
Students' Motivations for Social Media Enhanced Studying and Learning

Kirsi Silius*

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland
E-mail: kirsi.silius@tut.fi

*Corresponding author

Thumas Miilumäki

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland
E-mail: thumas.miilumaki@tut.fi

Jukka Huhtamäki

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland
E-mail: jukka.huhtamaki@tut.fi

Teemo Tebest

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland
E-mail: teemo.tebest@tut.fi

Joonas Meriläinen

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland
E-mail: joonas.merilainen@tut.fi

Seppo Pohjolainen

Hypermedia Laboratory and Department of Mathematics, Tampere
University of Technology, Korkeakoulunkatu 1, PO Box 553, FI-33101
Tampere, Finland. E-mail: seppo.pohjolainen@tut.fi

Abstract: Solutions of social media enhanced learning are widely studied in Hypermedia Laboratory at Tampere University of Technology (TUT). In recent years Web 2.0 based social media services (e.g., Facebook®, LinkedIn®, Last.fm®, etc.) have become popular, especially among young people. Based on this phenomenon TUT Hypermedia researchers have developed a social networking site for TUT freshmen aiming to provide convenient tools for interaction and study support. The first idea was to offer a free-of-charge social web site in the context of learning Basic Engineering Mathematics at TUT. This was thought to be an efficient tool to get new students studies off to a good start as mathematics courses play a significant role. However, the prediction failed, which caused us to study students' motivations for social network site usage in the study context. This paper describes research conducted in 2009. Moreover, a description of subsequent measures accomplished (e.g., web site development and social network analysis) at TUT is included.

Keywords: social media services, motivations, study support, e-learning, mathematics.

Biographical notes: Kirsi Silius has received an M.Ed. degree from Tampere University. She is carrying out post-graduate studies in hypermedia 2004. The subject of her doctoral thesis is modelling pedagogically personalized and adaptive hypermedia content production and web services. She has published several papers and presented them in international conferences.

Thomas Miilumäki is a research assistant in the Hypermedia Laboratory and the Department of Mathematics at Tampere University of Technology finishing his master studies in mathematics. His Master of Science thesis concerns social network analysis (SNA) methods and applications.

Jukka Huhtamäki is a researcher and a post-graduate student working with the Hypermedia Laboratory of Tampere University of Technology. Jukka holds an M.Sc. in Hypermedia. Jukka's interests include the visualisation of online communities, user and information modelling, and the development methods and implementation technologies of adaptive, distributed hypermedia.

Teemo Tebest is a student and a research assistant at Tampere University of Technology. Teemo is currently making his M.Sc. thesis at the Hypermedia Laboratory which consists of study about web service analytics. Teemo's interests include visualization of real life online services among others.

Joonas Meriläinen is currently writing his M.Sc. thesis with a title "Streamlining the Creation of Social Network Services with Drupal" at Tampere University of Technology. He has been working at the Hypermedia Laboratory at Tampere University of Technology since May 2008.

Seppo Pohjolainen is professor of mathematics and the head of the Department of Mathematics and director of the Hypermedia Laboratory at Tampere University of Technology. His research interests include mathematical control theory, mathematical modelling and simulation, distance learning, open learning environments, and development of hypermedia courseware. He has led several research projects and written a number of journal articles and conference papers on all these fields.

1. Introduction

Web 2.0 based social media services (e.g., Facebook® (1), LinkedIn® (2), Last.fm® (3), etc.) have recently become well known especially among young people. There is clearly something appealing in web-based social services. In social networking sites a user can participate intensively in activities in the service, share contents, debate and share opinions and create different kinds of groups for different needs.

Why use social networking sites in the study context? Kärkkäinen (2007) observed that one of the crucial problems in (Finnish) university level studies is that the very early steps at the beginning of studies are the most difficult for many students. One reason for this is that only a few new students know any of their peers at the beginning of studies in their new university.

The integration of students into a student community can be supported in many ways. One method is to use the opportunities, techniques and customs offered by social media. Researchers in hypermedia at Tampere University of Technology (TUT) therefore developed a social networking site for new students at TUT. The aim of the service is to provide convenient tools for interaction and study support. Furthermore, this development work led us to study students' attitudes towards social networking sites. The aim of the research was to find aspects of social network services that motivate students to actively participate in discussions, social networking procedures etc. in this context of studying at their home university.

2. A web community

Preece (2000) defines a web community as a group of people who are gathered together in the web for some particular intention and argues that the individuals in a community are controlled by community norms and policies. Boyd and Ellison (2007) define a web community in the context of social networking and creating connections. Typical aspects of social networking sites are user profiles, connections between users, comments and private messages. In addition web communities may have various extra features (e.g., content sharing, blogging and instant messaging) that separate different web communities from each other. (boyd & Ellison, 2007.)

