

## Chapter 5.15

# Harnessing Web 2.0 for Context-Aware Learning: The Impact of Social Tagging System on Knowledge Adaption

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### ABSTRACT

We present an empirical study investigating how interactions with a popular social tagging system, called del.icio.us, may directly impact knowledge adaptation through the processes of concept assimilation and accommodation. We observed 4 undergraduate students over a period of 8 weeks and found that the quality of social tags and distributions of information content directly impact the formation and enrichment of concept schemas. A formal model based on a distributed cognition framework provides a good fit to the students learning data, showing how learning occurs through the adaptive assimilation of concepts and categories of multiple users through the social tagging system. The results and the model have important implications on how Web 2.0 technologies can promote formal and informal learning through collaborative methods.

### INTRODUCTION

The World Wide Web (WWW) gained extreme popularity during the late 1990s due to its simple architecture and design (Millard & Ross, 2006). The 1990s version of the WWW, now dubbed as Web 1.0 (O'Reilly, 2005), is characterized as "read-only" Web. Web 1.0 efforts included content management systems, fixed directory structures and portals that used client-server architecture. In stark contrast, Web 2.0 is characterized by user-generated content (e.g., blogs, photos), communities of users (e.g., social networks), peer to peer networks (e.g., Napster), and content syndication (O'Reilly, 2005). While the exact definitions of Web 2.0 is open to debate, it is important to note that web applications have evolved into collaborative user-centered rich internet applications (RIA). The implication of this evolution is significant considering its possible impact in a variety of domains ranging from healthcare (Kaldoudi *et al.*, 2008), marketing (Parise & Guinan, 2008), e-Science (Fox *et al.*, 2007) and education (Ullrich *et al.*, 2008).

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The traditional WWW has been a strong medium for development of the e-learning tradition. The use of traditional web as a teaching and learning medium has led to the development of traditional learning management systems (e.g., WebCT and Blackboard) and also more adaptive intelligent tutoring systems. But, research on the use of Web 2.0 technology for teaching and learning is limited (Ullrich et al., 2008). The features afforded by Web 2.0 are in line with educational theories such as constructivism, exploratory learning, and connectionism, making it extremely interesting instructors, learners and designers. Ferdig (Ferdig, 2007) describes four theoretical aspects of Web 2.0 that make it suitable for pedagogy. He argues that Web 2.0 technologies: (a) provide an environment for scaffolded learning (with teachers, peers or an intelligent system), (b) support collaboration, cooperation and shared work resulting in active student participation learning, and (c) provide constructivist learning environments by encouraging students to actively publish, revise and comment on others' content. Alternatively, (Ullrich et al., 2008) provide technical, social and cultural characteristics of Web 2.0 that make it useful for pedagogy. These include the support for individual creativity and exploratory behavior, usability aspects such as desktop-like interactions, technological aspects such as the use of light-weight architectures and easy modifications, and multiple modes of access (e.g., PC, mobile devices).

Though researchers have claimed the potential usefulness in using Web 2.0 technologies for educational purposes, there are very few studies that explore how Web 2.0 technologies can be effectively incorporated into the public education milieu. One possible reason could be relative newness of these technologies. But, it is interesting to note that several for-profit companies have strongly encouraged their employees to write blogs and develop internal wikis (Ajjan & Hartshorne, 2008). Another reason could be the instructors' lack of knowledge or interest in using

these technologies or tools in the classroom. Ajjan and Hartshorne (Ajjan & Hartshorne, 2008) use a survey based study to investigate faculty interest in using Web 2.0 technologies in the classroom in a large public university. They found that faculty members are generally aware of the pedagogical benefits of using Web 2.0 technologies. But, more than half of the respondents did not plan to use any Web 2.0 technologies in their classrooms.

Researchers have explored the development and use of Web 2.0 technologies in a variety of domains and tools. One domain that has received attention for Web 2.0 technologies is e-Science projects. Pierce et al (Pierce *et al.*, 2008) developed outreach tools as a means of creating communities of like-minded researchers. This is an e-Science venture aimed at outreach activity of broadening the participation from minority institutions. Fox et al (Fox et al., 2007) examine the usefulness of tagging and social bookmarking for identifying and building keyword-based profiles that can be used for "collaborator match-making services". The system, called Minority Serving Institution-Cyber Infrastructure Empowerment Coalition (MSI-CIEC) incorporates online bookmarking and tagging for researchers. Mason and Rennie (Mason & Rennie, 2007) report on the development and use of a range of Web 2.0 technologies that supported the development of a community in Scotland. The social software helped in community interaction, ownership and pride about the local landscape and learning about the local tourist locations.

With respect to the use of Web 2.0 technologies for education, most research reports have focused on design and development of tools. Others have argued about the opportunities for using these tools (Alexander, 2006). Kaldoudi et al (Kaldoudi et al., 2008) describe a problem-based learning approach using wikis and blogs for supporting medical education. The authors contrast the lecture-based tradition in medical education with the active, exploratory learning approach that is afforded by Web 2.0 technologies. The

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