ISBN: 978-989-8704-08-5 © 2014

THE IMPLEMENTATION OF WEB 2.0 TECHNOLOGY FOR INFORMATION LITERACY INSTRUCTION IN THAI UNIVERSITY LIBRARIES

Oranuch Sawetrattanasatian
Faculty of Arts, Chulalongkorn University
Phyathai Road, Patumwan, Bangkok 10330, Thailand

ABSTRACT

Web 2.0 technology has drawn much attention recently as a fascinating tool for Information Literacy Instruction (ILI), especially in academic libraries. This research was aimed to investigate the implementation of Web 2.0 technology for ILI in Thai university libraries, in terms of information literacy skills being taught, types of Web 2.0 technology that were implemented, ways of implementing Web 2.0 technology, and problems in implementing Web 2.0 technology. Additionally, in case of the university libraries which did not apply Web 2.0 technology to their ILI, the research also explored their reasons, implementation plan, and factors important to their decisions on the implementation of Web 2.0 technology. Despite the research limitation in the context of Thai higher education, the research should be helpful to fulfill the research gap, and, particularly, to provide other university libraries with interesting suggestions on the implementation of Web 2.0 technology for ILI, including the reinforcement of the implementation.

KEYWORDS

E-learning, Information literacy, Information literacy instruction, University libraries, Web 2.0 technology

1. INTRODUCTION

Information Literacy (IL) has been the term coined since 1974 by Paul G. Zurkowski (Grassian & Kaplowitz 2009, p. 3). Now, it is still recognized and so important that "… it is a prerequisite for participating effectively in the Information Society, and is part of the basic human right of life long learning" (Thompson 2003). Many have defined this term but the one most commonly accepted is defined by the American Library Association (ALA) (Campbell 2004). It indicates that an information literate can find, evaluate, and use information effectively no matter where the information comes from (American Library Association 1989).

In academic setting, these three IL standards are best known (Webber 2008, p. 41): the standard issued in 2000 (ACRL 2000) by the Association of College and Research Libraries (ACRL), the standard issued in 1999 (SCONUL 1999), which was recently revised in 2011 (SCONUL Working Group on Information Literacy 2011), by the Society of College, National and University Libraries (SCONUL), and the standard issued in 2004 (Bundy 2004) by the Australian and New Zealand Institute for Information Literacy (ANZIIL). A correlation between these standards does exist as ANZIIL's standard is developed from ACRL's standard (Bundy 2004, p. 3) whereas SCONUL's recent standard is comparable to ACRL's standard (Martin 2013).

In this environment of information overload, IL is essential to an individual both as a person and a citizen. As a person, an information literate is able to be a lifelong learner who can determine information needs as well as locate, access, evaluate, and use information effectively and efficiently for personal, academic, and working purposes (Detlor et al. 2011, p. 572). As a citizen, IL contributes to an active participant who is able to gain and express information powerfully (Livingstone, Van Couvering & Thumim 2008, p. 105).

Since IL is a critical issue, librarians consider IL development as one of their key roles (Ferguson 2010) and Information Literacy Instruction (ILI) as one of their main services, particularly in academic libraries (Hart 2010, p. 181). Because today's society is networked, new Information and Communication Technologies (ICTs) should be incorporated into ILI (Fernandez-Villavicencio 2010, p. 128). Increasingly, a technology that has drawn librarians' attention recently is Web 2.0 technology (Luo 2010, p. 32).

Web 2.0 technology refers to web-based technology that emphasizes users, interoperability, communication, collaboration, and information sharing (Carpan 2010, p. 106; Whittaker & Dunham 2009, p. 51). The types of Web 2.0 technology that are among the most popular applications (Kelly 2008, p. 22) which can be useful to ILI are Blog, Instant Messaging (IM), Media Sharing, Podcasting, Social Bookmark, Social Networking, Virtual World, and Wiki (Fernandez-Villavicencio 2010, p. 131; Godwin 2008a, pp. 168-174; Grassian & Kaplowitz 2009, pp. 304-307).

Despite numerous positive potentials of Web 2.0 technology to ILI, as illustrated in some literature (Bobish 2011, pp. 56-63; Click & Petit 2010, pp. 138-141; Godwin 2007, pp. 105-110), it is a waste of opportunity that the technology offers (Hart 2010, p. 181) if no or only a few university libraries implement Web 2.0 technology for ILI. Additionally, since specific cases and the focus on one type of Web 2.0 technology prevail the literature on Web 2.0 technology and its adoption (Luo 2010, p. 33; Magnuson 2013, p. 250), it is necessary that a study revealing a holistic view be undertaken to fill the research gap. This is especially important in the context of Thai university libraries where most studies found are about the assessment of students' information literacy and there is currently no study addressing the application of Web 2.0 technology to ILI.

This research was aimed to investigate the implementation of Web 2.0 technology for ILI in Thai university libraries, in terms of information literacy skills being taught, types of Web 2.0 technology that were implemented, ways of implementing Web 2.0 technology, and problems in implementing Web 2.0 technology. Additionally, in case of the university libraries which did not apply Web 2.0 technology to their ILI, the research also explored their reasons, implementation plan, and factors important to their decisions on the implementation of Web 2.0 technology. It was hoped that the research should contribute to the implementation of Web 2.0 technology for ILI, including the reinforcement of the implementation, especially in university libraries.