A new generation social networking service can be explored from the technical point of view. This way is the most commonly used O'Reilly's (2005) concept of Web 2.0 that refers to more active and end user oriented web-based applications focused on social content production and sharing. Typical technical aspects of Web 2.0 applications are Ajax (Asynchronous JavaScript and XML) which enables high rate interactivity and RSS (Really Simple Syndication) behind e.g., news streams.

The idea of connecting web communities to teaching, studying and learning is quite rational because the formal systems supporting studying do not normally include any social properties. In fact in many cases social aspects are not in any way part of the nature of particular systems designed to support studying and learning. On the other hand students could achieve more effective co-operation in their studies if they could make friends outside tutor groups, army friends and other traditional channels. Social media can be seen as one answer to this problem. (Silius et al., 2009.)

3. The TUT Circle

To support collaborative study in mathematics at TUT and also to provide social networking tools for students especially at the beginning of their studies, the development TUT's own social network site was begun in spring 2008. The development project is still running and the site has been improved during the past two years.

The social networking site called TUT Circle is a web based environment for students offering customized tools for enhancing social aspects of student life at TUT. The primary target is to provide an efficient and compact system to help new students at TUT to create new social contacts with each other and with students already studying at TUT, e.g., peer tutors etc. The secondary target is to help students form studying groups and circles for their own needs considering their motivations, attitudes, learning methods and orientations (Pohjolainen et al., 2007).

The first version of TUT Circle was released for new students starting their studies in fall 2008. The environment at that time was called Study Circle, which reflected the main purpose of the system. The idea was to offer a web site including social networking tools and environment to help students form groups for different needs when studying Basic Engineering Mathematics courses at TUT. Among general user networking tools e.g., friend requests and private messaging, the environment included basic grouping tools such as member management, a group wall, a discussion board and file management. Static groups for different study programs and different Basic Engineering Mathematics lecture groups were offered for students as a default when they logged in to the system for the first time.

The Study Circle web site was introduced to new students during the very first lectures of Basic Engineering Mathematics courses in the first week of lectures at TUT. The system was announced to be free of charge and all usage was voluntary. The developers, researchers and teachers relied on students' independent initiative and self-directed behaviour in Web 2.0 based environments. According to the voluntary feedback collected using an open feedback report form in Study Circle as well as a specific survey form, the students simply prioritized usage of this new environment as low as possible mainly because of there was nothing mandatory about its usage. Although only a few responses were received it can be said that the curiosity of students was enough for them to log in to the system only once. There was no activity. Another reason reported for this behaviour was that the environment was totally void of content. Blank discussion boards and walls did not encourage new students to start discussions even about simple topics because all messages were supposed to be written using the author's full name.

The passiveness of the usage and the results of the study regarding students' motivation for social media enhanced studying and learning led developers and researchers to change the main purpose of the Study Circle environment. It was decided to include the context of mathematics as a different kind of widgets offered to users through specific interventions. The research described above on students' motivations to use social networking sites in the context of studying showed that systems of this type should not be too complex to use and that the added value for the student should be something unique. A networking site in the context of a student's own university could be enough to motivate students to use the system if it works properly and provides only the tools needed for basic interaction and social activity. Developing a new Facebook was deemed totally worthless.

As a result of the experiences with Study Circle the developers decided to make radical changes in the usage of the environment and in the system itself. The first of all

the crucial changes made was to change the platform used for the site. Study Circle was built on a specific open source social networking site platform Elgg (4). The version used was v0.9x and some special modifications were made to it to serve the different needs of study support more effectively. The further development of Elgg (e.g., version 1.0) did not satisfy the developers and researchers with regard to feedback collected about the usability, accessibility and reachability of Study Circle. Thus the platform was changed to a more flexible and usable system.

TUT Circle uses an open source CMF (Content Management Framework) Drupal® (5) that provides basic tools for content management and editing. With specific modules the system can be tailored to various needs. Therefore building up a social networking site on CMF is not a problem in Drupal. In four months through an iterative development process the four-person developer team in co-operation with the researchers built up a much more usable, dynamic and structurally organized web site than the previous versions using Elgg platform had ever been.

Technically development focused on improving the dynamics of the network. One of the basic problems in Study Circle was that the activity of a single user was not shown to other users of the network. Therefore no interactions between users occurred. As a solution in TUT Circle there is a personal dashboard (see Figure 1) for every user. The dashboard collects all activity of the user and the user’s neighbourhood into one page in a systematically ordered way and in real time. Even the activity of users outside the user neighbourhood is shown on the dashboard, which enables the user to widen his/her network.



Figure 1. TUT Circle User Dashboard.

