An Analysis of using Social Bookmarking for Acquiring Web Resources for e-Learning

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Abstract: With respect to the increasing trend that students acquire information from the Internet for their formal or informal learning, we aim at analyzing the use of social bookmarking to help students collaboratively access useful and creditable Web resources, facilitating collaborative learning. We also investigate the use of social bookmarking for after-school learning. Social bookmarking allows users to search for, tag, and share Web resources, and hence recommend students Web resources that are potentially useful and relevant. Experiments were conducted to study how social bookmarking can improve the quality of the acquired Web resource. In particular, students using social bookmarking could acquire a more focused and high quality set of Web resources compared with students not using social bookmarking.

Keywords: social bookmarking, Web resources, collaborative learning

Introduction

With the rapid growth of Internet technology, students are readily to access different kinds of information in the forms of online articles, Web sites, Wikis, etc., from the World Wide Web (the Web) for learning. Students increasingly use the Web to obtain informative Web resources to replace visiting libraries [1] for learning or completing their assignments. In light of this, this raises the need of cultivating the information literacy of students and developing their ability to evaluate the credibility and relevance of the Web resources such as Web pages, documents, journal articles, etc. [2]. On the other hand, finding accurate, trustful and reliable Web resources becomes essential. Tools are needed to assist students to acquire the correct information, so as to avoid them from obtaining incorrect information and learning the "wrong knowledge" [3,4].

Though a number of researches have been conducted and showed that social media can help collaborative learning [5], the use of social media to help students collaboratively obtain useful Web resources has not been well investigated. Social bookmarking, which is a particular form of social media, can help students collaboratively access useful and share Web resources. Students can supply key terms to the social bookmarking system to search for relevant Web resources. Instructors and students can provide additional information to their acquired Web resources by making use of descriptive tags if the resources are useful. Moreover, each user of the social bookmarking system can see the tags given by other users to any Web resources and have a rough understanding of the Web resources. Figure 1 illustrates the relationship between the Web resources, users, and tags in a social bookmarking system. The three entities are inter-dependent and correlated. For example, suppose user ***u*1** tags a Web page ***d*3** in the system tags ***t*2** and ***t*4**. Users ***u*2** and ***u*3** may read and give tags to the same Web page ***d*3** because of tags given may raise their interest.

Similarly, the acquired Web resources and the tags given by users ***u*2** or ***u*3** will influence ***u*1**. This leads to the situation that multiple users may access the same set of resources via the system and users have influence on each other via the acquired resources and the tags given, leading to collaborative learning. Therefore, social bookmarking is particularly useful for sharing Web resources. However, from our best knowledge, no effective pedagogical approaches have been developed to exploit social bookmarking to help learners acquire useful and quality Web resources. In this paper, we aim at analyzing the use of social bookmarking to help learners search for quality Web resources and investigate the possibility to use social bookmarking for e-learning and after-school learning. Durlak & Weissberg showed that after-school programs could improve students' self-perceptions and bonding to school, their positive social behaviors, and their school grades and level of academic achievement [6]. In particular, our research questions are as follows:

1. Can social bookmarking improve the quality of acquired web resources for e-learning?
2. Is there any potential for adopting social bookmarking for after-school learning?

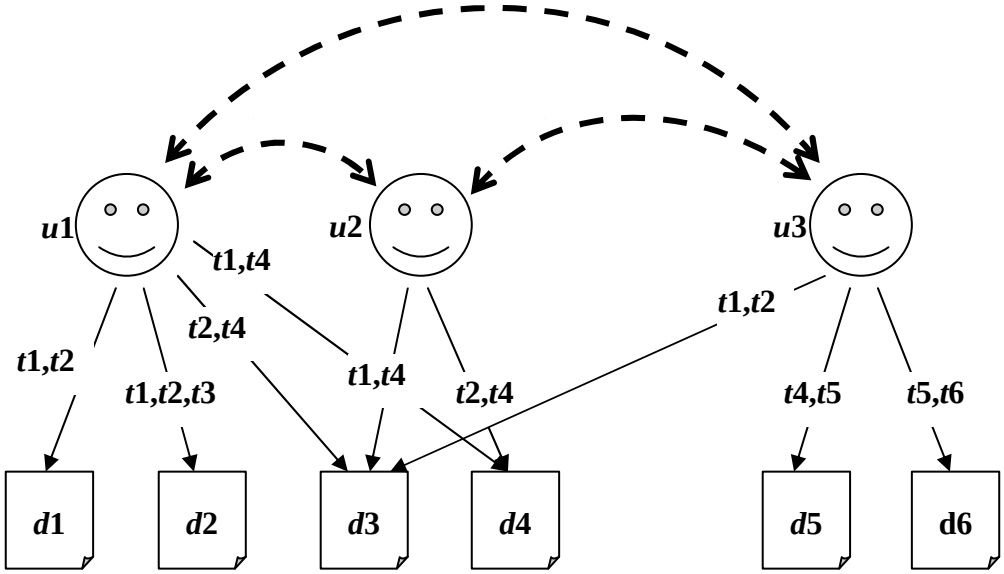

Figure 1. An illustration to show the relationship between users, tags, and Web resources

