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# KNOWLEDGE BUILDING WITH SOCIAL BOOKMARKS AND TAGS

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## Introduction

The era of traditional learning management systems (LMS) is about over. Traditional LMS's have several shortcomings that can be avoided by WEB 2.0 technologies and social software applications. LMS is typically a closed and authoritarian system where only the teacher has rights to design the structure of the content and the course.

The technology of WEB 2.0 and social software are getting more popular among students because it enables to them to be not only the readers but also the creators of the content. Students often use different forms of social software tools even before they start using an LMS at school. Why to force them to use a closed information system that will be abandoned when they finish the school. Instead they can use environments that they can even use after the school. On one hand, this choice would remove the barrier between the student and the school. On the other hand it would show to students the alternative ways how to use different tools for different purposes. This can increase their ICT skills in their everyday life.

There is a contradiction about using the social software tools for educational purposes – the use of social software is based on free will but the school tends to be more or less autocratic. The aim of this article is to define the relationship between social software and learning management. How much freedom can be given for the students in learning so that the situation retains the characteristics of social software usage and the learning still can be managed by teacher in the optimal way? The data and the ideas are collected from a pedagogical experiment of using the social bookmarking tool del.icio.us as an environment for managing learning and knowledge.

## Classification of Social Software

Social software refers to software that supports group interaction [1]. Usually they are web based applications that involve communication, social networking, collaboration, content creation and sharing. According to the social constructivist learning theory, learning is most effective when students can construct their own meaning of knowledge, and particular when this construction is done in communication and collaboration. From this point of view the overall objectives of social software and learning seem to support each other.

The most popular social software tools are instant messaging and chat environments, forums, blogs, wikis, collaborative real time editors, social networking environments, social bookmarking and content sharing tools. The classification of social software applications is not an easy task because most of them can be used for different purposes. In this article we classify them according to overall learning objectives.

The classification of communication levels is based on the range of users involved in information exchange:

- One-to-one (e.g. e-mail, MSN)
- One-to-many (e.g. blog, forum, flickr, YouTube, del.icio.us)
- Many-to-many (e.g. wiki, Google Docs).

The concept of collaboration levels is adopted from the document created by the Collaborative Strategies LLC [2]:

- Messaging and Calendaring - exchange of information (e.g. e-mail, MSN).
- Data Management - sharing of information is based on file management (e.g. flickr, YouTube, del.icio.us, Orcut).

- Neutral Data Access - information is accessible to wide range of users but they can't change the original information (e.g. forum, blog).
- Native Data Access - users can change the original information (e.g. wiki)
- Real Time Design Reviews - users can change the original information at same time (Google Docs).

As another classification criterion, levels for content construction are adopted from Learning Object Metadata Specification [3]. The element number 1.9 level of aggregation specifies four levels for the complexity and the size of content:

- Atom (asset) e.g. Image
- Document e.g. Illustrated text
- Collection of documents or assets
- Master collection - binding of collections

Based on presented classifications following matrix is constructed (Table 1). This table is visualized as 3-D chart and located in Flickr [4]. This table intends to simplify the teacher's selection of the optimal platform with represent of given learning objectives.

Table 1 Classification of Social Software based on overall learning goals.

Type	Example	Range of Communication	Level of Collaboration	Size of Constructed Content
e-mail	Pegasus Mail	1 one-to-one	1 Messaging	1 atom
Instant messaging and chat	Skype, MSN	1,5 one-to-one/many	1 Messaging	1 atom
Forum	Yahoo Groups	3 one-to-many	3 Neutral Data Access	2 document
Blog	WordPress	2 many-to-many	3 Neutral Data Access	2 document
Wiki	MediaWiki	3 many-to-many	4 Native Data Access	4 master collection
Collaborative real time editor	Google Docs	3 many-to-many	5 Real Time Design	2 document
Social networking	Orkut, Facebook, MySpace	2 one-to-many	2 Data Management	3 collection
Social bookmarking	del.icio.us	3 one-to-many	3 Data Management	3 collection
Content sharing	Flickr, Youtube, Slideshare	2 one-to-many	2,5 Data Management	3 collection

### Social software examples in education

**E-mail** is commonly used in education for a long time as a channel for sending tasks to students and receiving home tasks from students. This is very labor-intensive approach but still very popular. **Chat** is rarely used and basically among teachers who are e-learning enthusiasts. Chat is suggested as environment for group discussions. Often teams have problems to start discussions or to focus on non-relevant issues. A **forum** is a better environment for developing group discussion because the off-line communication. Forum entries and answers to them can be described as content.

