

# Social Dimension of Web 2.0 in Engineering Education: Students' View

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## Abstract

Contemporary engineers need to become more cognizant and more responsive to the emerging needs of the market for engineering and technology services. Social dimension of Web 2.0 which penetrates our society more thoroughly with the availability of broadband services has the potential to contribute decisively to the sustainable development of engineering education. However, the success of the social dimension of Web 2.0 in engineering education requires student engineers' view on needs in the social dimension of Web 2.0 to be considered. Analysis of needs in the social dimension of Web 2.0 by engineering students is significant to contribute to the efficient incorporation of the social dimension of Web 2.0 in the curriculum of engineering science. The study was conducted in the frame of the Fifth Baltic Summer School *Technical Informatics and Information Technology* at the Institute of Computer Science of the Tartu University, August 7-22, 2009, Tartu, Estonia. The results of the empirical study reveal that the student engineers' view on needs in the social dimension of Web 2.0 has changed after the efficient incorporation of the social dimension of Web 2.0 in the curriculum of engineering science. The conclusions suggest the following hypothesis for further studies: in order to develop the use of the social dimension of Web 2.0 by student engineers it is necessary to promote student engineers' use of the social dimension of Web 2.0 for organizational and professional purposes, as well as to create a favourable learning environment which supports learners' needs in a multicultural environment.

## Introduction

Web 2.0 is jointly formed by four dimensions, namely, the infrastructure dimension, the functionality dimension, the data dimension, and the social (or socialization) dimension. Socialization, described as taking software or even user-generated content and sharing or jointly using it with others, covers the aspect of user-generated content as it occurs in blogs or wikis, in tagging as well as in social bookmarking (Vossen, 2009).

Typical social dimension of Web 2.0 techniques and technologies where the increased data exchange within the system is no longer a limiting parameter with the current developments in the infrastructure include "social software", namely, Skype, the eBay seller evaluation, the Amazon recommendation service, or Wikipedia, etc., and online

social networks, namely, a blog, or Facebook or MySpace for mostly private applications, LinkedIn or Xing for professional applications, or as Twitter for both (Vossen, 2009) and have found widespread acceptance in the community.

Aim of the following paper is to analyze student engineers' view on needs in social dimension of Web 2.0.

### State-of-the-Art

The methodological foundation of the present research on the student engineers' view on needs in the social dimension of Web 2.0 within engineering education is formed by the System-Constructivist Theory based on Parson's system theory (Parson, 1976) where any activity is considered as a system, Luhmann's theory (Luhmann, 1988) which emphasizes communication as a system, the theory of symbolic interactionism (Mead, 1973; Goffman, 2008) and the theory of subjectivism (Groeben, 1986). The application of this approach to learning introduced by Reich (Reich, 2005) emphasizes that human being's point of view depends on the subjective aspect (Maslo, 2007): everyone has his/her own system of external and internal perspectives (Figure 1) that is a complex open system (Rudzinska, 2008) and experience plays the central role in a construction process (Maslo, 2007). Therein, the subjective aspect of human being's point of view is revealed to be applicable to the present research on the student engineers' needs in the social dimension of Web 2.0 within engineering education.

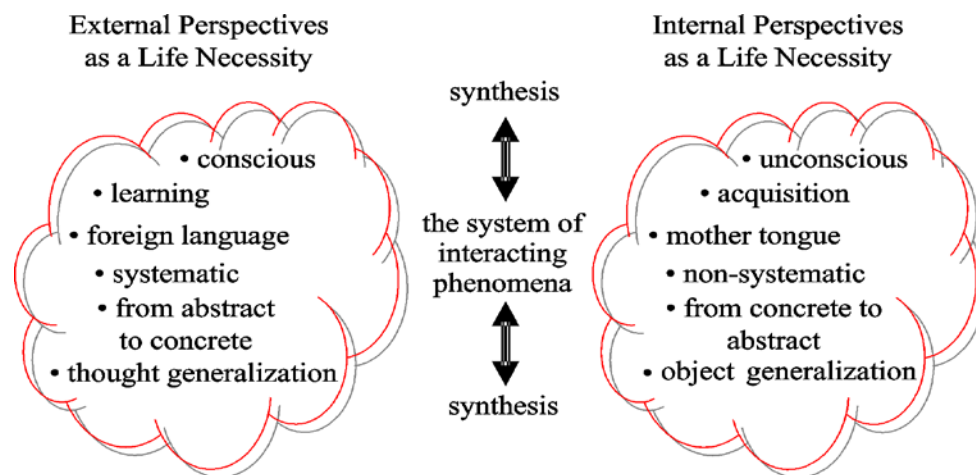


Figure 1. Developing the System of External and Internal Perspectives

### Research Methodology

This study is oriented towards the revealing of efficiency of use of the social dimension of Web 2.0 within the Baltic Summer Schools *Technical Informatics and Information Technology* in 2009.