2. WEB 2.0 TECHNOLOGY AND ILI

Since the introduction of Web 2.0 technology in the academic sphere, a variety of literature has valued its advantages to learning (Farmer, Yue & Brooks 2008; Luce-Kapler 2007; Minocha 2009; Vaughan 2010). In ILI, the technology has also enticed academic libraries for many reasons.

Firstly, today's students are digital natives, Internet generation, millennials, and NetGen (Kent 2008), characterized, for instance, by their natural use of information and technology as well as preference of collaboration, teamworking, and social networking (Godwin 2008b, pp. 5-6). They have widely used Web 2.0 technology (Collis & Moonen 2008, p. 95). Compared to their elders, they were the group doing these activities more: using social networking sites and IM, reading blogs, working on own blog, downloading podcasts, and participating in virtual worlds (Zickuhr 2010). In Thailand, the age group of 15-24 years also used the Internet most (National Statistical Office of Thailand 2011). Specifically, in a tertiary institution, it was found that the majority of undergraduates knew and ever used many types of Web 2.0 technology, namely, IM, Media Sharing, Podcasting, Social Networking, and Wiki. Also, the majority of them needed to use Web 2.0 technology for learning (Sawetrattanasatian 2013). As a result, implementing Web 2.0 technology for ILI to teach this user group should be useful as it was a way to reach them where they were acquainted to and would promptly engage in (Williams 2010, p. 161). Importantly, despite their familiarity with technology, it was described in the library and education domain that students were generally lack of information literacy skills (Detlor et al. 2011, p. 573).

Secondly, Web 2.0 technology could be diversely applied to ILI as depicted in some literature (Bobish 2011, pp. 56-63; Click & Petit 2010, pp. 138-141; Godwin 2007, pp. 105-110; Godwin 2008a, pp. 168-174; Grassian & Kaplowitz 2009, pp. 304-307; Luo 2010, pp. 34-36). On the issue related to ways of implementing Web 2.0 for ILI, the technology could be used for instructor's (instructors') own personal purposes (e.g. information sources for teaching, organization and management of teaching materials); examples to illustrate the concept of information literacy to learners; distribution of teaching content, news relevant to the instruction, and resource/information access to learners; cases, which learners will study and complete their assignments, so that they can understand the concept of information literacy; means of interaction, between instructor(s) and learners, and between learners; and places where learners share, work, and present their works (Deitering & Gronemyer 2011; Fernandez-Villavicencio 2010, p. 133; Godwin 2007, p. 110; Luo 2010, pp. 34-36; Whittaker & Dunham 2009, p. 57).

Finally, adopting Web 2.0 technology into ILI could support the pedagogy of constructivism which was "… increasingly popular among educators …" (Farkas 2012, p. 86). This is because while using Web 2.0 technology, learners are allowed to collaboratively create, gain, and share information. They could act as an active agent, not only a passive recipient (Dunaway 2011, p. 155). In brief, it could be summarized that Web 2.0 technology could reinforce

active learning which could also be regarded as learner-centered learning in which learners could get involved (Grassian & Kaplowitz 2009, p. 223) and this is "…an important ideal, both in educational institutions generally as well as in library settings …" (Jacobson 2009, p. xxvi).

In the circumstance of academic, medical, and research libraries, only 18% of the articles, published during 2006-2011, were dealing with Web 2.0 tools used in user education and information literacy (Gardois et al. 2012, p. 90). Additionally, most previous studies on the integration of Web 2.0 technology into ILI were about individual types of the technology (Luo 2010, p. 33; Magnuson 2013, p. 250). There was not much empirical research, notably in academic libraries where the background of the current research was based. However, since grasping a comprehensive view of a phenomenon was indispensable to the insightful understanding, some stimulating studies did still exist.

Luo (2010) examined the current practice of Web 2.0 integration in information literacy instruction and found that librarians surveyed applied Web 2.0 technology in teaching IL. Their adoption of Web 2.0 tools could be divided into three levels: Level 1 – Using Web 2.0 tools to organize and manage course-related material for librarians' own purposes, Level 2 – Using Web 2.0 tools to facilitate the delivery of content to students, and Level 3 – Using Web 2.0 to illustrate IL concepts. Among these levels, Level 2 was found as the framework that most libraries applied for Web 2.0 integration into ILI. The study also revealed that the challenges librarians had to overcome were technical challenges, online vandalism, and students' preconceptions of Web 2.0.

Daniels & Huxor (2011) investigated the current level of Web 2.0 usage among academic liaison / subject librarians in IL programmes. RSS feeds, Weblogs, and Wiki were the most commonly used applications whereas Social Bookmark was used limitedly.

Magnuson (2013) examined how Web 2.0 tools in an online information literacy instruction course could correlate to ACRL's IL standard. Positively, it was reported that Web 2.0 could enhance all five IL standards. She also identified five themes in which Web 2.0 enhanced learning: sharing and collaboration, organization, creativity and enjoyment, catalyst for discussion, and learning about educational technology.

