

# The Web 2.0 Driven SECI Model Based Learning Process

Mohamed Amine Chatti<sup>1</sup>, Ralf Klamma<sup>1</sup>, Matthias Jarke<sup>1</sup>, Ambjörn Naeve<sup>2</sup>

<sup>1</sup> *RWTH Aachen University, Informatik 5 (Information Systems),*

*{chatti, klamma, jarke}@cs.rwth-aachen.de*

<sup>2</sup> *Royal Institute of Technology, amb@nada.kth.se*

## Abstract

*Nonaka and his knowledge transformation model SECI revolutionized the thinking about organizations as social learning systems. He introduced technical concepts like hypertext into organizational theory. Now, after 15 years Web 2.0 concepts seem to be an ideal fit with Nonaka's SECI approach opening new doors for more personal, dynamic, and social learning on a global scale. In this paper, we present an extended view of blended learning which includes the combination of formal and informal learning, knowledge management, and Web 2.0 concepts into one integrated solution, by discussing what we call the Web 2.0 driven SECI model based learning process.*

## 1. Introduction

Peter Drucker, among others, 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 front-line worker productivity is the greatest challenge of the 21st century [1]. Realizing that knowledge and competence have become increasingly critical to their continued success, organizations worldwide are spending upwards of \$ 2.2 trillion dollars on training and education measures, which have become integral to any organization for it to remain competitive [2]. Over the last decade, it has been widely argued that e-Learning could respond to accelerating global competition, increase the quality of learning experiences, remove situational barriers, be more cost effective, and transform the way we learn. However, despite isolated achievements, the success record was on the whole not very encouraging and e-Learning did not succeed to revolutionize our education and learning processes [3][4]. The most influential knowledge management theory by Nonaka [13] opened the debate that organizational learning is mainly a social process

and Japanese companies are more competitive because of their collaborate culture. In the past few years, attention has been shifting towards the importance of knowledge management in corporate and academic learning environments [5]. Now 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 e-Learning solutions. Researchers are starting to explore how emergent Web 2.0 technologies will influence the academic and corporate learning process. In this paper, we mainly address the question of how learning, knowledge management, and Web 2.0 concepts converge, and explore the potential of their combination into one integrated framework and process.

The rest of the paper is structured as follows: Section 2 stresses the importance of social networking and community building for learning, explores the shift from e-Learning to we-Learning, and points to the potential use of Web 2.0 concepts in learning environments. Section 3 introduces a framework for Web 2.0 driven learning. Section 4 presents the SECI model based learning process. Finally, Section 5 gives a summary of the paper.

## 2. Web 2.0 meets e-Learning

*Individually, we are one drop. Together, we are an ocean." -- Ryunosuke Satoro*

Learning and knowledge can be viewed as two sides of the same coin and are fundamentally social in nature – as emphasized by many researchers.. Polanyi places a strong emphasis on dialogue and conversation within an open community to leverage knowledge and one of his three main theses is that knowledge is socially constructed [6]. Wenger stresses that knowledge does not exist either in a world of its own or in individual minds but is an aspect of participation in cultural practices. He expands on learning as an inherently social activity within communities of practice (CoP),

which are ideal vehicles for leveraging knowledge and learning [7]. Similarly, Lave and Wenger note that learning may be understood as participation in a social process. They explore the participation metaphor of learning within which learning is a matter of legitimate peripheral participation (LPP) [8]. More recent research also views learning as a social process. Most of the CSCL literature relies on the socio-cultural theory of learning [9]. Recently, Siemens stresses that a major challenge today is not what you know but who you know, and introduces connectivism as a new learning theory that presents learning as a connection/network-forming process. During this process, learning is the act of encoding, connecting and organizing specialized nodes or information sources to facilitate data, information, and knowledge flow [10].

Despite the wide agreement that learning occurs within a social context, current e-learning efforts continue to put a heavy emphasis on content delivery and technology. In fact, most e-learning content today is designed, authored, delivered, and managed via centralized learning management systems as statically packaged online courses and modules without focusing on the social aspects of learning. However, 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 mean 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. The people-driven approach to learning can be implemented around Web 2.0 concepts.

We are entering a new phase of Web evolution: The read-write Web. A new generation of user-centric, open, dynamic Web, with peer production, sharing, collaboration, collective intelligence, distributed content, and decentralized authority in the foreground.

