

## Consideration of Competencies of the Future Learners from a Review of “Web 2.0” Literature

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*“Web 2.0” was a symbolic word that pointed out a paradigm shift of websites from just information retrieval to information sharing and collaboration. It brought a significant impact upon the education sector as well as the business and commercial sectors. We conducted a review of literature on Web 2.0 technologies in an educational context to discover a new image of learners. 181 articles were collected from 13 international journals. Viewpoints of analysis were research approach, technology, learning activity, contents, pedagogy and community. As a result, articles referring to Web 2.0 gradually increased and these researches were conducted mainly in tertiary education Collaborative learning based on constructivist approaches was the mainstream of the articles. Images of Web 2.0 changed from user-generated to social networking and data sharing. It was concluded that the future learners would need the following four competencies: high ICT skills, creative thinking, self-regulation and sociability.*

**Keywords:** web 2.0, literature review, future learners, competencies

### Introduction

The term “Web 2.0” suggested a new paradigm around Web technology (O’Reilly & Battelle, 2004). They proposed “Web as Platform” where software applications were built upon the Web and users changed their role from consuming content to generating content. Blogs, wikis, RSS and other Web 2.0 technologies enabled us to communicate and collaborate with each other more actively than during the previous “Web 1.0” time. With the advance of technology, different generations have been labeled according to their relationship to novel technology. Prensky (2001) defined “Digital Natives” as native speakers of the digital language of computers and the Internet. Compared with “Digital Immigrants”, members of the older generations have to learn to use the technology. Digital Natives use the technology very naturally because they grew up with it.

In educational contexts, various 2.0 terms, appeared such as E-learning 2.0 (Downes, 2005), pedagogy 2.0 (Dron, 2006), classroom 2.0 (Hargadon, 2011), school 2.0, teacher 2.0 etc. It seems that we have pushed many kinds of expectations into 2.0 terms. Hart (2008) argued that “Learners 2.0” were highly engaged users of a broad range of social media tools on a frequent (daily) basis and they preferred multi-tasking, visual information, discovery learning, social interaction and so on. Even so, the common image of 2.0 terms might be a more interactive and flexible learning environment than ever. Anderson (2007) introduced the impacts of Web 2.0 in education from six key ideas: individual production and user generated content, harnessing the power of the crowd, data on an epic scale, architecture of participation, network effects and openness. Many new learning environments and educational practices adopted some of these ideas. However, in recent years, web services have become more social, connected mutually and linked with our daily life. The change in technology has brought a chance for learners to interact more and to customize their learning objectives. It seems that the future learners will have, and be expected to have, different levels and kinds of competence from previous learners. In this paper, we attempted to clarify a trend of Web 2.0 in the educational context for the last five years from a literature review and find an image of future learners that have enough competence to succeed in newer learning environments.

## Methodology

To find literature about Web 2.0 in education, we used the following online journal databases: EBSCO, Pro Quest and Google Scholar using a categorical search and keyword such as Web 2.0, learning and e-learning. As a result, 363 articles that were published in 2006-2010 were found in 19 international journals. However, some of the articles were forewords, comments about other papers, book reviews or using “Web 2.0” only in the references. Finally, we analyzed 181 articles in 13 journals (Table 1). All articles were analyzed from following four viewpoints.

**An outline and research approaches.** To grasp an outline of subjects, the number of published articles were counted. These articles were categorized by research approaches: system development, project opportunity, practice and evaluation, case study, investigation of learners or teachers and literature review. The articles were divided into two parts: from 2006 to 2008 and from 2009 to 2010.

**Community and contents.** Who were engaged in research projects and used Web 2.0 technologies in the articles and what contents did they learn through the project. However, some articles were excluded because system development articles did not specify participants and contents.

**Web 2.0 technologies and images of Web 2.0.** The greater part of the authors mentioned what Web 2.0 technologies were and how they affected society. Other articles were reports of systems and practices using Web 2.0 technologies. We picked out sentences about technologies and images of Web 2.0.

**Learning and pedagogy.** What kinds of learning activities were carried out in the articles and what types of pedagogy were adapted to the practice and system. This revealed the core values in Web 2.0 learning.