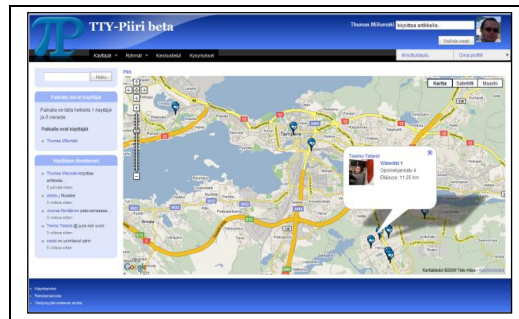


Figure 2. Geotags describing users' places of residence with metadata (e.g. name of college hostel) viewed using a specific map widget.

The general idea and target of system usage was also changed. Study Circle was developed specifically to support studies in mathematics, but TUT Circle is in general a social network site with separate features offering support for studying at TUT at crucial moments during the semester. These features are brought into the system through well-planned interventions. The priority is to support new students' social networking process in real life at TUT. Student life at TUT includes a variety of aspects of everyday life. TUT Circle provides a channel for individuals and groups to join together and share the same interests etc. Supporting studies is only one part of the whole.

To make it much clearer that TUT Circle is not primarily a learning environment at all, new students that started their studies at TUT in fall 2009 received information about the system already in summer 2009 before arriving at TUT. This way the new students could familiarize themselves with TUT in general and got to know each other beforehand. This was thought to facilitate the start of studies at university level.

As a social network site TUT Circle provides all the common tools for interaction between individual users. Every user has his/her own profile where a wide range of information about user him/her can be shared with others. Typical profile information is e.g., name, gender, date of birth, year of starting studies at TUT and degree program. A user can also add something about his/her hobbies, interests, skills and life in general (e.g., biography, place of birth and current place of residence).

Among basic user actions like status updates and private messaging between users every user can request some other user to be his/her friend in TUT Circle. The friend requests must be accepted before the relationship is formed. Through these friend requests and by accepting others' requests a user's neighbourhood in the environment widens and more options for social activity become available. For example, in a user dashboard friends' activity is shown with higher priority. Furthermore, the system can more precisely suggest other users of network as potential friends for a particular user. These suggestions are based on social network theories concerning friend's friends etc. Simple SNA (Social Network Analysis) (e.g., Knoke & Yang, 2008; Scott, 2000; Wasserman & Faust, 1994) methods and algorithms are used to find potential users.

To enhance the dynamics of activity all content in TUT Circle can be tagged with keywords. These tags help users to find contents on particular topics dynamically without using complex searches etc. Tags also support social networking when users can easily list all users e.g., according to some specific interest or hobby. Tags describing geographical information such as place of residence and place of birth can be shown for

all users or restricted to user's neighbourhood using Google Maps™ (6) based map widget (see Figure 2).

Groups in TUT Circle provide more efficient tools for collaborative activity in the environment. Every user can create his/her own group. The purpose of the group is not restricted and topic can be anything that is relevant. Every group has member management tools and the visibility of a group in TUT Circle can also be modified by a group administrator (the creator of the group). A group has tools to help collaborative activity and even group studying and learning in web environments. In a group members can chat, write news, manage events, write blog posts and edit wiki pages collaboratively. Sharing resources (e.g., files, images, etc.) is also an option.

The discussion board has a static structure that helps users to find the correct forum for their posts more easily than in discussion boards with user modifiable tree structure of discussion topics. Under every default topic users can initiate new discussions about subtopics related to the primary topic and these subtopic trees are user modified. The default topics consider many aspects of student life at TUT. One topic is discussion about first-year studies, another is student life in general. Topics related to leisure time and living in Tampere are also included, likewise a flea market where students can easily sell and buy items (e.g., course books, furniture, etc.) from each other.

The questions feature enables every user to ask a question anonymously. This feature was developed because according to the research students found it easier to ask even a stupid question out loud if it was possible to do so anonymously. Every user can answer these questions and the answers are given with a name. This gives active respondents social credit when they help others with their responses. It also gives visibility for a respondent when his/her answer to a question is shown on dashboards.

Furthermore, the questions feature is used to support studies in Basic Engineering Mathematics. Through an intervention special groups in the context of mathematics are brought into the system and users are directed to join them. In these groups users studying mathematics at TUT can ask questions about mathematics anonymously and an online tutor answers those questions. Clearly every user can also answer any question. This way lecturers teaching Basic Engineering Mathematics can recommend the TUT Circle for students as a system for supporting studies and truly rely on the fact that support really can be obtained.

Other features designed to support study are mainly special widgets available to users through interventions. These widgets may be surveys etc. One example is a Mathematics Horoscope which through a 15-question survey tells the user how he/she is oriented to study mathematics, his/her mathematical skill level and how he/she could study mathematics at TUT to learn certain topics better. Students also get some tips on how to improve their study methods (Silius et al., 2009). The analysis of the survey is based on a study conducted at TUT on students' skills, orientations and methods in learning mathematics. (e.g. Pohjolainen et al., 2007.)