The sample of the present empirical study involves 22 participants of Fifth Baltic Summer School *Technical Informatics and Information Technology* at the Institute of Computer Science of the Tartu University, August 7-22, 2009, Tartu, Estonia.

All 22 participants of Fifth Baltic Summer School *Technical Informatics and Information Technology* have got Bachelor or Master Degree in different fields of Computer Sciences and working experience in different fields. The aims of the Baltic Summer Schools *Technical Informatics and Information Technology* are determined as preparation for international Master and Ph.D. programs in Germany, further specialization in computer science and information technology and learning in a simulated environment. The Summer School *Technical Informatics and Information Technology* contains a special module on Web 2.0.

The module on Web 2.0 examined the advantages and problems of this technology, which makes new social communication forms possible, namely, architecture and management, protocol design, and programming.

An explorative research has been used in the research (Tashakkori and Teddlie, 2003; Mayring, Huber and Gurtler, 2004). The study consisted of the following stages: exploration of the contexts in the use of Web 2.0 thorough analysis of the documents, analysis of the students' feedback regarding their needs (content analysis), data processing, analysis and data interpretation (Kogler, 2007) and analysis of the results and elaboration of conclusions and hypothesis for further studies.

Analysis of the student engineers' view on needs in the Web 2.0 within engineering education is based on needs analysis of three levels, namely, individual needs, organizational needs and professional needs, where regular needs analysis of students' needs becomes a means of development of students' use of the social dimension of Web 2.0 (Lūka, 2008). Moreover, needs analysis serves as a basis for designing (Surikova, 2007) the following questionnaire:

- Question 1: Do you know the word *Web 2.0*?
- Question 2: Do you know the basic idea of Web 2.0?
- Question 3: Have you already used Web 2.0, namely, Facebook, Twitter, Wikipedia, etc?
- Question 4: Do you think Web 2.0 requires a lot of profound knowledge, namely, math, physics, etc?
- Question 5: Do you think Web 2.0 is useful for your individual needs?
- Question 6: Do you think Web 2.0 is useful for your organizational use?
- Question 7: Do you think Web 2.0 is useful for your professional use?

The evaluation scale of five levels for each question is given where "1" means "disagree" and low level of experience in use of Web 2.0 technologies and "5" points out "agree" and high level of use of Web 2.0.

## **Findings and Discussion**

The participants' use of Web 2.0 was evaluated by the participants themselves on the first day of the Baltic Summer School, namely, August 7, 2009.

The analysis of the survey (Fig. 2) reveals the following: the use of Web 2.0 by the Baltic Summer School (BaSoTi) participants is heterogeneous and the participants consider Web 2.0 to be most useful for their individual needs as analysed by question 5.

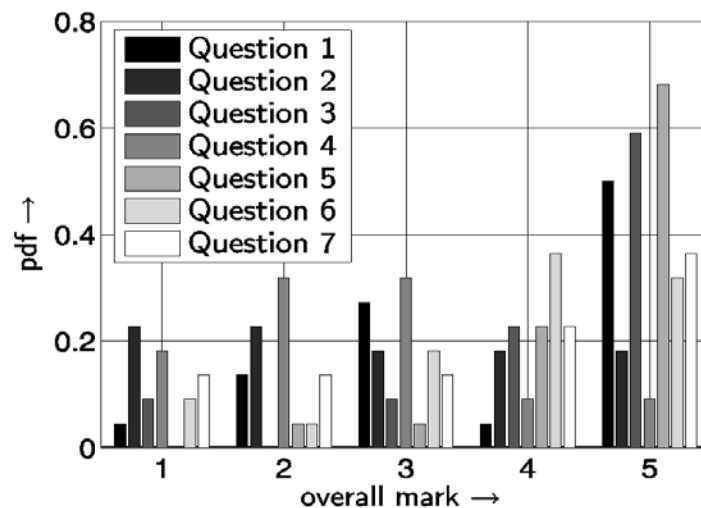


Figure 2. PDF (probability density function) of the BaSoTi participants' evaluation on August 7, 2009