**Blog** is usually the web diary for a single user. Other students can comment here post and blog's owner can create blogrolls – links to posts in other users' blogs. Blogs can also be used for reflecting longer study projects. The teacher can measure the progress of project based on blog entries. A blog can even be used instead of e-mail communication between teacher and student. For example home tasks can be published on the teachers' blog. Students can create a blogroll to task and post homework as entry to their personal blog. The second task for the students can be to commenting other students' blog entries. For example find the best blog post and comment why? Because a blog is usually freely readable for all Internet users, it increases the quality of homework. Fellow students can see what others have done. It also decreases teacher's workload.

**Wikis** and **online document editors** (e.g. Google Docs and Spreadsheet) are excellent tools for creating content in collaboration. Depending on the settings of the document or the environment authors can share rights for

reading or editing the document. This teaches the students how to manage the document rights. They are also the easiest ways to publish the textual content in Internet

**Social networking environments** like Orkut, My Space and Facebook are very popular among students. They share their personal information and photos to make new friends there. Some environments can be used for learning management. Created learning communities can either be closed or open for all. This kind of community space can be used for creating and storing learning content.

**Environment for content sharing** like Flickr, YouTube, SlideShare and LeMill can be used for delivering learning content from the teacher to the students. The content can be created by teacher but also the existing materials created by others can be used. Those environments are also applicable for publishing the students' home works too. For example the students take photos from student's project outcomes on learning exhibition. They can upload their photos to Flickr and comment pictures of their fellow students. SlideShare and LeMill can be used for publishing the final presentation of students work.

**Social bookmarks** like del.icio.us can be used for delivering content from teachers to students using shared bookmarks. The same environment is excellent for students to collect the information related with a study project. A web page with social bookmarks can be the starting page of a course. This approach is more closely described in the following section.

To summarize, software is social when user can freely choose the tool what best suite to she's needs. Different students prefer different tools. To collect all information created from different environments the teacher can use feed burners. Different syndicators are available, however the treatment of these is outside the scope of this article.

### **Social bookmarks in teaching**

Social bookmarking tool del.icio.us (<http://del.icio.us>) was tested in a pedagogical experiment taking place from 10<sup>th</sup> of January to 30<sup>th</sup> of May 2007. The school was the Audentes secondary school in Estonia and the subject was project management for 10<sup>th</sup> graders. The size of the group was 19 students. The aim of the pedagogical experiment was to control the suitability of social software tools for teaching and to collect software development ideas for increasing the suitability. This experiment was reflected in web diary [5].

The teacher created and published the content of the course with the LeMill (<http://lemill.net>) – environment for teachers to create learning content in collaboration, and made bookmarks to content in the del.icio.us environment. All of the lessons were held in a computer lab. In the beginning of the first lesson, the students created their personal del.icio.us accounts and joined with teachers' network. Mediate by the joint network they had instant access to the teachers list of bookmarks. During the lesson they copied the bookmarks and added their personal tags. The goal for the students was to create their personal starting pages for content of the subject – personalized e-conspectus. This e-portfolio contained links to materials and a tagcloud. In order to motivate students to share the bookmarks and to create their personal tags, it was mentioned that they would be allowed to use bookmarks and tags in the final exam for finding answers to the questions.