4. Motivation research

Since 2008 a social network site for new students starting their studies has been developed at TUT in the Department of Mathematics and Hypermedia Laboratory. The first idea was to offer a free-of-charge social web site in the context of learning Basic Engineering Mathematics at TUT. This was thought to be an efficient tool to facilitate the beginning of studies in which mathematics courses are in a significant role. However, the

prediction failed which caused us to study students' motivations for social network site usage in the study context.

The research was done in spring and autumn 2009 at TUT. The focus was on finding out students' attitudes to web communities and social networking sites. The target of the research was to explore aspects of a university related web community that would motivate students to participate in its activity.

As a result the opinions of early adopters were ascertained. Students studying technology are more likely to be early adopters of technology than students from other fields of study. Rogers (1976) categorizes people concerning adaptability of technology into innovators, early adopters, early majority, late adopters and reluctant adopters. Of all adopters 13.5 percent are early adopters characterized as famous forerunners in technology related issues and often seen as examples in usage of new technologies (Rogers, 1976). Thus early adopters' opinions of the usefulness of social media services are also perceived as guidelines for the more general audience's opinions in the near future.

4.1. Research data and data analysis

In spring 2009 a first data was collected from ten hypermedia students regarded as early adopters using insight into method. Thus it was ensured that the research would produce valid information to support development process. The students answered two different frame stories as essays. The frame stories are shown below:

It is 2015. Among students at TUT a web service that helps students to create social networks and relationships and also helps them to start their studies at the university more efficiently has become extremely popular. The service has thousands of users and the information about it has already spread to other universities interested in having a similar web community service in their universities, too.

Why has this web service become so popular? What are students using it for?

It is 2015. Among students at TUT a web service that supposedly should support students' social networking and help them to start their studies in university is generally disliked. Although (or precisely because) participating is voluntary (and the service has cost the university way too much) the service lacks users.

Why is this service so infamous? What is wrong with it?

No guidelines for answers were set, but students were asked that the answers' length for each frame story would be at least one page (A4). Approximate answer length was one and a half page. Total amount of text data collected was 22 pages.

In data analysis according to Grounded Theory (Glaser & Strauss, 1980) material based coding and categorization were used. Analysis based on material does not remove the effect of a researcher. Rather the earlier experiences and theoretical understanding of a researcher affecting the analysis should be noted. Moreover, it is important to connect the results obtained to earlier studies and scientific discussion.

In material based theory development the basic principles of a research are formalized and based on research data rather than earlier studies or theory formalization,

i.e. the research material is allowed to tell what it contains and the theory is formalized upon that knowledge. (e.g. Haig, 1995; Metsämuuronen, 2003; Siitonen, 2000)

After the coding process it is easy to find aspects relevant for further study in the research material. Furthermore, data reorganizing that widens the theoretical point of view becomes much easier. In this research the researchers read the material through, coded the data and through the classifying process categorized found principles and topics separately (researcher triangulation). These categorizations were compared and the results formalized.

In autumn 2009 the second data was collected from 38 hypermedia students also regarded as early adopters. They were asked to sign up for TUT Circle and analyse aspects, functions, or features motivating users to use the service. In this evaluation students used a specific WeSQu tool and its User Motivation section. WeSQu is a web-based tool for evaluating web service quality, e.g., in terms of reliability, accessibility, visual design and community properties (e.g. Kailanto, 2009; Silius, Tervakari & Pohjolainen, 2003; Silius & Tervakari, 2003).

WeSQu's theory is based on research in HCI (human-computer interaction), psychology, and pedagogy as well as on evaluation research, which has its roots in the theory of usefulness of computer systems. The usefulness of web-based services includes usability and utility sections. The framework is needed to define the factors crucial to the implementation of web services for a varied group of users. The main issues within this evaluation framework are usability, added value as well as accessibility and informational quality of web services. (Silius & Tervakari, 2003; Silius, Tervakari & Pohjolainen, 2003; Forsblom & Silius, 2002a, 2002b; Nielsen, 1993.)

Usability means that the user interface of a web-based application must be easy and effective to use so that the user can concentrate on the information content instead of the interface. When software is usable it is easy and efficient to use, easy to remember, has few errors and it is subjectively pleasing (Nielsen, 1993). The added value of web services can be evaluated as in conventional services. Is there something special or something new for users? An essential part of quality is also accessibility, because web design today is designed for individuals in various contexts with different devices (Foley & Regan, 2002; Burgstahler, 2002). The fourth part of quality is the informational quality of any web service. To be of high quality the informational content of a web service should meet the five main criteria: accuracy, authority, objectivity, currency and coverage (Liu, 2001; Albion, 1999; Tergan, 1998).

