like summaries or file-cards for the learning community (knowledge export) respectively when to access knowledge residing within the community (knowledge import). Learning content is no longer imposed by the corresponding teachers upon the learners at a given time. Rather learners search for new or further information navigating through a tag cloud, using the fulltext search or communicating with their community (*knowledge pull*).

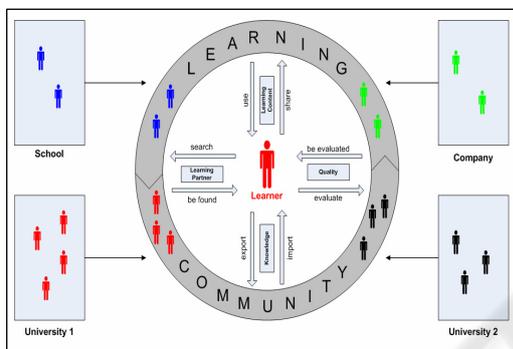


Figure 2: User-Perspective in Learnr.

According to Chatti et al. (2007), future learning platforms need to offer a perceived usefulness and an ease of use (*Adoption, Acceptance*). Utilizing the social focus in Learnr, learners find additional, valuable information: Explicit annotations of the community, the learning focus of other learners (for example, so called “hot slides” hold a high number of tags, notes and discussions) or the exchange of knowledge (summaries, file-cards). Furthermore, the single learners’ own contribution achieves some quality assurance as the community reads and rates the published notes and summaries. The ease of use is offered as the RIA-concept (Rich Internet Applications) is followed: On the one hand, Learnr can be accessed via ordinary Web browsers (no installation required), on the other hand the extensive use of AJAX enables a desktop-like usability (rare page reloads, instant search results). In comparison to classical TEL platforms, a general shift from top-down to bottom-up learning can be identified (*Bottom-Up Learning*). As the previously explained aspects already showed, in the first line learners gain a new degree of liberty instead of formerly experienced force: learning groups naturally evolve “from below” instead of being

defined “from above” and distributed content is pulled from a wide range on demand instead of being pushed by a single teacher. In general, the role of teachers shifts to a learning process advisor/facilitator. Offering the networking concepts described above a learning community characterized by trust and liberty can evolve (*Knowledge Sharing Culture*). As learners follow the same objective, e.g., to pass an exam, further content is studied and evaluated and explicit knowledge is shared.

4.2.2 Content-Perspective

Learnr brings together learning content from varying organisations like universities, companies, or secondary schools. The concept of user-generated content (e.g., learners creating slides using their own vocabulary) is supported as well. In the end learners decide which content to work with. Indeed, slideshows presented by the teacher who performs the final exam might achieve the highest priority, but related, more detailed distributed information is available via a tag cloud, for example.

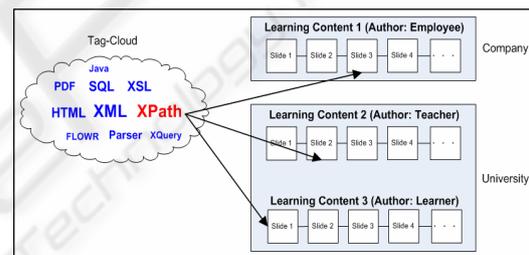


Figure 3: Content-Perspective in Learnr.

Utilizing the concept of *deep tagging* (Arrington, 2006), not only entire slideshows are labelled with notes and tags, but also small sub units like single slides are annotated. In this way small learning units provided by different authors are brought into relation and can be accessed by learners easily (see Figure 3, *Decentralisation of Content*).

5 CONCLUSIONS AND FUTURE WORK

In this paper at first deficiencies in present and success factors for future TEL models were illustrated. The potential of social concepts known from Web 2.0 applications was pointed out for the context of TEL. The platform Learnr, developed and prototypical in use at the University of Münster, is based on concepts like social tagging and networking and therefore offers its users a new perspective of Web 2.0 driven learning.

Learnr already implements the key elements of the crucial factors introduced by Chatti et al. (2007), but a consequent continuation of their approaches might enable additional potentials. For example, the system still focuses on courses and learning content, via which new learners can be found. In the sense of user centralization it is desirable to look for new learning partners directly based on a not yet defined search interface: according to already known social software applications like OpenBC/Xing learners and their knowledge domains should be the key factors. In result, the individually best fitting learning partner could be found more easily.

Regarding learning content existing TEL repositories could be coupled loosely, for example based on Web Services so that on-demand access to a broad range of resources could be offered. Finally, we could speak of a real decentralization of content, as currently different content and sources are supported, but the single artefacts still need to be uploaded into Learnr. Moreover, already existing social networks should be importable to the system; unfortunately, this currently lacks due to missing interfaces to popular social software applications. Even a new generation of external, content-independent tagging service would make sense: learners could not only tag learning content, but also learning partners, relationships, discussions, emails, and so on. These approaches already tend into the research field of personal learning environments (Wilson et al., 2007).

ACKNOWLEDGEMENTS

This work is supported in part by the EU Network of Excellence PROLEARN (<http://www.prolearn-project.org>) and the BMBF funded cHL Hybrid Project (<http://elearning.uni-muenster.de>).

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