Regarding Thai literature, at the time when the current research was conducted, there was no study interrogating the implementation of Web 2.0 technology into ILI. There were only some studies reflecting the issues of IL development in academic libraries (Khamhomkun 2011; Sirichai, Techamanee & Treewanich 2010; Tuamsuk 2013).

3. METHODOLOGY

In this survey study, a questionnaire responding to the research objectives was developed as the research instrument. It was pretested by a random of ten library heads or library staff members who were responsible for information literacy instruction in ten faculty libraries, located in the universities from different geographical regions of Thailand.

After the pretest and revision, during August and October 2013, the final version of questionnaire was distributed by mail to collect the data from the library director/library head/library staff member who was responsible for information literacy instruction in all 127 Thai university central libraries. The questionnaire was divided into three parts: Preliminary data on ILI of the library (Part 1), Implementation of Web 2.0 technology for ILI (Part 2), and Non-implementation of Web 2.0 technology for ILI (Part 3). In regard to Part 2, ACRL's standard (ACRL 2000) was used for the question on information literacy skills being taught since it is in accordance with the SCONUL's and ANZIIL's standards, as mentioned above. Also, it is the influential standard in higher education (Magnuson 2013, p. 245). Of the questionnaires sent, a total of 93 were returned and usable for further analysis, so the overall response rate was 73.23%. Then, the data collected were analysed using frequency, percentage, mean score, and standard deviation.

4. FINDINGS AND DISCUSSION

After analyzing the collected data, the preliminary data on ILI of these respondents revealed that most university libraries provided information literacy instruction (76.34%). Among them, most had librarians as those who were responsible for ILI (90.14%) and had undergraduate students as their target audience (97.18%). The approach that most libraries took to providing ILI was independent instruction offered by the library as supplemental instruction to a curriculum (84.51%). Generally, the majority of university libraries (60.56%) did not implement Web 2.0 technology whereas the rest (39.44%) did implement it. To explain this, apart from what they answered for their reasons on the non-implementation, it may be due to the claim that "… librarians in developing countries are still at the early stage of getting themselves familiarized with the 2.0 tools …" (Esse 2013, p. 183).

4.1 Implementation of Web 2.0 Technology for ILI

This section would describe the major findings found for Thai university libraries who implemented Web 2.0 technology for ILI (39.44%) as follows:

4.1.1 Information Literacy Skills Being Taught

The majority of university libraries implemented Web 2.0 technology for ILI to teach all five skills as displayed in Table 1. The findings confirm Bobish's (2011) and Magnuson's (2013) literature describing the possibilities of Web 2.0 to foster all skills of ACRL's standard. Regarding the standard which most respondents (96.43%) applied Web 2.0 technology, it was Standard 2: Accesses needed information effectively and efficiently. This is in line with the research findings indicated that most Thai university libraries promoted accessing needed information effectively and efficiently (Khamhomkun 2011).

Table 1. Information Literacy Skills Taught by Implementing Web 2.0 Technology

Information Literacy Skills	Percentage
Standard 1: Determines the nature and extent of the information needed	85.71
Standard 2: Accesses needed information effectively and efficiently	96.43
Standard 3: Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system	64.29
Standard 4: Individually or as a member of a group, uses information effectively to accomplish a specific purpose	71.43
Standard 5: Understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally	71.43

However, it is also noteworthy that Standard 3: Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system was the standard that least university libraries (64.29%) implemented Web 2.0 technology although information evaluation was identified as a concept "… better illustrated with reference to the Web 2.0 technology" (Luo 2010, p. 36). More importantly, in today's world of abundant information, it is the skill that must be increasingly highlighted (Farkas 2012, p. 90).

4.1.2 Types of Web 2.0 Technology That Are Implemented

The majority of university libraries implemented four types of Web 2.0 technology for ILI as presented in Table 2. They were Social Networking (92.86%), Media Sharing (78.57%), Blog (64.29%), and Instant Messaging (IM) (57.14%). This may be because these types of Web 2.0 technology were quite prominent in the library realm. Social Networking, Blog, and IM were among the popular technologies for USA and UK librarians (Arif & Mahmood 2012, p. 475). Similarly, Social Networking and Blog were among the most used social media in European librarians (EBSCO 2010). In regard to Thailand, it was also found in a study on Web 2.0 technology uses and needs of state university libraries that Social Networking, Blog, and IM were the top three types of Web 2.0 technology that most state university libraries used (Paphatsurichote 2011).