In addition the foregoing quality experiences of web services are also subjective and depend on the user's personality, expertise, needs and use situation and context (e.g. Fulton Suri, 2003; Höök et al., 2006). WeSQu's User Motivation section concentrates on means of awarding the user for using the system, how different user groups are considered, how the system can be personalized and how easily service content can be followed. In addition, the students were asked to analyse the extent of evaluation.

The total amount of text data collected was 160 pages. The data was analysed using theme analysis, which is suitable for research pursuing more profound knowledge about a phenomenon and having theory based data collected. In practice theme analysis is data slicing and rearrangement in different categories. The purpose is to find themes explaining the research problem, i.e. relevant topics are identified and separated from text data. A strict connection between data and theory is crucial in theme analysis (Eskola & Suoranta, 2000).

4.2. Results

When the content is useful for the user he/she takes an advantage of it and informs other users about it (boyd, 2006). This fact was repeated in many of the students' answers in the first data collected. "When users' first experiences of system usage were positive the information about the system started to spread to other students, for example, in coffee table discussions." (7) After all, the quality of a social networking site depends on the quality of the community within it.

The students generally thought that a social networking site in the context of studying needs some particular purpose and this added value must become clear to every user (Forsblom & Silius, 2002). Combining studying and leisure time seemed to be the most relevant purpose in which such a system could be useful. In the context of one's own university the system could increase the feeling of fellowship and solidarity. In general every well designed and developed system with good usability, technical sustainability and well-thought-out purpose should gain enough motivated users to survive. But if the added value is missing or the only target of the system is to integrate every feature and system together in one place the usage threshold becomes insuperable on social, content and technical levels.

The research revealed numerous motivating aspects that should be somehow included in a study oriented social networking site. Linking together studies and spare time needs active students in the environment. These active users could be regular students but especially peer tutors, members of various clubs, students working actively in study groups and personnel. Thus a wide range of features is required for particular needs. On the other hand many basic tools can be used for many different purposes if they are technically well designed and easy to use (Silius & Tervakari, 2007). Because the service is free and all activity is voluntary the system needs to fit into the context, encourage a positive attitude and have clear processing methods so that even the weakest users do not feel like outsiders.

Table 1. Aspects increasing and decreasing students' motivation for study orientated social network site usage.

	Motivating	Non-motivating
Background and reputation of system	Voluntarism Free of charge Positive usage experiences General popularity Trendy Fashion craze	Narrow focus Bad or dubious reputation Unknown system Uninspiring
Basic idea and targets	Centralization of information Collaboration Social networking Improvement of communication Connecting studying and leisure	Nothing new Everything about anything in one place Similarity to other services available
Usage needs	Networking Social interaction Enriched user profile University related information sharing Study support Connecting users with similar interests etc.	Irrelevant features The system is not supported to be adjusted to individual user behavior Lack of interactivity
Functionality	User-to-user relations Messaging Groups Discussions Resource sharing Managing events (incl. calendar) Collaborative content production	Complex widgets Irrelevant games
Content	Information about student life University related content General discussion board with clear structure and relevant topics (e.g., living, studying, jobs, buy or sell, ...) Study schedules	Lack of content Too much information Irrelevant or too specific discussion topics (e.g., discussion about one single course etc.) Spam messages
Usability	Easy to use Clear and simplified user interface	Too complex structure Content cannot be found easily Long chains of navigation
Layout	Eye-catching layout Trendy theme	Machine-like Lack of pictures and images
Technical sustainability and flexibility	Fast and stable system Fault tolerance Fully functional Open interfaces User agent independence	User feels like a test user Unstable system Parallel systems cannot be synchronized Lack of mobile version
Moderation	Continuous surveillance and development Bug fixing Responses to feedback Short service breaks (prior notice sent to users)	Slow and/or inaccessible administrator Lack of surveillance No control Long service breaks Feedback is ignored

Aspects decreasing usage motivation, according to the students, were systems trying to integrate too much into one place. “It was planned that many of those before separately accessible features like study management tools, viewing a transcript of records, study schedule planning and announcements by the university would be joined together in one new system and environment. Because the maintenance of the old systems was too expensive the new system was specified by the university administration in co-operation with the IT system supplier that had earlier contracts with the state. The new system should become as good as possible at once. But the target users of the system were totally forgotten in the specification phase of the development process and definitions were only made from administration’s point of view.” (8) Systems containing nothing new and giving users no extra value was seen as useless as a technically well-working but totally empty network. “Students are not so interested in joining a networking service that lacks of users to be connected with.” (9)

Even if a system is based on some new invention it should somehow inspire a positive attitude among users. Negative rumours are not easily replaced with more positive information. “Among students the reputation of the new system was so bad that even if after several years the system started to work properly the problems in the beginning were still remembered.” (10). Thus the first impression is crucial. If a regular user starts to feel like a test user when the system should be properly up and running a deleterious effect on regular and continuous usage is inevitable.