After the analysis, we focused on collaborative learning in the tertiary education which most of the articles targeted. Considering the benefits of Web 2.0 learning environments and expectations for learners to perform in these environments, we argued for several core competencies of the future learners.

Table 1. *Journal List and Number of Articles*

| Title                                                        | N          |
|--------------------------------------------------------------|------------|
| Australasian Journal of Educational Technology               | 36         |
| Canadian Journal of Learning and Technology                  | 7          |
| Computers & Education An International Journal               | 45         |
| E-learning and Digital Media                                 | 22         |
| Journal of e-Learning and Knowledge Society                  | 18         |
| ED-MEDIA                                                     | 26         |
| Journal of Educational Technology and Society                | 2          |
| Educational Technology Research and Development              | 4          |
| Global Learn                                                 | 5          |
| Journal of Interactive Media in Education                    | 7          |
| Interdisciplinary Journal of E-Learning and Learning Objects | 2          |
| International Journal on E-Learning                          | 5          |
| Journal of Learning Design                                   | 2          |
| <b>Total</b>                                                 | <b>181</b> |

## Results

### Outlines and Research Approach

The number of published articles referring to Web 2.0 gradually increased: 1 in 2006, 13 in 2007, 31 in 2008, 46 in 2009 and 91 in 2010. Hence, the articles were divided into two parts: from 2006 to 2008

and from 2009 to 2010. These articles were categorized by following the research approaches in Table 1. “System development” and “Practice and evaluation” were the main approaches. Some systems were newly developed considering Web 2.0 characteristics such as customization, social interaction and user generated content. Others were mash-ups, connecting and fitting the existing Web 2.0 services.

“Investigation” was also common. Web 2.0 affects not only learning, but also daily communication of learners and teachers. Valtonen et al. (2008) reported readiness and experience of high school students in Finland with regards to online learning. Ebner et al. (2010) investigated the Web 2.0 competency among freshmen at the University in Austria. Such studies on the relationship between learners’ readiness and Web 2.0 give instructional designers important information to plan online learning.

Table 2. *Research Approach and Number of Articles*

| Category                | Definition                                                                                                    | n.<br>06-08 | n.<br>09-10 |
|-------------------------|---------------------------------------------------------------------------------------------------------------|-------------|-------------|
| System development      | Development of a system using or related to Web 2.0 technologies and implementation, evaluation of the system | 13          | 37          |
| Practice and evaluation | Practice adopting Web 2.0 technologies and evaluation of the practice                                         | 11          | 34          |
| Investigation           | Investigation into learners’ and teachers’ usage of Web 2.0 technologies                                      | 7           | 29          |
| Concept                 | Proposal of a new concept or expression of an anxiety about teaching and learning considering Web 2.0         | 6           | 10          |
| Literature review       | Review of papers about practice adopting Web 2.0 technologies and learning theories                           | 3           | 11          |
| Case study              | Comparing several practices using Web 2.0 technologies or systems                                             | 1           | 11          |
| Project opportunity     | Introducing a project using Web 2.0 technologies organized by a university or a certain organization          | 4           | 4           |
| <b>Total</b>            |                                                                                                               | <b>45</b>   | <b>136</b>  |

### Community and Contents

Who engaged in learning with Web 2.0 technologies? Figure 1 shows the ratio of articles in each education sector. The tertiary education sector accounts for 63.6% of the articles. 16.1% and 9.8% were covered by K12 education and teacher education respectively. Few articles covered organizational learning and lifelong learning. In addition, Web 2.0 technology can open materials and learning environments to everyone who is able to access the Internet. Five cases were open to the world. Nguyen-Ngoc and Law (2010) introduced “i-Camp Trial” where students from eight European countries were involved and learned about e-learning course design using blogs.

