

Knowledge Building and Competence Development in eLearning 2.0 Systems

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Abstract: In the paper the new possibilities of eLearning 2.0 management systems for knowledge production, experience sharing and communication are presented. The Web 2.0 effects and mechanisms for knowledge capturing and construction are discussed. Reviews of seven new generation learning systems are done with aim one of them to be selected for knowledge building and competence development during the university education as well as after degree receiving. The analysis of eLearning 2.0 management systems is performed in context of the IEEE LTSA (Learning Technology Systems Architecture) component architecture.

Keywords: eLearning 2.0, LMS, LCMS, knowledge transfer, competence development, IEEE LTSA, analysis

Categories: H.0, H.5.3, H.5.4, J.0, J.4, M.4

1 Introduction

At the present time, information and knowledge are increasingly produced, distributed and used collaboratively through the proposed possibilities of Web 2.0 technologies [Grant, 06], [Prensky, 06], [Kerres, 06], [Alexander, 06]. Knowledge management is generally understood as a means of having better control over the production and usage of explicit and implicit knowledge. The paradigm shift in the understanding of information and knowledge management is not just the result of a particular distribution or retrieval process, using and applying existing knowledge to new problems, but it is also the result of communication, collaboration and social interactions. The new view on knowledge management does not take knowledge and information as fixed, but emphasizes the ongoing growth and renewal of information and knowledge in a continual process of authoring, sharing and contribution.

Technology can play an important role in ensuring that learning is the result of a dialogue and production of new knowledge, experience and competences in new environments for audiences in and beyond the classroom, making learning design, courses content and learner activities more relevant. The integration of new emerging technologies, tools and systems into a tailored learning process is an important reason for achieving the quality in the education and society.

Current pedagogical, organizational and technological models for learning do not meet wholly the demands and possibilities for knowledge acquisition and competence development. Traditional LMSs – open source based and commercial ones are typically closed systems where knowledge cannot be received, transferred and

diffused outside. They do not allow the integration of formal and informal learning opportunities for individuals and groups.

The new approaches of eLearning 2.0 management systems suppose openness between learners and knowledge providers in the framework of the curriculum as well as beyond it - in self-organized groups, community of practices and social networks during the university education and after degree receiving.

The aim of this paper is to discuss the new possibilities of eLearning 2.0 management systems in order to select environment for knowledge building and competence development. The paper is organized as follows. In section 2 the Web 2.0 effects and mechanisms for knowledge capturing and sharing are presented and their impact on eLearning 2.0 is summarized. Section 3 contains the analysis of eLearning 2.0 management systems in the context of the IEEE LTSA component architecture and the review of seven new generation learning systems is done. The conclusion is placed in Section 4.

2 eLearning 2.0 and Knowledge Transfer

eLearning 2.0 is based on Web 2.0 technologies and emerging trends in eLearning and proposes different mechanisms for knowledge capturing and reusing [Downes, 06], [Rosen, 06]. Some arising effects explain the new way in production, sharing and transferring the information and knowledge through the collaborative framework and collective intelligence:

- *Data, information and knowledge on an epic scale* – This effect characterizes the methods for data, information and knowledge gathering and remixing - not only from search engines, but it is collected indirectly from users and aggregated as a side effect of the ordinary use of major web services and applications.
- *Network effect* - The Network effect is a term used to describe the increase in value to the existing users of a service in which there is some form of interaction with others, as more and more users start to use it.
- *Collective intelligence* – This effect reflects the knowledge embedded within societies or large groups of individuals. Collective intelligence can be explicit, in the form of knowledge gathered and recorded by many people and implicit intelligence that result from the data generated by the activities of many users over time.
- *Long Tail* – This effect leads to realization of significant profit out of selling small volumes of hard-to-find items to many customers, instead of only selling large volumes of a reduced number of popular items. The group of persons that buy the hard-to-find or "non-hit" items is the customer demographic called the Long Tail [Wikipedia, The Long Tail]. The Long Tail effect is related to the personalization in eLearning [Karrer, 08].
- *Snowflakes Effect* – Also, the importance of personalized eLearning is reflected through Snowflakes effect: all snowflakes in a snowstorm are unique, so each person has specific characteristics and interests [Duval, 07].
- *Openness* - The web proposes working with open standards, using open source software, making use of free data, reusing data and working for creating innovative solutions.

3 Analysis of eLearning 2.0 Systems

The new generation LMSs is built as a reflection on Web 2.0 characteristics and effects such as networked communication, collaborative learning, integration of social software applications, and further for developing the new competencies surrounding knowledge acquisition and information sharing.