In summary, according the first data, motivating study oriented social networking site should be either better than all the existing services or provide some extra value that cannot be easily obtained from other systems. Common interests in the context sustain the motivation for activity. In general a social networking site in the context of studying was seen as a possibility and also as a necessity. All these results (see Table 1) were applied during the development of the TUT social networking site.

In the evaluations of the second data the same topics as in the first data was occurred (see Table 1) were emphasized. In addition, the following was highlighted in students’ answers:

- New features should be added into the networking service a bit by bit. It was considered that beginning system usage is easier if a platform is fairly simple at first. To maintain interest there was appreciation for new functionalities introduced in the platform, when the network was organized and properly formed.
- A networking site is a suitable tool for promoting different events for students. The option to add geographic information (Silius, Tervakari & Miilumäki, 2009) was deemed very motivating: “...Profile section is fairly versatile and it is very easy to add information, e.g. a map with a tag representing one’s own home or home town.” (11)
- A profile level indicator was considered a good feature. It was also appreciated that a user can give only the personal information he/she wants to share: “Different kind of interests are also clearly visible if wanted. This helps to find similar or certain new friends and can also enhance the motivation to use the service when one can show what kind of music and movies he/she likes. It is also convenient that titles of songs listened in Last.fm can be imported to TUT Circle.” (12)
- It was motivating to follow friends’ events, content and profile information.
- E-mail messages about new features and content feeds are increasing the participation in content producing in the social networking site. In addition, content

feeds in a user dashboard were considered to be motivating: “The dashboard gives a great overview of all new content and activities.” (13)

- A function to register like or dislike of content and features was desired, likewise listings of the most popular content, users, actions, etc.: “...The ‘like’ function gives a user an opportunity to give positive feedback on content produced by another user.” (14)
- RSS feeds were considered as convenient functionality: “A chance to export an RSS feed from a discussion board also motivates users, likewise the option to produce one’s own content.” (15)
- Some students emphasized the importance of anonymity in web community activity.

After all, TUT Circle was seen to increase a sense of belonging, because in the system it is “easy to discuss local issues and get to know the people at TUT” (16). Wellman (2002) refers to this phenomenon as “glocalization”; the ability of the Internet to both expand user’s social contacts and bind them more closely to the place where they live.

5. Further research

To make TUT Circle popular among students, developers and researchers at the Department of Mathematics and Hypermedia Laboratory at TUT designed interventions for fall 2009 when the semester began and new students started their studies. During summer 2009 the focus was on encouraging the activity of new students so that in fall the study supportive widgets would have been easily-obtained and used by students. Furthermore, the activity was monitored and the development of networks in TUT Circle studied using social network analysis (SNA) methods and applications.

For basic usage monitoring in TUT Circle Google Analytics™ (17) is used. However, at the Department of Mathematics and Hypermedia Laboratory at TUT researchers are developing more flexible tools for web community usage monitoring. With these tools usage monitoring can be done even on single user level. Furthermore, tools for analysing network development, evolution and structure are under study and development. All this analysis supports further research on the success of interventions done and on achieving primary targets of system usage.

In TUT Circle there is a tool that is used to collect log data about different network actions. The data can be used for SNA that enables enriched network information production. Based on log data and together with SNA methods different visualizations can be produced. Visualizations can be used to support the analysis of social networks e.g. to detect changes and weak signals, to gain an overall view of the social network as a whole, and to concretise development of the network. (e.g. Huhtamäki, Nykänen & Salonen, 2009)

Another target of SNA analysis together with proper visualizations is to guide network development. The interactive SNA report containing a sociomatrix, SNA figures such as user centrality and prestige (e.g. Wasserman & Faust, 1994) and a visualization of user neighbourhood shown to the user can be used in several ways in trying to make some changes in the network. For example, if some groups are formed separately but they share a common interest visualization can be used as a tool to bring these two groups closer to each other if necessary. The same idea also works for individual users.

6. Conclusions

This paper described research on students' motivations for social networking site usage in the context of studies. The results showed that such an environment with social aspects connected to studying and student life in various levels is means of enhancing studies and basically a needed tool, especially for students in the early phase of studies in a new university. The motivation should be still encouraged by the system itself when it relies on students' own voluntary activity.

There is a variety of options available to motivate users to participate more actively in social network sites. To stimulate user interest and motivation it is crucial to find some added value that can be obtained only by using the system under consideration. Service personalization based on user profile and recent user activities in the network are seen as important for system usability.

To activate students in the social network it is essential to have easy access to information about friends' and similar users' activity. This also enhances networking not only on a personal level but also through common interests etc. Positive feedback for users on their actions increases user motivation on different levels.