This new Web generation has been referred to as Web 2.0. Harnessing collective intelligence has become the driving force behind Web 2.0 and social media, also called social software, has emerged as a key component of the new Web. Social media consists of networking and collaboration services that support

collaborative knowledge creation as well as media sharing and aggregation. Rapidly evolving examples of social media include wikis, blogs, RSS, pod/vodcasting, and social tagging. Social media is however not restricted to these technologies.

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. In a learning context, social media 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. E-Learning via Web 2.0 technologies has recently been referred to as E-Learning 2.0 [11].

### 3. A framework for Web 2.0 driven learning

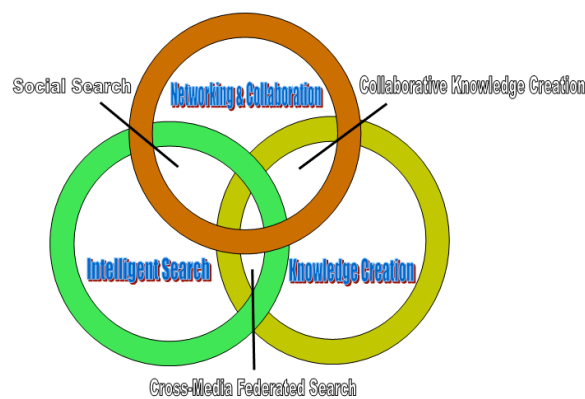


Figure 1. A Framework for Web 2.0 driven learning

In this paper, we do not contribute a step-by-step instruction on how to best include Web 2.0 technologies into the traditional learning process. We rather provide a possible framework for creating a new understanding of learning around Web 2.0 concepts. We stress here 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. We should be looking beyond classrooms to the emerging arena of Web 2.0 concepts and technologies. Web 2.0 concepts

are opening new doors for more effective learning and have the potential to overcome many of the limitations of traditional learning models. With Web 2.0 technologies as an enabler, future learning models need to revolve around three core components: networking and collaboration, intelligent search, and knowledge creation, as depicted in figure 1.

*Networking and Collaboration:* To have a chance of success, learning models need to recognize the social aspect of learning and as a consequence place a strong emphasis on knowledge networking and community building to leverage, sustain, and share knowledge in a collaborative way. To build such communities and networks, we need to cross classroom and organization boundaries to involve peers, customers, partners, suppliers, and different types of frequently overlapping, formal and informal communities including learning communities, communities of practice, and communities of interest. This requires a participatory culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship whereby what is known by the most experienced is passed along to novices. A participatory culture is also one in which members believe that their contributions matter, and feel some degree of social connection with one another [12]. Social media support a bottom-up building of communities and networks. Blogs, social tagging and folksonomies are good examples of bottom-up social media in action. Commenting on blog posts makes the interaction between blog-authors and - readers possible and can lead to interesting discussions. New blog-readers can then join the discussion by commenting or writing a post on their own blog with a reference to the blog post that they want to comment on. Trackbacks detect these remote references and enable us to establish a distributed discussion across multiple blogs. Over time, a social knowledge network from people with similar practices or interests can be created and even enlarged by 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.

*Intelligent Search:* Effective learning models need to take a personal, open, and knowledge-pull approach based on small, loosely joined pieces. The main obstacle of the knowledge-pull model lies in the information overflow on the Web. Therefore, we need intelligent search mechanisms for reliable access to information, services, communities, and expertise.

*Knowledge creation:* The knowledge-creation metaphor of learning views learning as analogous to innovative processes of inquiry where something new

is created and the initial knowledge is either substantially enriched or significantly transformed during the process [9]. Effective learning models need to provide ecologies that facilitate and enhance creativity and give people the support for collaborative knowledge creation. The knowledge creation process will be discussed in the next section based on Nonaka and Takeuchi's SECI model [13].

#### 4. SECI model based learning process

Learning and knowledge management are increasingly similar in terms of input, outcome, processes, activities, components, tools, concepts, and terminologies and can thus be viewed as two sides of the same coin. Nonaka and Takeuchi adopt a dynamic model of knowledge management, view knowledge as activity rather than object and focus on knowledge creation, collaboration and practice. This knowledge creation model has been referred to as the SECI model.