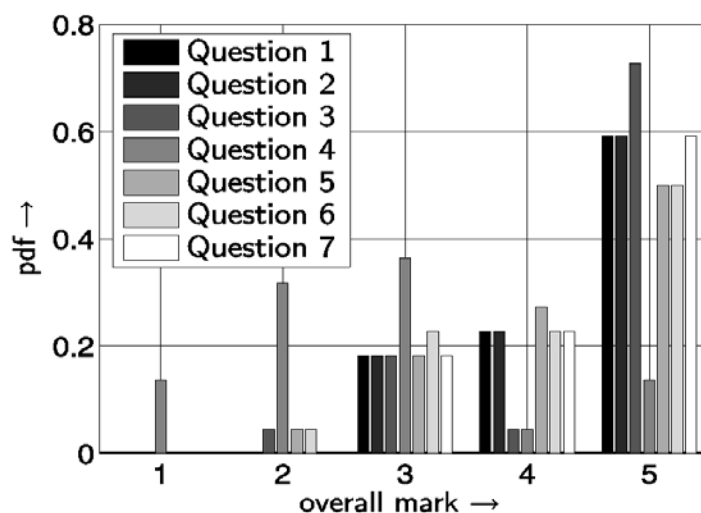


Figure 3. PDF (probability density function) of the second BaSoTi participants' evaluation on August 11, 2009

Hence, the use of Web 2.0 by the BaSoTi participants is provided by the knowledge the participants obtained in Bachelor or Master studies in different fields of Computer Sciences and by their working experience in different fields thereby putting the emphasis on developing the internal perspective.

Between Survey 1 and 2 of the participants' experience in use of the social dimension of Web 2.0 teaching/learning activity involved courses in Technical Informatics and

Information Technology (German and English), preconference tutorials for introduction into advanced research topics, attendance of conference *Advanced Topics in Telecommunication*, tutorials and practical tasks, language training for talk and presentation (optional in English or German), leisure activities and social contacts, practical work at an IT company.

Then, the analysis of the second survey (Fig. 3) reveals that the participants' experience in use of the social dimension of Web 2.0 has become homogeneous and the participants have put the emphasis on use of Web 2.0 for professional needs as analysed by question 7.

The result summary of two surveys of the participants' experience within the Baltic Summer School 2009 demonstrates the positive changes in comparison with Survey 1:

- the level of the participants' experience in terms of use of Web 2.0 has been enriched;
- the level of the participants' experience in terms of knowledge of basic idea of Web 2.0 has been improved;
- the level of the participants' experience in terms of use of Web 2.0 for individual needs decreased, thereby developing the system of the external and internal perspectives;
- the level of the participants' experience in terms of use of Web 2.0 for organizational and professional needs increased, thereby developing the system of the external and internal perspectives.

The results reveal that the level of the participants' experience in use of the social dimension of Web 2.0 has enriched. The results' comparison of Survey 1 and Survey 2 of the participants' experience in use of the social dimension of Web 2.0 emphasizes the decrease of the participants' number who have obtained the low and critical level of experience and the increase of the participants' number who have achieved the average and optimal level of experience.

### **Conclusions for Education**

The emphasis of the System-Constructivist Theory on the subjective aspect of human being's point of view and experience that plays the central role in a construction process does not allow analyzing student engineers' needs in the social dimension of Web 2.0 objectively: human beings do not always realize their experience and their wants in the social dimension of Web 2.0.

The recommendation here is the role of educators in mathematical education at tertiary level as mentors for student engineer self-discovery and self-realization; to motivate student engineers, to stimulate their interests, to help them to develop their own structure and style, as well as to help them to evaluate their performance and be able to apply these findings (Maslo, 2007) to improve their further use of the social dimension of Web 2.0.

The research results could be particularly useful for the educators in mathematical education at tertiary level who enable new specialists to act in a multicultural environment.

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