Table 2. Types of Web 2.0 Technology Implemented for ILI

Web 2.0 Technology	Percentage	Web 2.0 Technology	Percentage
Blog	64.29	Social Bookmark	21.43
Instant Messaging (IM)	57.14	Social Networking	92.86
Media Sharing	78.57	Virtual World	10.71
Podcasting	35.71	Wiki	25.00

These four types of Web 2.0 technology could be implemented into ILI variedly as demonstrated in these examples. Social Networking, such as Facebook, LinkedIn, and Myspace, could be applied to ILI for illustrating the need of being able to consider the quality of information, promoting IL training activities, and communicating with patrons (Fernandez-Villavicencio 2010, p. 133; Luo 2010, p. 36). Media Sharing, such as Flickr, Picasa, Slideshare, and Youtube, could be applied to ILI for serving as a source for teaching, distributing instructional media, and sharing students' content (Luo 2010, p. 35; Whittaker & Dunham 2009, p. 57). Blog, such as Blogger, GotoKnow, and Wordpress, could be applied to ILI for presenting course-related content, supporting class interaction, and providing subject-related blogs that students could explore to have better IL understanding (Deitering & Gronemyer 2011; Luo 2010, p. 34-35). Finally, apart from functioning as a means to inform learners news relevant to the instruction or a place where learners could work and share, IM, such as, Google Talk (Google+ Hangouts in 2013), MSN Messenger, Skype, and Yahoo! Messenger), could be principally applied to ILI for communication (Godwin 2007, p. 110).

4.1.3 Ways of Implementing Web 2.0 Technology

The majority of university libraries used almost every type of Web 2.0 technology for distribution of teaching content, news relevant to the instruction, and resource/information access to learners, namely, Blog (83.33%), Instant Messaging (62.50%), Media Sharing (77.27%), Podcasting (60.00%), Social Networking (84.62%), Virtual World (66.67%), and Wiki (57.14%). The exception was Social Bookmark (50.00%) but the percentage was still the highest compared to other ways university libraries implemented Social Bookmark into ILI.

The findings correlated to what Luo (2010) found in her study that most librarians adopted Web 2.0 tools in ILI to facilitate the content delivery to students. Nevertheless, this way of implementing Web 2.0 technology could not yield the most benefits the technology could offer (Dunaway 2011, p. 152) as it is deemed as passive instruction where learners are the consumers, not active participants or creators. Consequently, they do not practice the activities of high order thinking involved in active instruction, which could result in preferable learning outcomes (Detlor et al. 2012, p. 156).

4.1.4 Problems in Implementing Web 2.0 Technology

According to the 5-Likert scale (most problematic, very problematic, quite problematic, not very problematic, least problematic), university libraries considered all four types of problems as *quite problematic* respectively: problems relevant to operation (3.22)[*], problems relevant to learners (3.10), problems relevant to instructor(s) (2.93), and other problems (2.90).

Concerning the sub-problems, all were rated as *quite problematic* except the one receiving the highest mean score under problems relevant to operation which was viewed as *very problematic*. The sub-problems receiving the highest mean score under each type of problem were as follows: The library did not have enough staff to implement Web 2.0 technology into ILI (3.65) for problems relevant to operation, learners did not have enough knowledge and skills to use Web 2.0 technology (3.15) for problems relevant to learners, instructor(s) did not have sufficient time to implement Web 2.0 technology into ILI (3.11) for problems relevant to instructor(s), and there were some risks in using Web 2.0 technology, such as the issues of authority, security, and privacy (3.28) for other problems.

Compared to all other sub-problems, that the library did not have enough staff to implement Web 2.0 technology into ILI is vital since it received the highest mean score and was the only sub-problem rated as *very problematic*. In some studies on IL reinforcement in developing countries (Baro & Keboh 2012; Sirichai, Techamanee & Treewanich 2010), inadequate number of competent or trained staff was also mentioned. Additionally, this was in accordance with the findings of the university libraries who did not implement Web 2.0 technology for ILI, described in the next section. This is because most of them did not implement Web 2.0 technology for ILI because they had a limited number of staff and existing staff already had a lot of works to do. Also, the sub-problem might be directly relevant to two internal sub-factors, important to the decisions on implementing Web 2.0 technology for ILI. They were instructor's (instructors') knowledge and skills to implement Web 2.0 technology into ILI and adequacy of library staff, which were ranked among the internal sub-factors receiving the first three highest mean scores by those who did not implement the technology.

Respecting the problems relevant to learners, that learners did not have enough knowledge and skills to use Web 2.0 technology is interesting as, generally, it is assumed that this generation of learners should be digital natives. However, they might have different technology literacy and competency (Farkas 2012, p. 88). The sub-problem was also aligned with Luo's findings that a challenge librarians should overcome when adopting Web 2.0 into ILI was students' unfamiliarity with the Web 2.0 technology (Luo 2010). Learner's knowledge and skills to use Web 2.0 technology was also a highly-rated external sub-factor, important to the decisions on implementing Web 2.0 technology for ILI, described in the next section.

Time is needed for librarians who teach IL to "… develop appropriate content, instruct, solicit feedback, respond and engage students in an active learning process …" (Owusu-Ansah 2004, p. 9). This statement is still true to the implementation of Web 2.0 technology for ILI and it might explain why the sub-problem that instructor(s) did not have sufficient time to implement Web 2.0 technology into ILI received the highest mean score for problems relevant to instructor(s). This might also be the result of librarians' work overload and staff insufficiency.

Finally, another sub-problem receiving the highest mean score that could hinder the implementation of Web 2.0 technology for ILI was the technology itself as there were some risks in using it, such as the issues of authority, security, and privacy. This might be due to its open unmonitored environment (Godwin 2007, p. 106) and its general nature of external hosting (Kelly 2008, p. 23).