3.1 Used Methodology

The analysis of eLearning 2.0 Systems is performed with the goal to select a solution for knowledge production and management. The methodology comprises: (1) investigation via Internet search engines and using keywords “LMS, LCMS” and “Web 2.0”, (2) forming a feature list with several criteria for the description of the functional features, (3) experimental practices with the environments, (4) comparison between eLearning 2.0 system and LTSA and (5) making the decision.

3.2 Analysis

The seven eLearning 2.0 systems are identified: EctoLearning, Edu 2.0, eLearning Community 2.0, LearnHub, LectureShare, Nfomedia and Tutorom. They are examined according to the created criteria list which is focused on their main functional features for knowledge capturing and sharing and competence development. These features are summarized in Table 1.

EctoLearning is a networked Personal Learning Environment where the learning content and knowledge can be user-created, user-rated, shared and open. Ecto hosts libraries of knowledge content that can be explored by class participants and imported, exchanged, rated, modified or just shared. [EctoLearning, 08].

Edu 2.0 is a Learning Management System (LMS) with features for teachers, students and parents. The functionality of Edu 2.0 includes: private or public class registration, personal portfolio and space creation; group, community and network collaboration, assessment, tracking and monitoring, communications [Edu 2.0, 08].

eLearningCommunity 2.0 is a social site for knowledge seekers to enrich their knowledge through online learning, sharing and socializing. It proposes tools and services for (1) knowledge providers: organizing a virtual classroom, conversion of knowledge into variety of digital formats, a knowledge repository area, communication; (2) knowledge seekers: access the knowledge repository on a demand, communicate with knowledge-provider through various interaction tools provided in the learning management system [eLearning Community 2.0, 08].

LearnHub is a network of communities. For teachers LearnHub proposes tools for online teaching. For students: LearnHub gives free access to courses with specific subjects. There are many communities which offer information, created by expert teachers, and other students. The line between teacher and student is blurred, because a student in one subject can be a teacher in another [LearnHub, 08].

LectureShare is a LMS that connects students and instructors by allowing instructors to effortlessly post course material and allowing students to get course updates via text messages, emails or RSS. Students: stay organized with course materials and announcements for all chosen classes gathered in a single location, beyond text-streaming audio and video content along with text and files [LectureShare, 08].

Criteria		EctoLearning Course-Pages	Edu2.0 Schools-Class- lessons	eLearning Community 2.0 Classroom- Course	LearnHub Course-Lesson	LectureShare Course-Lectures	Nfomedia Course-Unit	Tutorom Courses- Lessons
Information and knowledge capturing and sharing Tools and Services	Course Weblog		●				●	●
	Course Wiki		●				Wikis tyle	●
	Book-marking	●						
	RSS Feeds	●	●			●		
	Link Sharing	●	●	●	●	●		●
	Picture Sharing	●	●	●	●			●
	AV/ Podcast	●	●	●	●	●		●
Com-muni-cation	Synchr.		●	●		●	●	●
	Asynchr.	●	●	●	●	●	●	●
Social Networking	Social Network	Entire social groups	Schools, Classes, Groups	Communi-ties	Com-muni-ties	Communi-ties	Add conta cts	Communi-ties, Groups
	Communi-ty file sharing	●	●		●	●	●	
Produc-tivity Tools	Search	●	●	●	●	●	●	●
	Event Planning	●	●	●				
ePortfolio Creation Tool		●	●					
Personalization Tools			●				●	
Assessment			●	●			●	
New educational widgets creation		●	●					
	Import		Integrate					

Table 1: eLearning 2.0 System Tools and Services

Nfomedia is a system for higher education professors to augment their traditional classroom courses, and it's typically used to supplement the traditional classroom course to enable blended learning. Nfomedia is also an online hub for professors and students providing various ways to stay connected [Nfomedia, 08].

Tutorom (Eduslide) allows knowledge providers to create educational content and deliver it online. The system offers different ways of presenting information, as well as testing modules, wikis, chat, blogs, and slideshows. The templates for developing the complex learning web sites facilitate providers of knowledge [Eduslide, 08].

3.3 eLearning 2.0 System Component Architecture

The analysis of eLearning 2.0 systems is performed in the context of IEEE LTSA architecture [IEEE LTSA, 01]. The existing model of IEEE LTSA is brought up-to-date with the main aim to discover high-level frameworks for understanding certain kinds of system's components, and their interactions. The repository with Learner Records in IEEE LTSA is replaced from Learner ePortfolio that contains the learner's knowledge production according to performed learning activities. Also, Learning Resources repository is replaced with Knowledge repository, where knowledge is gathered from different web sources using several services. The process Coach is replaced by Knowledge provider who can be educator, other learner, and expert. The model is presented in Figure 1 and its main components are explained in Table 2.