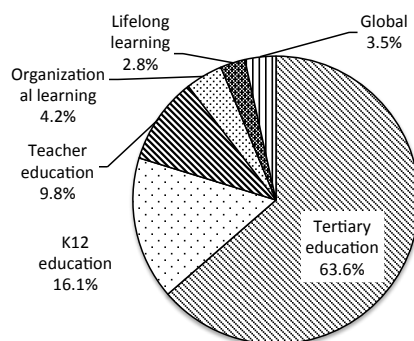


Figure 1. Situations for Web 2.0 use

About contents of learning activities, 62.4 % of articles did not specify subject or learning objectives, because “Investigation”, “Literature review” and “Concept” articles did not need an actual educational practice and some “Project opportunity” and “System development” articles covered various contents or introduced the system as a platform for every kind of content. Figure 2 indicates that these 68 articles contain the various specified subjects of learning activities. Science and pedagogy were found in 15 articles. Science covered physics, psychology, information and medical science for tertiary and K-12 education. Pedagogy was for teacher education. Following these, language contained English, Chinese, Italian and Turkish, mainly for tertiary and K-12. Technology means learning how to use applications and Web development. Skills such as thinking skills and media literacy were mainly for K-12. Arts covered music, visual arts and drama. Others were culture, business and so on.

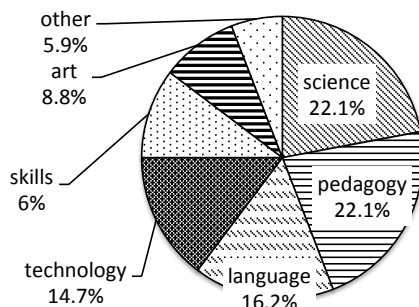


Figure 2. Specified subjects of learning activities

### Technologies and Images of Web 2.0

Because the definition of “Web 2.0” as “Web as platform” (O’Reilly & Battelle, 2004) included broad meanings, this term has been used for various services and social phenomenon. In addition, new technologies and services using the web have been developed and introduced for several years. Recently, microblogging and social network services have come to account for major parts of our online communication. It is supposed that technologies referring to Web 2.0 and images of Web 2.0 society are changing. Figure 3 shows typical services that the authors mentioned in their articles. Blogs, wikis and social networks were common tools describing Web 2.0. Comparing the first period (2006 - 2008) and the latter one (2009 - 2010), blogs, wikis, instant messaging decreased and social networking, video sharing and micro blogging increased. Web services designed for learning, such as LMS, e-portfolio and other education specific applications were removed from the analysis.

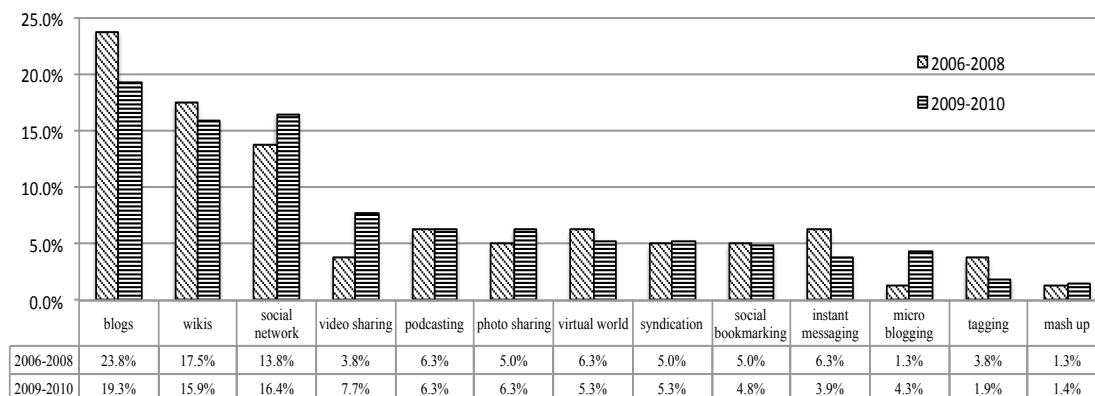


Figure 3. Typically mentioned Web 2.0 services

Images about Web 2.0 were described in the articles with the following four aspects. Figure 4 compares the percentage of articles related to four categories in the earlier and later periods. Social networking and data sharing became common. At the same time, the ratio of “User generated content” decreased. This trend represents the changing image of Web 2.0. “Social networking” and “Data sharing” were representative of typical services: SNS and photo or video sharing services. These services were

relatively more social than blogs and tagging, where people use them personally first and connect with each other later. SNS and micro blogging connect people more directly. Although “Collaboration” did not account for a large part, it was the most comprehensive image of Web 2.0. The other images may be seen as means to the end of collaboration.