For system launching and promoting process it is vital that the system on some levels has content and some activity can be seen by a regular user already in promoting phase. It is clear that an empty social community will not motivate a regular user to open discussions etc. especially when participation is voluntary. Users need some examples and models of how the system can be used. Moreover, the intensive actions of developers, researchers and administrators can be used as tools in directing network activity development.

In fall 2009 TUT Circle was also used as a tool for remedial teaching. Students found support for their studies and an online tutor was available for every user. The weakest students on Basic Engineering Mathematics courses at TUT were identified using TUT Circle and data based on course results. For those students really in need of support remedial teaching and more personal and concrete support was offered. This remedial teaching was a part of another experiment to be carried out during the academic year 2009-2010. The project containing this experiment ends in 2011 and experiences of this program will be reported later.

In technical fields of study students are interested in the possibilities of social media and the potential benefits it could offer for study enhancement. Students are increasingly requiring web based tools for studying as well as freely accessible electronic course materials. Obviously tools provided by social media are attractive to students today and making those tools a part of traditional teaching, studying and learning is rational. This is what young people want and need. Thus the universities are challenged to provide modern systems and methods for supporting studying in social levels if multilevel interaction with students' lives has a high priority at universities. Otherwise it will be much more complicated to develop teaching and studying at universities in the way that students' belief in university education is sustained in the future.

7. Endnotes

- (1) <http://www.facebook.com/>
- (2) <http://www.linkedin.com/>
- (3) <http://www.last.fm/>

- (4) <http://www.elgg.org/>
- (5) <http://drupal.org/>
- (6) <http://maps.google.com/>
- (7) A quote from the answer given to the first frame story by student M5 in the first data.
- (8) A quote from the answer given to the second frame story by student M4 in the first data.
- (9) A quote from the answer given to the second frame story by student M2 in the first data.
- (10) A quote from the answer given to the second frame story by student M4 in the first data.
- (11) A quote from a student's answer in the second research data.
- (12) A quote from a student's answer in the second research data.
- (13) A quote from a student's answer in the second research data.
- (14) A quote from a student's answer in the second research data.
- (15) A quote from a student's answer in the second research data.
- (16) A quote from a student's answer in the second research data.
- (17) <http://www.google.com/analytics/>

References

- 1 Albion, P. R. (1999). Heuristic evaluation of educational multimedia: from theory to practice. *16th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education*, ASCILITE.
- 2 Boyd, D.M. (2006). Friends, Friendsters, and Top 8: Writing community into being on social networking sites. *First Monday*, 11(12). <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1418/1336>.
- 3 Boyd, D.M., & Ellison, N.B. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication*, 13(1). <http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html>.
- 4 Burgstahler, S. (2002). Distance Learning. Universal Design, Universal Access. *AACE Journal*. Vol. 10, Iss. 1, pp. 32-61.
- 5 Eskola, J., & Suoranta, J. (2000). *Johdatus laadulliseen tutkimukseen*. Tampere: Osuuskunta Vastapaino.
- 6 Foley, A. & Regan, B. (2002). Web Design for Accessibility: Policies and Practice. *AACE Journal*, 10 (1), 62-80. Norfolk, VA: AACE.
- 7 Forsblom, N., & Silius, K. (2002). Value Added on Web-based Learning Environment. Pantzar, E. (ed.). *Perspectives on the age of the information society*. Reports on the Information Research Programme of the Academy of Finland, 103-113.
- 8 Forsblom, N., & Silius, K. (2002). What is the Added Value of Web-based Learning and Teaching? The Case of Tampere University of Technology. *Proceedings of The New Educational Benefits of ICT in Higher Education conference*. September 2002, Rotterdam, the Netherlands.
- 9 Fulton Suri, J. (2003). Empathic Design: Informed and inspired by Other People's Experience. Koskinen, I., Battarbee, K. & Mattelmäki, T. (eds.). *Empathic Design - User Experience in Product Design*. Edita Publishing Ltd., 51 – 58, 2003.
- 10 Glaser, B.G., & Strauss, A.L. (1980). *Discovery of Grounded Theory: Strategies for qualitative research*. New York: Aldine Transaction.