[*] The number in parentheses is the value of mean.

4.2 Non-Implementation of Web 2.0 Technology for ILI

This section would describe the major findings found for the majority of Thai university libraries who did not implement Web 2.0 technology for ILI (60.56%) as follows:

4.2.1 Reasons of Non-Implementation

Most university libraries did not implement Web 2.0 technology for ILI because they had a limited number of staff and existing staff already had a lot of works to do (72.09%). In fact, even without the adoption of Web 2.0 technology, lack of staff was also another existing challenge librarians faced in ILI as stated in some literature both in developed and developing countries (Detlor et al. 2012; Idiodi 2005; Lwehabura & Stilwell 2008).

4.2.2 Web 2.0 Technology Implementation Plan

The majority of university libraries did not have a plan to implement Web 2.0 technology into ILI (53.49%). However, the number of those who did have a plan was not so different (46.51%). In respect to the latter group, most planned to implement Web 2.0 technology into ILI within more than a year. Notably, all who had a plan were interested in utilizing Social Networking. This might be because of its most familiarity (Kent 2008), its popularity among students (Godwin 2007, p. 108), and its promising capability to enhance all five IL skills in ACRL's standard (Bobish 2011).

4.2.3 Factors Important to the Decisions on the Implementation of Web 2.0 Technology

According to the 5-Likert scale (most important, very important, quite important, not very important, least important), university libraries considered both internal factors and external factors as *very important.* Similarly, all sub-factors under each type of factor were rated as *very important*. Table 3 shows the factors important to the decisions on implementing Web 2.0 technology for ILI together with the sub-factors receiving the first three highest mean scores.

Table 3. Factors Important to the Decisions on Implementing Web 2.0 Technology for ILI*

Factors	Mean
Internal Factors	**4.12**
Policy of the library administrators	4.33
Instructor's (Instructors') knowledge and skills to implement Web 2.0 technology into ILI	4.19
Adequacy of library staff	4.14
External Factors	**4.04**
University readiness of computer facilities and Internet	4.21
Support and co-operation of stakeholders in the university, such as administrative board, and faculty members	4.09
Learners' interest and co-operation	4.09
Learners' knowledge and skills to use Web 2.0 technology	4.05

*Under each type of factor, only the sub-factors receiving the first three highest mean scores were presented.

Considering the internal factors, the policy of the library administrators was rated with the highest mean score. This might be because their policy on the implementation of Web 2.0 technology for ILI could guide and encourage the staff's movement. Also, it could assure every kind of their support (i.e., money, time, resources). Analogously, the importance of this sub-factor could be illustrated with a survey on teaching and fostering IL programmes where lack of policy was a barrier (Baro & Keboh 2012).

Instructor's (instructors') knowledge and skills to implement Web 2.0 technology into ILI were highly important since instructors should develop a deeper understanding of the technology, skills, and new ways of working (Godwin, 2007, p. 104), so they could play with the technology to create something new and unique possible to the educational purposes (Magnuson 2013, p. 245). It is also critical when recognizing that lack of knowledge and skills on Web 2.0 technology was the problem that library staff in Thai state university libraries encountered with the highest mean score (Paphatsurichote 2011).

In case of external factors, university readiness of computer facilities and Internet was the most important as it received the highest mean score. This might be because it is impossible to implement Web 2.0 technology for ILI without computer facilities and Internet. Some findings of a study on highly cited factors contributing in the successful application of Library 2.0, which was underpinned by Web 2.0 technology, could also confirm this (Esse 2013).

With respect to support and co-operation of stakeholders in the university, such as administrative board, and faculty members, their support and co-operation could assist in a successful story of ILI (Detlor et al. 2011, p. 578). In addition, since low percentage was found for the cooperation between librarians and faculty members in a study conducted on ILI in Thai higher education (Tuamsuk 2013), this might clarified why university libraries determined support and co-

operation of stakeholders in the university as the second most important external sub-factor to the implementation of Web 2.0 technology for ILI.

Concerning learners' interest and co-operation, it could definitely affect librarians' effort to implement Web 2.0 technology for ILI. If learners are not interested in ILI implementing Web 2.0 technology, they might not seriously participate in the teaching and learning activities that could lead them to essential IL learning outcomes. This is even more interesting when noting the findings in the Thai context that students were not interested in IL promotion activities (Khamhomkun 2011). Additionally, a special attention should be taken for this sub-factor since students might have the conception of Web 2.0 technology for social and entertainment purposes only and they might not be aware of or interested in its educational potential (Luo 2010, pp. 37, 39).