The biggest part of the students was satisfied with bookmarking and tagging (46%). 23% of students were not satisfied. They wanted to describe the bookmark with longer sentences not with separated single words. 31% of students did not have clear preference. One of them formulated the golden rule of learning: "It does not matter what kind of tool you use. Learning is learning!" And that's truth. The most important factor to learning results is the students' ability to learn. The school and the teacher can change it very little.

This kind of pedagogical experiment was interesting also for teacher though he faced different learning management problems. Those issues led to software development ideas to make del.icio.us-like environment suitable for teaching.

### **Learning management problems observed and software development suggestions**

The functionality of del.icio.us is simple but enough to manage the content. On one hand the simplicity is the biggest advantage of del.icio.us. This environment is very easy to use by students. Special training about how to

bookmark and tag content is not needed. On the other hand, because of its simplicity it's hard to manage the learning process in del.icio.us. Teachers' need some additional functions to have overview of learning process:

- sorting the list of bookmarks
- hiding the bookmarks
- statistics about bookmarks ad tags in network
- hide tags created by others
- comments to notes
- more personalized user profile
- graphical relations between tags and bookmarks.

Bookmarks are stored in descending chronological order. When the bookmarks are created synchronically with the schedule of the course, the freshest information is displayed on the top of the list. When the same list of bookmarks is reused on the next course the students must start using the bookmarks from the bottom of the list. For better learning management there must be functionalities for changing the order of bookmarks. Usually the order of bookmarks depends on subject curriculum. For better control over the content on screen, teachers should have the functionality of hiding the bookmarks. It enables to present the bookmarks according to learning schedule.

During the learning process students' activity was measured and graded based on tags they created. del.icio.us has excellent functionality for showing how many users have bookmarked the same content. Clicking on this information, the user can see who are sharing the bookmark and what kind of tags they used. However, collecting statistics about student names, the quantity and the quality of tags is labor-intensive. To reduce the effort needed for data collection, this kind of environment adopted for learning should offer a cross-table based on bookmarks and users who have bookmarked the content (Table 2). The information in the cells of such a table could be the number of tags or the power of description, measured by comparison to tags added to bookmark by the teacher. Teachers' tags should be hided. Otherwise the students can copy this information without the desired learning effect.

Table 2 Cross-table of users, bookmarks and tag quality information

Student ID	Bookmarks		
	Syllabus	Introduction	Ex Is Project?
Stud01	100%	100%	50%
Stud02	50%	50%	50%
Stud03	100%	100%	50%
Stud04	100%		0%

Because it's so easy in del.icio.us to copy the existing bookmark and its tags this may sometimes have counterproductive effect for learning. Students don't learn when the task is too simple, as it appears in practice. This occurred very often before exam. Students started to copy missing bookmarks. On the bookmark saving page, the users can add tags and also see popular tags created previously to this content by other students. Typically they simply copy the tags without reading the content. They create personal tag clouds that seems meaningful from teacher's point of view but are meaningless for the students. In order to motivate students to read the content and create tags as the result of thinking, learning environment must have option for teacher to hide the tags created previously by other users.

As another issue related to tagging in general, some students preferred longer sentences instead of the list of separated words – tags. They started to create comments to bookmarks. For this reason the notes area should be larger. It would be also useful to be able to add comments to notes. It would enable instant feedback from the teacher. Also start short discussions.

To register in del.icio.us small amount of information is asked. Only the username and password is needed. For better learning process management the first name, surname and e-mail should be mandatory fields. Also image of user can be very helpful.

del.icio.us has functionality for grouping the tags. Only some of the students were using this opportunity (32%). During the final exam in interviews with students it appeared that only one student out of 19 come up with a structure of tags that was meaningful in the given context. She was also able to explain the basis of the structure and to give overview of structured list. This suggests that social bookmarking and tagging approach does not create strong relations between bookmarks and tags. At least most of the students have difficulties to see the relations among bookmarks through the tags and relations between tags trough the bookmarks.

To help students to have a clearer overview of the subject there should be an alternative way for constructing the structure of content. A possibility is to create a concept map from bookmarks and tags. A concept map can be created automatically by system based on relations between tags and bookmarks or manually by student. For educational purposes automatically generated chart could be hided, so that it could be used only for measuring the descriptiveness of students mind map.