- 11 Haig, B.D. (1995). Grounded theory as scientific method. *Philosophy of Education 1995*.
- 12 Huhtamäki, J., Nykänen, O., & Salonen, J. (2009). Catalysing the Development of a Conference Workspace. *HCI International 2009 Conference Proceedings*. July 19-24 2009, San Diego, CA, USA. Springer.
- 13 Höök, K., Isbister, K., Sharp, M., & Laaksolahti, J. (2006). The sensual evaluation instrument: developing an affective evaluation tool. *Proceedings of the SIGCHI conference on Human Factors in computing system*. April 2006, Montréal, Québec, Canada. New York: ACM Press, pp. 1163 – 1172.
- 14 Kailanto, M. (2009). *Yhteisöllisten verkkopalveluiden laadukkuuskriteerit*, Master's Thesis. Tampere University of Technology.
- 15 Knoke, D., & Yang, S. (2008). *Social Network Analysis*. Second Edition. Los Angeles: Sage Publications.
- 16 Kärkkäinen, J. (2007). *Raportti uudessa tutkintorakenteessa opiskelevien ensimmäisen ja toisen vuoden opiskelijoiden opintojen etenemisestä Tampereen teknillisessä yliopistossa*. Tampereen teknillinen yliopisto. Opiskelijapalvelut.
- 17 Liu, M.C. (2001). A Systematic Web-Course Development Process: User-Centered Requirements. *Educational Technology*, 41(6), 15 – 22.
- 18 Metsämuuronen, J. (2003). *Tutkimuksen tekemisen perusteet ihmistieteissä*. 2nd edition. Helsinki: International Methelp Ky.
- 19 Nielsen, J. (1993). *Usability Engineering*. San Diego, CA: Academic Press.
- 20 O'Reilly, T. (2005). *What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software*. <http://oreilly.com/web2/archive/what-is-web-20.html>.
- 21 Pohjolainen, S., Silius, K., Huikkola, M., & Raassina, H. (2007). Clustering of Students of Engineering Mathematics Based on Their Attitudes, Orientations, Motivations and Intentions. Mastorakis, N. et al. (eds.). *Proceedings of the 4th WSEAS, ISME International Conference on Engineering Education (EE'07)*. July 24-26, 2007, Agios Nikolaos, Crete, Greece.
- 22 Preece, J. (2000). *Online Communities: Designing Usability and Supporting Sociability* (1st ed.). Wiley: 439.
- 23 Rogers, E. (1976). New Product Adoption and Diffusion. *The Journal of Consumer Research*, 290-301.
- 24 Scott, J. (2000). *Social Network Analysis. A Handbook*. Second Edition. London: Sage Publications.
- 25 Siitonen, J. (2000). *Voimaantumisteorian perusteiden hahmottelua*. Doctor for Education Thesis. Oulu: Oulun yliopiston kirjasto, Luku 3. Tutkimuksen metodologiana grounded theory. <http://herkules.oulu.fi/isbn951425340X/html/c229.html>.
- 26 Silius, K., Miilumäki, T., Sairanen, H., Huhtamäki, J., Liukkonen, A., & Pohjolainen, S. (2009). *Mikä motivoi opiskelijat verkkoyhteisöön? What Motivates a Student to Use a Web Community?* <http://hlab.ee.tut.fi/hmopetus/sosiaalinen-media/mika-motivoi-opiskelijat-verkkoyhteisoon>.
- 27 Silius, K., & Tervakari, A.M. (2003). An Evaluation of the Usefulness of Web-based Learning Environments. The Evaluation Tool into the Portal of Finnish Virtual University. Peñarrocha, V. et al. (eds.). *Proceedings of International Conference on Network Universities and E-Learning, mENU*. May 2003, Valencia, Spain. http://matriisi.ee.tut.fi/arvo/liitteet/usefulness_of_web.pdf.

- 28 Silius, K., & Tervakari, A.M. (2007). Variety of quality experiences on web-based courses. Spector, J. M. et al. (eds.). *Proceedings of the 7th IEEE International Conference on Advanced Learning Technologies ICALT 2007*, July 18-20 2007, Niigata, Japan.
- 29 Silius, K., Tervakari, A.M., & Miilumäki, T. (2009). Learning by doing as mobile with a Urban Computing Lab. In *Proceedings of International Technology Enhanced Learning Conference 2009, TELearn 2009*. October 2009, Taipei, Taiwan. <http://matriisi.ee.tut.fi/hypermedia/julkaisut/2009-silius-et-al-learningbydoing-ucl.pdf>.
- 30 Silius, K., Tervakari, A.M., & Pohjolainen, S. (2003). A Multidisciplinary Tool for the Evaluation of Usability, Pedagogical Usability, Accessibility and Informational Quality of Web-based Courses. *The Proceedings of The Eleventh International PEG Conference: Powerful ICT for Teaching and Learning, PEG2003*. June and July 2003, St. Petersburg, Russia.
- 31 Tergan, S. O. (1998). Checklists for the evaluation of educational software. Critical review and prospects. *Innovations in Education and Training International*, 35(1), 9-20.
- 32 Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications*. New York: Cambridge University Press.
- 33 Wellman, B. (2002). Designing the Internet for a networked society: Little boxes, glocalization, and networked individualism. *Communications of the ACM*, 45(5), 91-96.