5. CONCLUSION

Although Web 2.0 technology and IL has just become a salient topic since 2006 (Godwin 2009, p. 267), the opportunity Web 2.0 technology brings to ILI has drawn much attention in library domain, especially the academic ones. Based on the research findings, the following recommendations for implementing Web 2.0 technology for ILI are proposed:

Since the majority of university libraries have not yet implemented Web 2.0 technology despite its advantages to ILI, the incorporation of Web 2.0 technology into ILI should be more reinforced. University administrators, including library administrators, should acknowledge the importance of ILI, particularly with the use of Web 2.0 tools, and should assist in the supportive atmosphere across the institution (e.g. adequate number of skilled ILI staff, equipped computer facilities and Internet, and co-operation among IL instructors, faculty members, and learners). Specifically, library administrators should encourage the implementation of Web 2.0 technology for ILI with a clear policy so that it could rigorously push the ILI staff's action. Apart from a proper personnel plan and job description, library administrators should also promote IL instructors' knowledge and skills to implement Web 2.0 into ILI through some staff development activities. This is also emphasized in some literature since training on various Web 2.0 applications in libraries was found important (Esse 2013) and needed by the majority of librarians (Arif & Mahmood 2012).

Pertaining to faculty members and learners, they should mutually co-operate with IL instructors in implementing Web 2.0 technology for ILI. This is because positive relationship with faculty members could leverage ILI support (Detlor et al. 2011, p. 578), including the experience with Web 2.0 technology. In regard to learners, they should widen their conception of Web 2.0 technology from social aspect and entertainment to academic practice. Moreover, they should acquire sufficient knowledge and skills to be able to use Web 2.0 technology effectively, safely, and morally for their learning.

Last but not least, IL instructors should enthusiastically develop their knowledge and skills to implement Web 2.0 technology into ILI. They should also experiment and create new ideas to figure out the best possibilities of integrating Web 2.0 technology into their instruction. They should adopt Web 2.0 technology to the most benefits it offers to teach all IL skills, increasingly Standard 3: Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system, since least university libraries instructed it with the application of Web 2.0 technology. In addition, they should include various types of Web 2.0 technology in their ILI as a combination of Web 2.0 technology could result in a wide array of IL outcomes (Magnuson 2013, p. 250). Importantly, their instruction should be more active so that more desirable learning outcomes could be generated and it could have such an impact and sustaining influence that one active ILI session might be enough (Detlor et al. 2012, p. 156). This suggests that active ILI could also relieve the problem of time and staff limitation. Moreover, they should build a strong co-operation with faculty members as it is a key to success. They should also cultivate in learners an understanding of IL and its importance, especially achieving these skills with ILI implementing Web 2.0 technology. In case of the learners who have insufficient knowledge and skills to use Web 2.0 technology, they should provide them with some training. Finally, they should study the risks that might occur in using Web 2.0 technology so that they, or with the consultation of some experts or technologists, could overcome the problems and implement it into ILI properly.

This study should fill some parts of a research gap. In spite of this, additional knowledge on the implementation of Web 2.0 technology for ILI is still required so that better understanding and application could be revealed. Since the current research was on the quantitative paradigm, the investigation of implementing Web 2.0 technology for ILI should be further carried out on the basis of other paradigms for greater depth, namely, qualitative or mixed methods. Also, the current research explored the implementation of Web 2.0 technology for ILI only on the side of instructors in libraries. Therefore, future research focusing on learners, such as their perception and achievement (Luo 2010, p. 39) as well as problems and needs, in regard to the implementation of Web 2.0 technology into ILI is suggested.

ACKNOWLEDGEMENT

The researcher gratefully acknowledges the supporting fund from the Research Section, Faculty of Arts, Chulalongkorn University and from Suthilak Ambhanwong Memorial Fund. Also, she greatly appreciates the co-operation of the participants, without which this study could not be accomplished.

REFERENCES

American Library Association (ALA), 1989. *Presidential Committee on Information Literacy: Final Report*. Retrieved September 17, 2004, from http://www.ala.org/ala/acrl/acrlpubs/whitepapers/presidential.htm

Arif, M. & Mahmood, K., 2012. The Changing Role of Librarians in the Digital World: Adoption of Web 2.0 Technologies by Pakistani Librarians. *The Electronic Library*, Vol. 30, No. 4, pp. 469-479.

Association of College and Research Libraries (ACRL), 2000. *Information Literacy Competency Standards for Higher Education*. Retrieved July 4, 2004, from http://www.ala.org/acrl/files/standards/standards.pdf

Baro, E. E. & Keboh, T., 2012. Teaching and Fostering Information Literacy Programmes: A Survey of Five University Libraries in Africa. *The Journal of Academic Librarianship*, Vol. 38, No. 5, pp. 311-315.

Bobish, G., 2011. Participation and Pedagogy: Connecting the Social Web to ACRL Learning Outcomes. *The Journal of Academic Librarianship*, vol. 37, No. 1, pp. 54-63.

Bundy, A. (ed.), 2004. *Australian and New Zealand Information Literacy Framework: Principles, Standards and Practice*. 2nd ed. Adelaide, Australian and New Zealand Institute for Information Literacy.

Campbell, S., 2004. *Defining Information Literacy in the 21st Century*. Retrieved June 20, 2013, from http://www.ifla.org/IV/ifla70/papers/059e-Campbell.pdf

Carpan, C., 2010. Library Services in the Age of Google: Introducing Information Literacy 2.0. *College & Undergraduate Libraries*, Vol. 17, No. 1, pp. 106-113.

Click, A. & Petit, J., 2010. Social Networking and Web 2.0 in Information Literacy. *The International Information & Library Review*, Vol. 42, No. 2, pp. 137-142.