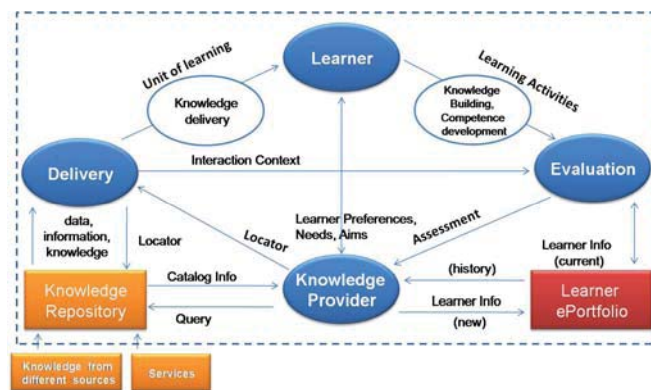


Figure 1: Component Architecture of eLearning 2.0 System

Processes and Stores	Standard LMSs	eLearning 2.0 Systems
Learner A conceptual process that represents an abstraction of a human learner: a single learner, a group of learners	The learners learn in a closed environment with access to other systems and virtual laboratories in the time of the course duration. - (Input/Output) The preferences, needs, aims are negotiated with the educator. - (Input) The learner receives course content. - (Output) The learner's activities are monitored.	The learners use an open environment with communities of practices, self-organized groups and social networks during the course and after this. - (Input/Output) The preferences, needs, aims are negotiated with the knowledge providers or they are self-defined by learners. - (Input) The learner receives not only Units of Learning, but shared knowledge, experience, ideas. - (Output) The results of learner's activities are knowledge products saved in ePortfolio.
Evaluation A conceptual process that produces measurement(s) of the learner	The evaluation is done primarily by educator. - (Input) The learner's observable behavior. - (Output) Assessment information is sent to the educator. - (Input/Output) Learner information is stored in the Learner Records.	The knowledge provider can participate in the evaluation process as well as other learners. - (Input) The learner's constructed knowledge. - (Output) Assessment information is accessible by all evaluators. - (Input/Output) The products of learner's activities are retrieved and stored during evaluation process in the Learner ePortfolio.

Processes and Stores	Standard LMSs	eLearning 2.0 Systems
<p>Knowledge Provider A conceptual process that incorporate information from several sources, such as the learner, evaluation process, learner portfolio, and knowledge repository and use this information to search and select appropriate knowledge content.</p>	<p>The knowledge provider is primarily educator.</p> <ul style="list-style-type: none"> - (Input/Output) The preferences, needs and aims are defined. - (Input) The current assessment information from the evaluation process - (Input) Learner information from the learner records. - (Output) Queries may be sent to the learning resources to search for resource. - (Input) The learning resources return catalogue information. - (Output) Locators are sent to the delivery process. 	<p>A Knowledge provider can be educator, learner, expert and so on, who is registered and participates in the social environment.</p> <ul style="list-style-type: none"> - (Input/Output) The preferences, needs and aims are defining and changing continuously - (Input) The current assessment information from the evaluation process - (Input) Learner's products from the ePortfolio. - (Output) Queries may be sent to the shared knowledge repository to search for (appropriate) knowledge. - (Input) The knowledge repository return catalogue information, e.g., a list of locators that match the search query. - (Output) Locators (information, knowledge) are sent to the delivery process.
<p>Delivery A conceptual process that transforms knowledge obtained via knowledge repository and deliver it to the learners.</p>	<ul style="list-style-type: none"> - (Input) May receive locators from the educator. - (Output) May use locators to retrieve resources. - (Input) May receive retrieved resources and may transform them in multimedia. - (Output) May send multimedia to the learners. 	<ul style="list-style-type: none"> - (Input) May receive locators from the knowledge provider and/or learners. - (Output) May use locators to retrieve knowledge from different knowledge sources. - (Input) May receive retrieved knowledge and may transform it into a Unit of Learning for the learner. - (Output) May send Unit of Learning with integrated knowledge to the learners.
<p>Learner ePortfolio It stores learner's performance information.</p>	<p>Learner record stores information for learner.</p> <ul style="list-style-type: none"> - (Input/Output) The evaluation process store/retrieve learner's information - (Input) Learner information is sent by educator. - (Output) - Learner information is retrieved by educator. 	<p>Learner Portfolio is a storage contains the products of the learner's activities.</p> <ul style="list-style-type: none"> - (Input/Output) After the evaluation process the learner's products are stored/retrieved. - (Input/Output) The knowledge provider process store/retrieve the learner's information.
<p>Knowledge repository It collects, stores, retrieves knowledge</p>	<p>The Learning Resources Repository contains the resources uploaded by educators and/or learners.</p> <ul style="list-style-type: none"> - (Input) May be searched by queries. - (Output) The matching information is returned as catalogue info. - (Input/Output) The locators are used by the delivery process to retrieve knowledge. 	<p>Knowledge Repository includes knowledge derived by different sources using several services and tools such as: RSS syndication, blog, wiki, podcasts.</p>