**User generated contents.** Learners and teachers create contents and share it via Web 2.0 services. Cifuentes et al. (2010) set a website based on Web 2.0 technologies, where students made a website of resources about the local area and teachers could access and evaluate it.

**Social networking.** Learners and teachers use a social networking service like Facebook or Myspace. McCarthy (2010) built an online forum in Facebook, where first year university students, including internationals, could communicate with each other to build meaningful relationships.

**Data sharing.** Learners share a variety of information related to their learning activities on Web 2.0 services. Ravenscroft and Boyle (2010) developed a system using bookmarking and annotations to build ontology through dialogs based on deep learning design.

**Collaboration.** Learners collaborate with each other using Web 2.0 services. Philip and Nicholls (2009) implemented a “group blog” for collaborative processes in drama education.

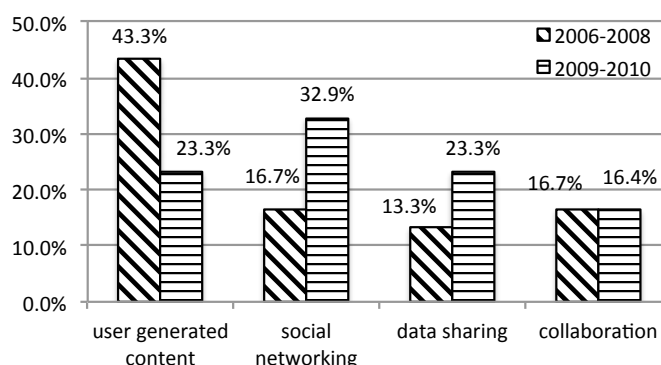


Figure 4. Images about Web 2.0 technologies

## Learning and Pedagogy

As each system and practice mentioned multiple learning styles, papers were counted repeatedly. The first perspective is about learning situations. Blended learning and e-learning were 13.9% and 9.8% respectively. In addition, four papers described informal learning settings.

The commonest kind of learning activity, collaborative learning, accounted for 42.6%. Focusing on articles that were categorized as “Practice and Evaluation”, the instructors and learners used Web 2.0 technologies for collaborative learning. For example, Neumann and Hood (2009) introduced wiki for statistics. In this practice, a wiki was used to make their reports. The tutors collaborated with the learners by using the wiki, and assisted them in making their reports. Tsai (2010) also assisted the learners by using Moodle.

In contrast, 26.3% were individual, self-regulated learning using blogs and personalized learning supported by RSS feeds and learner-customized learning courses. Drexler (2010) built a personal learning environment for secondary students to conduct independent inquiries with network support.

Concerning pedagogical viewpoint, constructivism was the main theory. Duffy and Jonassen (1992) and “Community of practice” (Wenger, 1998) were often referred to. Many authors design their system and practice for collaborative learning based on a constructivist approach. Battigelli and Sugliano (2009) developed “Learn Web” for EPIC (European Pedagogical ICT License) teachers where participants could share lesson plans with metadata and enable them to build a community of practice based on the social repository. Other authors such as Fini (2008) mentioned “Connectivism” which focuses on creation and navigation of distributed and networked knowledge in learning (Siemens, 2004).

## Discussion

In this paper, 181 articles that mentioned “Web 2.0” in educational contexts were analyzed. As the results, researches were conducted mainly in tertiary education. At the same time, concern for Web 2.0 has been spreading to the K12, teacher education and lifelong education sectors. Collaborative learning based on constructivist approaches was the mainstream of the articles. Web 2.0 technologies - social networking, user-generated contents, data sharing and collaboration - accelerate communication and interaction of learners and teachers. Technologies are changing rapidly. It is confirmed that the kind of Web services mentioned as Web 2.0 changed in these five years. We should change the term “Web 2.0” to another term which describes more social usages and connected to our daily life.