Figure 2. SECI model based learning process

The basis of this model is a distinction between two types of human knowledge: explicit and tacit. Explicit knowledge or information is codified, objective knowledge that can be transmitted in formal, systematic language. In contrast, tacit knowledge is not easily codified, difficult to express and subjective. Nonaka and Takeuchi argue that knowledge is created and expanded through the social interaction of tacit and explicit knowledge [13]. Similar to the knowledge creation process, the learning process encompasses more than knowledge acquisition. It is a dynamic process within a collective intelligence, continuous knowledge in action, and cyclic conversion of tacit and explicit knowledge. This spiraling, highly dynamic and complex process is modeled in figure 2. It consists of four modes of knowledge conversion: socialization (tacit to tacit), externalization (tacit to explicit),

combination (explicit to explicit), and internalization (explicit to tacit). Each of these modes will be discussed in detail below within a learning context, along with actual examples on how various Web 2.0 concepts and emerging technologies can be applied and used in conjunction with one another to support each mode of the learning process.

Nonaka and Takeuchi point out that an individual can acquire tacit knowledge directly from others without using language. *Socialization* is the process of sharing tacit knowledge, i.e. the rich and untapped knowledge that resides in individuals such as know-how, expertise, understandings, experiences and skills resulting from previous activities, not through language but through observation, imitation, practice, and participation in different formal and informal communities. According to them, the socialization mode starts with building a “field” or “space” of social interaction. Social media provide great opportunities to build such spaces and hand on tacit knowledge from one person to another.

*Externalization* is a process of articulating tacit knowledge into explicit concepts. It is generally based on metaphors, analogies, concepts, hypotheses, and models. According to Nonaka and Takeuchi, externalization holds the key to knowledge creation, because it creates new, explicit concepts from tacit knowledge. Blogs for example support the externalization process by giving voice to everyone and providing a space to capture personal knowledge and distributed discussions across blogs, immediately document thoughts, and annotate information. The nature of knowledge is such that we always tell more than we can write down [14]. Consequently, tacit knowledge that may be expressed but cannot be easily recorded into formal documents and manuals can be verbalized via oral communications. VoIP and phone/video-conferencing for example are powerful tools to trigger externalization via open participation, dialogue, and discussion. Social media in general offer unique means for effective capturing of context-rich and quality knowledge as it gets created, with a minimum amount of effort. Collaboration contextualizes content. For example, discussions around a blog post through comments and trackbacks give more context to the codified knowledge. And, recording of phone/video-conferences and instant messaging sessions support the online capturing of context-rich knowledge as it gets created. The collective intelligence ensures that knowledge is up-to-date and relevant. In fact, knowledge captured by many is much more likely to be of better value. Wikis are good examples of the collective intelligence at work. They provide an opportunity for social interaction and collaborative knowledge capturing. Knowledge can be

expressed and captured through different possible modes of representation and expression including words, spoken or written; image, still and moving; video; music etc. Each medium has its own affordances, its own systems of representation, and its own strategies for representing knowledge [12][15]. Consequently, learners need to reflect across media; that is get familiar with a range of different media tools and determine which is most effective in capturing their knowledge. This is however not a big challenge, since today’s teenagers and kids are growing up digital and are comfortable with various media. Emergent social media provide learners with effective ways to capture and publish their knowledge in a number of ways and in a variety of media such as pictures, video or audio recordings. Knowledge capturing and publishing becomes easier through increasingly better devices that can capture high-quality audio and video.

*Combination* is the process of systematizing concepts into a knowledge system, and it integrates different bodies of explicit knowledge. Once knowledge is captured, it becomes explicit knowledge i.e. information that can be stored and accessed. Unlike traditional centralized learning object repositories, blogs and wikis build distributed community information stores with up-to-date, context-rich, and searchable learning assets. The captured information can then be transferred within a social context. Blogs and wikis allow quick and wide information dissemination across classroom and organization boundaries. Pod/vodcasting is growing in popularity as a powerful tool to share audio and video recordings. RSS is a successful technology that makes it easy to share resources across networks, as it brings content from different sources (e.g. new blog posts, podcasts) to a learner’s personal space, once she has subscribed to the feed source. The captured information can also be managed individually or collectively. A blog is a very valuable tool for personal information management and wikis and folksonomies are highly effective forms of collaborative information management. During the combination process, reconfiguration of existing explicit knowledge through adding, reorganizing, and combining, can lead to new knowledge, possibly more complex. Other Web 2.0 technologies such as mashups can be used to pull together content from more than one source, remix and assemble it to form a new service.