Collis, B. & Moonen, J., 2008. Web 2.0 Tools and Processes in Higher Education: Quality Perspectives. *Educational Media International*, Vol. 45, No. 2, pp. 93-106.

Daniels, K. & Huxor, E., 2011. Information Literacy and Web 2.0: Developing a Modern Media Curriculum Using Social Bookmarking and Social Networking Tools. *Journal of Pedagogic Development*, Vol. 1, No. 2, pp. 4-13.

Deitering, A. & Gronemyer, K., 2011. Beyond Peer-Reviewed Articles: Using Blogs to Enrich Students' Understanding of Scholarly Work. *Portal: Libraries and the Academy*, Vol. 11, No.1, pp. 489-503.

Detlor, B., Booker, L., Serenko, A. & Julien, H., 2012. Student Perceptions of Information Literacy Instruction: The Importance of Active Learning. *Education for Information*, Vol. 29, No. 2, pp. 147-161.

Detlor, B., Julien, H., Willson, R., Serenko, A. & Lavallee, M., 2011. Learning Outcomes of Information Literacy Instruction at Business Schools. *Journal of the American Society for Information Science and Technology*, Vol. 62, No. 3, pp. 572-585.

Dunaway, M., 2011. Web 2.0 and Critical Information Literacy. *Public Services Quarterly*, Vol. 7, No. 3-4, pp. 149-157.

EBSCO, 2010. *European Libraries and Social Media: Results from a Large Study Led by EBSCO in Europe*. Retrieved February 20, 2014, from http://www2.ebsco.com/fr-fr/Documents/news/Social_media_en.pdf

Esse, U. C., 2013. Library 2.0: Perception, Knowledge and Reception among Information Professionals at Covenant University Library. *IFE PsychologyIA*, Vol. 21, No. 2, pp. 181-189.

Farmer, B., Yue, A. & Brooks, C., 2008. Using Blogging for Higher Order Learning in Large Cohort University Teaching: A Case Study. *Australasian Journal of Educational Technology*, Vol. 24, No. 2, pp. 123-136.

Farkas, M., 2012. Participatory Technologies, Pedagogy 2.0 and Information Literacy. *Library Hi Tech*, Vol. 30, No. 1, pp. 82-94.

Ferguson, S., 2010. *Social Capital, Lifelong Learning, Information Literacy and the Role of Libraries*. Retrieved April 23, 2012, from http://www.canberra.edu.au/anzca2010/attachments/pdf/Social-capital,-lifelong-learning,-information-literacy-and-the-role-of-libraries.pdf

Fernandez-Villavicencio, N. G., 2010. Helping Students Become Literate in a Digital, Networking-Based Society: A Literature Review and Discussion. *The International Information & Library Review*, Vol. 42, No. 2, pp. 124-136.

Gardois, P., Colombi, N., Grillo, G. & Villanacci, M. C., 2012. Implementation of Web 2.0 Services in Academic, Medical and Research Libraries: A Scoping Review. *Health Information and Libraries Journal*, Vol. 29, No. 2, pp. 90-109.

Godwin, P., 2008a. Conclusion. In P. Godwin & J. Parker (eds.), *Information Literacy Meets Library 2.0*. London, Facet Publishing, pp. 165-181.

Godwin, P., 2009. Information Literacy and Web 2.0: Is It Just Hype? *Program: Electronic Library and Information Systems*, Vol. 43, No. 3, pp. 264-274.

Godwin, P., 2007. Information Literacy Meets Web 2.0: How the New Tools Affect Our Own Training and Our Teaching. *New Review of Information Networking*, Vol. 13, No. 2, pp. 101-112.

Godwin, P., 2008b. Introduction: Making the Connections. In P. Godwin & J. Parker (eds.), *Information Literacy Meets Library 2.0*. London, Facet Publishing, pp. 3-18.

Grassian, E. S. & Kaplowitz, J. R., 2009. *Information Literacy Instruction: Theory and Practice*. 2nd ed. New York, Neal-Schuman Publishers.

Hart, L., 2010. Meeting the Challenge. In D. Parkes & G. Walton (eds.), *Web 2.0 and Libraries: Impacts, Technologies and Trends*. Oxford, Chandos Publishing, pp. 171-182.

Idiodi, E. A., 2005. Approaches to Information Literacy Acquisition in Nigeria. *Library Review*, Vol. 54, No. 4, pp. 223-230.

Jacobson, T. E., 2009. Introduction. In E. S. Grassian & J. R. Kaplowitz (eds.), *Information Literacy Instruction: Theory and Practice*. 2nd ed. New York, Neal-Schuman Publishers, pp. xxv-xxvii.

Kelly, B., 2008. Library 2.0 and Information Literacy: The Tools. In P. Godwin & J. Parker (eds.), *Information Literacy Meets Library 2.0*. London, Facet Publishing, pp. 19-35.

Kent, P. G., 2008. *Enticing the Google Generation: Web 2.0, Social Networking and University Students*. Retrieved July 30, 2012, from http://www.iatul.org/doclibrary/public/Conf.../2008/PKent080221.rtf

Khamhomkun, T., 2011. Information Literacy Promotion for Students in University Libraries. Master thesis, Chulalongkorn University.