A similar solution is developed in Katholieke Universiteit Leuven. DeliVis is a tool for del.icio.us users, bookmarks and tags visualization [6]. The user can see a cluster map of she's network (Figure 1). Blue nodes are tags created by network of users and selected by the user of DeliVis. The number next to the tag label indicates how often it is used by the network. Yellow nodes are bookmarks. The bookmark names can be presented in DeliVis environment. [7]

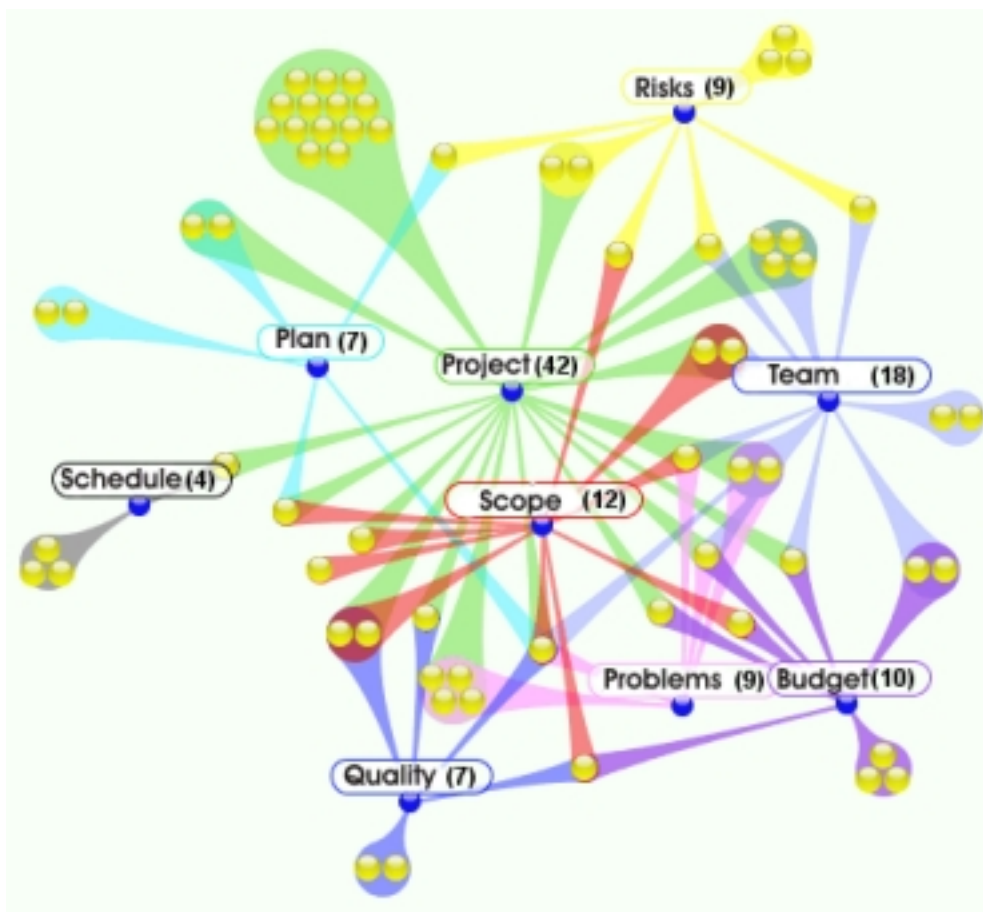


Figure 1. Cluster map of tags and bookmarks from del.icio.us/martinzillaotz network. Created with DeliVis.

### Conclusion and future work

Social Software environments can be easily integrated in blended or e-learning. Students are typically enthusiastic to use them because social software makes learning process more interesting. For making the

teachers task easier during the management of learning process some additional functions should be developed. As the next step after the described pedagogical experiment of using social bookmarks and tags for learning management and knowledge creation, the separate layer with learning management functionalities will be developed and tested.

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