Table 2: Description of eLearning 2.0 System Components

3.4 Analysis Results

This overview and analysis shows that the eLearning 2.0 systems possess the potential for knowledge transfer and competence development through their possibilities for: flexible management of collaborative strategies; sharing knowledge and best practices via open networks; Personal Learning Environment building and self-organized learning starting; RSS syndication, knowledge sharing, social networks contributing, assessing, accessing, and refining information and knowledge; innovations through using the functionality for new tools and widgets integration and development.

This analysis leads to the selection of an eLearning 2.0 system for knowledge and competence building in the higher education. Edu 2.0, eLearning Community 2.0 and Nfomedia are outlined as good solutions for this purpose. Edu 2.0 is chosen for further analysis, research and deployment, because of the rich functional features.

In Figure 2 the opportunity for multiple, simultaneous knowledge transfer for the same learner via integration of multiple learning activities, preferences, and different knowledge sources is presented. The learners can work in parallel sessions with an eLearning 2.0 system, Start page and Social Networks to receive effective performance support in their successful activities completeness.

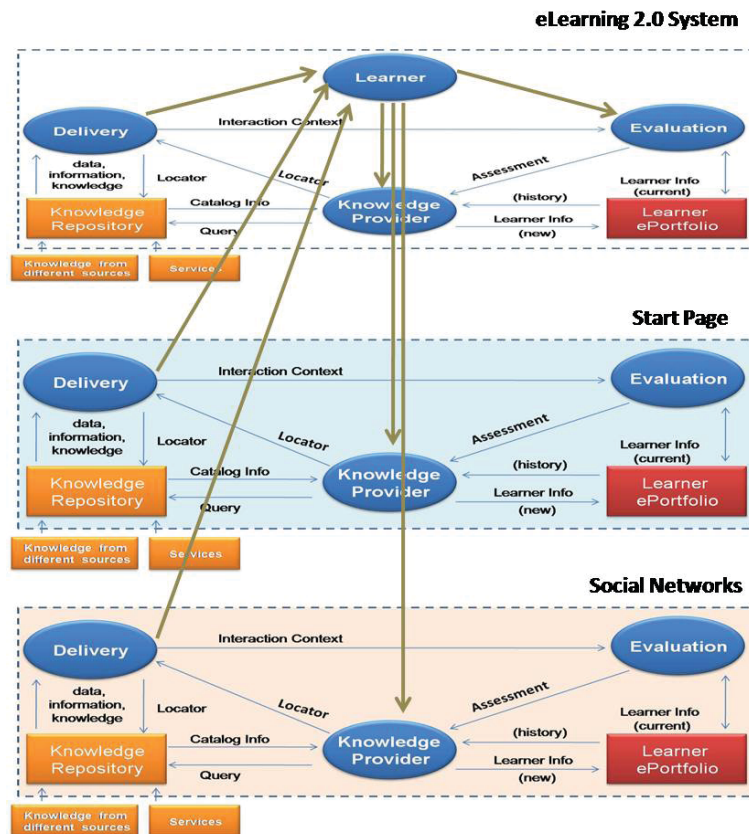


Figure 2: Multiple, Simultaneous Knowledge Capturing

4 Conclusion

In the paper the functions of seven eLearning 2.0 systems are examined and analyzed in the context of used Web 2.0 technologies, emergent eLearning directions and IEEE LTSA. Analysis shows that the eLearning 2.0 systems allow educators and learners actively exchange ideas, information and knowledge, work together on projects, from anywhere, using multiple communication modes. These environments stimulate the active participation and individual production of knowledge, support the performance of formal and informal web-based learning activities, form a bottom-up and less control-oriented learning culture, give the greater leverage of collective intelligence to create learning experiences, support the dynamics and openness of a learning process. Edu 2.0 is chosen for further research, learner's knowledge transfer and competence development. This eLearning 2.0 system can be used in parallel with start pages and social networks to enhance a learning process, according to proposed model.

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