Here we discuss several challenges of Web 2.0 use for collaborative learning in tertiary education:

**Selecting appropriate tools.** Web 2.0 technologies are not always introduced appropriately in learning activities. Instructors should select appropriate tools in view of contents and purpose to goals of the classes, the rules for usage of tools, and learners’ social situation. For example, Judd et al. (2010) prompted the learners to write in a wiki. However, students wrote when the deadline was approaching, or had just accessed it once. In this case, the wiki did not enhance interaction among the learners. On the other hand, Web 2.0 technologies also support learners to build their learning environments by themselves (Walczowski, L. & Ellis, 2009).

**Building a relationship for peer learning and the leadership of learners.** Although the learning environment using Web 2.0 technologies enables the learners to collaborate with each other, the learners sometimes do not want to participate in the classes actively unless they are motivated to learn from each other. Furthermore, the learners had negative feelings if there were some learners who didn’t contribute to the groups. To encourage learners to participate positively in the activities, leadership in the community should be considered (Brindley et al., 2009). SNS has a big potential to support their relationship. At the same time, most learners have already used SNS in their daily life. Instructors should consider both how the learners use Web 2.0 tools every day and they want to use them in their learning.

For learners, these trends in learning are also demanding various competencies. From the review of articles, we conclude that the future learners will need the following four competencies: high ICT skills, creative thinking, self-regulation and sociability in Figure 5.

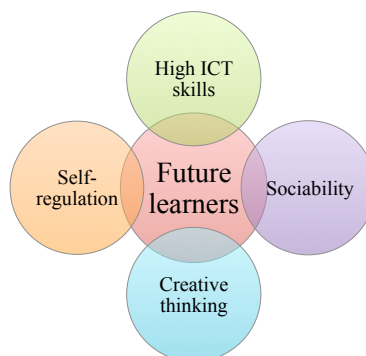


Figure 5. Competencies of future learners

**High ICT skills.** In the technologies and images of Web 2.0 section, video and picture sharing tools became used more. Learners need enough skills to communicate and collaborate with others, not only using text messages, but also using multimedia means on various Web services. In the papers categorized as investigation, Verhoeven et al. (2010) assessed ICT competencies of university freshmen, which included developing a Web site.

**Creative thinking.** The two most-used Web 2.0 technologies were blogs and wikis in the technologies and images of Web 2.0 section. In addition, the highest imagined keyword of Web

2.0 was “User generated”. Writing blogs and making videos and other products for publishing and sharing needs higher creative thinking. Cochrane and Bateman (2010) showed some examples of mobile learning scenarios using mobile Web 2.0 experience, where students created some videos. Learners will have more chance to express their own ideas and experiences through various media on the Web.

**Self-regulation.** In the learning and pedagogy section, learning activities were characterized by both collaborative learning and self-regulated learning. The experience of learners in Web 2.0 learning environments is sometimes more personalized than traditional classroom lessons. Magagnino (2008) presented a prototype of new personal learning environments based on several Web 2.0 services for lifelong learning. The learners can customize and manage their own learning environment with a metacognition of themselves. At the same time, in a collaborative setting, autonomy of participants is also important for successful cooperation. Self-regulation will be the basis of future learners who are engaged in collaborative and self-regulated learning.

**Sociability.** The most common learning style in all this research, collaborative learning, needs learners to have high levels of sociability. It includes both face-to-face sociability in blended setting and distant sociability in e-learning with Web 2.0 services. Even in personalized learning environments, learners were connected with other learners, mentors, teachers and other resources on the Web 2.0 services. Moreover, their learning environments are embedded in their daily communication (Mazman & Usluel, 2010). Skills for interaction with others and the ability to engage in multiple communities are fundamental competencies to plunge into Web 2.0 learning environments.

Web 2.0 learning environments are not only where learners perform based on these higher order competencies like 21<sup>st</sup> century skills (Trilling & Fadel, 2009) to acquire knowledge and skills, to communicate with each other and build new knowledge, but also where they learn how to communicate, collaborate with each other, solve a problem and express and share their ideas. In addition, it is also important that Web 2.0 technologies will bring personalized and customized curricula (Collins & Halverson, 2009), where learners can choose what and when they want to learn and build personalized curricula using distributed Web 2.0 tools. It will be important for future learners to have metacognition of surrounding social networks including both formal learning situations and informal ones and management of information, knowledge and networks to enrich their own learning experiences.

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