Since information is available in different forms such as texts, images, sounds, and videos, we need federated search technologies that make it possible to perform search across media and plug into multiple distributed repositories to locate relevant learning resources with a single query. We further need social and community-oriented search technology that builds

on the collective intelligence to locate quality resources and services as well as appropriate communities and experts. The collective intelligence decides what is valuable through filtering, rating, feedback, reviews, criticisms, and recommendations and supports the certification of people's expertise and the assessment of individual digital reputation. Amazon's review and recommendation system, YouTube's rating scheme, Google's PageRank algorithm, eBay's feedback, Flickr and Del.icio.us' social tagging, Digg's voting are successful examples of the collective intelligence at work. The search result should be modular content that can be remixed and aggregated to generate personalized learning resources, third-party lightweight services that can be mashed up to form adapted learning services, personal learning environments (PLE) that can be connected to build a learning community, and small communities that can be networked to create interdisciplinary learning clusters.

According to Nonaka and Takeuchi, *internalization* is the process of embodying explicit knowledge into tacit knowledge. Explicit knowledge is internalized into individual's tacit knowledge bases in the form of mental models or technical know-how. Learning by doing triggers internalization. Bringing learners competitively and cooperatively together via multi-player games and multi-user simulations offer the potential to learn through a new form of social experience. Games encourage us to take risks and learn through trial and error. Simulations broaden the kinds of learning experiences we can acquire by getting a chance to see and experiment things in a safe environment that would be impossible in the real world [12]. Internalization is also a process of continuous individual and collective reflection. Effective reflection requires the mastery of different skills such as the ability to see connections and recognize patterns and the capacity to make sense between fields, ideas, and concepts [10].

## 5. Conclusion

Recognizing that learning and knowledge management can be viewed as two sides of the same coin and that Web 2.0 concepts and technologies can leverage learning and knowledge sharing, we have addressed in this paper the importance of collaboration

and knowledge networking, presented a framework for Web 2.0 driven learning, and discussed the SECI model based learning process. The main aim was to achieve a new vision of blended learning defined by the convergence of learning, knowledge management, and Web 2.0 concepts into one integrated solution toward a new model of network learning through active participation in different communities.

## 6. References

- [1] P.F. Drucker, *The Theory of Business*, Harvard Business Review, September/October 1994, pp. 95-104.
- [2] J. Westfall, The Impact of Structure on Explicit Knowledge Recall - The Conclusion, *KMPro Journal*, Volume 3, Number 2 Winter 2006.
- [3] H. Kanuka, Has eLearning Revolutionized Education?, *EMBASSY REPORT*, February 22nd, 2006.
- [4] U.A. Mejias, A nomad's guide to learning and social software, *The Knowledge Tree: An e-journal of learning innovation*, ISSN 1448-2673.
- [5] M. Lytras, A. Naeve, and A. Pouloudi, Knowledge Management as a Reference Theory for E-Learning: A Conceptual and Technological Perspective, *International Journal of Distance Education Technologies*, 3(2), pp. 1-12.
- [6] M. Polanyi, *The Tacit Dimension*, New York, Anchor books (based on the 1962 Terry lectures), 1967.
- [7] E. Wenger, *Communities of practice: Learning, meaning and identity*, Cambridge University Press, Cambridge, UK, 1998
- [8] J. Lave and E. Wenger, *Situated Learning. Legitimate Peripheral Participation*, New York: Cambridge University Press, 1991.
- [9] S. Paavola, L. Lipponen, and K. Hakkarainen, Epistemological Foundations for CSCL, *Proceedings of CSCL 2002*, pp. 24-32.
- [10] G. Siemens, *Knowing Knowledge*, Lulu.com, ISBN: 978-1-4303-0230-8.
- [11] S. Downes, E-learning 2.0, *ACM eLearn Magazine*, Article, 2005.
- [12] H. Jenkins et al., Confronting the challenges of participatory culture, *MacArthur Foundation*, 2006.
- [13] I. Nonaka and H. Takeuchi, *The Knowledge-Creating Company*, New York: Oxford University, 1995.
- [14] D. Snowden, Complex Acts of Knowing - Paradox and Descriptive Self Awareness, *Journal of Knowledge Management*, Special Issue, July 2002.
- [15] G. Kress, *Literacy in the New Media Age*, New York: Routledge, 2003.