Livingstone, S., Van Couvering, E. & Thumim, N., 2008. Converging Traditions of Research on Media and Information Literacies: Disciplinary, Critical, and Methodological Issues. In J. Coiro, M. Knobel, C. Lankshear & D. J. Leu (eds.), *Handbook of Research on New Literacies*. New York, Lawrence Erlbaum Associates/Taylor & Francis Group, pp. 103-132.

Luce-Kapler, R., 2007. Radical Change and Wikis: Teaching New Literacies. *Journal of Adolescent and Adult Literacy*, Vol. 51, No. 3, pp. 214-223.

Luo, L., 2010. Web 2.0 Integration in Information Literacy Instruction: An Overview. *The Journal of Academic Librarianship*, Vol. 36, No.1, pp. 32-40.

Lwehabura, M. J. F. & Stilwell, C., 2008. Information Literacy in Tanzanian Universities: Challenges and Potential Opportunities. *Journal of Librarianship and Information Science*, Vol. 40, No. 3, pp. 179-191.

Magnuson, M. L., 2013. Web 2.0 and Information Literacy Instruction: Aligning Technology with ACRL Standards. *The Journal of Academic Librarianship*, Vol. 39, No. 3, pp. 244-251.

Martin, J. L., 2013. *Learning from Recent British Information Literacy Models: A Report to ACRL's Information Literacy Competency Standards for Higher Education Task Force*. Retrieved June 23, 2013, from http://mavdisk.mnsu.edu/ martij2/acrl.pdf

Minocha, S., 2009. Role of Social Software Tools in Education: A Literature Review. *Education + Training*, Vol. 51, No. 5/6, pp.353-369.

National Statistical Office of Thailand, 2011. *A Summary: Measuring ICT Usage through Household Survey in 2011*. Retrieved July 27, 2012, from http://service.nso.go.th/nso/nsopublish/themes/files/ictHsum54.pdf

Owusu-Ansah, E. K., 2004. Information Literacy and Higher Education: Placing the Academic Library in the Center of a Comprehensive Solution. *The Journal of Academic Librarianship*, Vol. 30, No. 1, pp. 3-16.

Paphatsurichote, R., 2011. Web 2.0 Technology Uses and Needs of State University Libraries. Master thesis, Chulalongkorn University.

Sawetrattansatian, O., 2013. Needs of Web 2.0 Technology for Learning: A Case Study of Undergraduates at Chulalongkorn University. In N. H. Taba & J. L. Stephen (eds.), *Proceedings of International Conferences on ACT, IPC & ITEeL CIIt, CENT & CSPE 2012*. New Delhi, Elsevier, pp.178-184.

SCONUL Working Group on Information Literacy, 2011. *The SCONUL Seven Pillars of Information Literacy: Core Model for Higher Education*. Retrieved May 28, 2013, from http://www.sconul.ac.uk/groups/information_literacy/Seven_pillars.html

Sirichai, S., Techamanee, Y. & Treewanich, A., 2010. The Implementation and Problems of the Development of Information Literacy Skills in Governmental Higher Education Institutions. *Manutsat Paritat: Journal of Humanities*, Vol. 32, No. 2, pp. 73-92.

Society of College, National and University Libraries (SCONUL), 1999. *Information Skills in Higher Education: A SCONUL Position Paper*. Retrieved April 15, 2004, from http://www.sconul.ac.uk/pubs_ stats/pubs/99104Rev1.doc

Thompson, S., 2003. *Information Literacy Meeting of Experts Prague, the Czech Republic September 20-23, 2003: Report of a Meeting Sponsored by the US National Commission on Libraries and Information Science (NCLIS) and the National Forum on Information Literacy (NFIL) with the Support of the United Nations Education, Scientific, and Cultural Organization (UNESCO)*. Retrieved January 20, 2014, from http://www.nclis.gov/libinter/infolitconf&meet/postinfolitconf&meet/FinalReportPrague.pdf

Tuamsuk, K., 2013. Information Literacy Instruction in Thai Higher Education. *Procedia – Social and Behavioral Sciences*, Vol. 73, pp. 145-150.

Vaughan, N., 2010. Student Engagement and Web 2.0: What's the Connection? *Education Canada*, Vol. 50, No. 2, pp. 52-55.

Webber, S., 2008. Educating Web 2.0 LIS Students for Information Literacy. In P. Godwin & J. Parker (eds.), *Information Literacy Meets Library 2.0*. London, Facet Publishing, pp. 39-50.

Whittaker, S. & Dunham, J., 2009. Experimenting with Web 2.0 to Cultivate Information Literacy within a Medical Ethics, Law and Human Rights Course. *Journal of Information Literacy*, Vol. 3, No. 1, pp. 51-59.

Williams, S., 2010. New Tools for Online Literacy Instruction. *The Reference Librarian*, Vol. 51, No. 2, pp. 148-162.

Zickuhr, K., 2010. *Generations 2010*. Retrieved January 20, 2014, from http://pewinternet.org/ Reports/2010/Generations-2010.aspx