1. Literature Review

The vast amount of information on the Web triggers the need for students to cultivate their information literacy [7,8]. One important component of information literacy is to evaluate the usefulness, trustfulness, and creditability of the information acquired. Brandt has discussed several aspects to evaluate information on the Internet [9]. A study has been conducted to investigate the practices of students to verify the credibility of the Web information [1]. Another approach has been proposed to evaluate the credibility of the information in Wikipedia, which can be authored by any Internet user and may contain inaccurate information [2]. However, this method mainly focuses on Wikipedia articles instead of generic Web resources. On the other hand, several methods have been proposed to help access useful information. For example, Lee proposes a method to help students retrieve Web sites based on the searching patterns of the peers in a course [3]. The main idea of the method is to recommend a student potentially useful Web sites by employing association rule data mining algorithm to analyze the searching patterns from students in the same course. One limitation of this method is that it lacks interaction between students and hence not having sufficient training of collaboration to students. Mangina and Kilbride

propose another approach to making personalized recommendation of documents based on user modeling and information retrieval techniques [4]. However, little prior research on such recommendation systems has focused on the quality of the accessed Web resources and assisting students to obtain useful and creditable Web information.

Different forms for computer-mediated communication applications and social media have been utilized in E-learning [10]. For example, using asynchronous online discussion forums has been shown to be effective in constructing deep knowledge among students [11]. Forms of social media such as Wikis, blogs, microblogs, etc, have been applied to facilitate formal or informal learning of students [5,12]. However, some researches show that it is doubtful in the effectiveness for using social media in learning [13]. Besides, the success of using social media greatly relies on the participation of students [14].

2. Method

20 students, who were in-service teachers of primary or secondary schools, from a course were invited to conduct the experiments. The students had general knowledge of computer and Internet usage. We setup a social bookmarking system for our classes[1]. A 30-minute training session about the usage of the social bookmarking system was given to all students to familiarize how to search for, tag, and share Web resources. In addition, the criteria of a good Web resource and examples of good Web resources were illustrated.

An experiment with experimental group and a control group was used as the overall research design. Students were divided into two groups. The first group consisted of 11 individual students who searched for Web resources using their own method. This was the control group of the experiment. The second group consisted of 9 individual students who used the social bookmarking system to search for and share Web resources. Students from both groups were asked to spend 30 minutes to search for relevant and useful Web resources in a topic. During this period, they were not allowed to communicate, so as to demonstrate the collaboration effect of social bookmarking. In the experiment, they were asked to search for resources about "information literacy". The obtained Web resources were then evaluated quantitatively and qualitatively. Quantitatively, we measured the number of Web resources found by each student, and the number of Web resource tagged by each subject. Qualitatively, we invited human experts to assess different aspects of each of the Web resource found by the students. Note that the human experts did not know the students from whom the Web resources originate. Each human expert is required to complete the following survey for each Web resource. Some questions of the survey are referenced to [2,9]. For each of the questions, a 5-point rating is used to score the resource, where point 1 refers to the most disagree and 5 refers to the most agree.

- Q1: The resource is relevant to the topic.
- Q2: The resource is trustworthy (e.g., the resource is published in an authority Web site, journals)
- Q3: The resource is authoritative (e.g., the resource is published with names of authors, contain list of references)
- Q4: The resource is accurate (e.g., the resource does not contain incorrect information)
- Q5: The resource is unbiased (e.g., the resource does not have related advertisement)
- Q6: The resource is informative (e.g., contain advanced knowledge, analysis)

[1] We employ the open-source social bookmarking system *scuttle*, which can be obtained in *http://sourceforge.net/projects/scuttle/*.

Q7: The resource is well-organized (e.g., the resource is easy to follow.)

The questions of the survey were provided to student as assessment rubrics to the Web resources acquired.

3. Results and Discussion

Table I shows the statistics obtained from the experiments. We have conducted statistically hypothesis testing, specifically, paired t-test, to evaluate the following hypothesis.

Hypothesis: There is no improvement in the quality of the acquired Web resources via using social bookmarking.

For Q1 of our survey, the average points of the experimental group and the control group were 4.46 and 4.25 respectively. It could be observed both experimental group and control group could acquire relevant Web resources for a particular topic. However, the points of the experimental group were significantly higher than those of control group from Q2 to Q7. It showed that using social bookmarking systems could improve the quality of the Web resources. The major reason was that students could collaboratively search for good Web resources, and share them via tagging. Students could give meaningful descriptive tags the Web resources, which were considered to be in high quality by the students. On the contrary, the students in control group could only search for Web resources individually without any collaboration and communication, and hence good resources could not be shared.

Table I. Statistics of the experimental group and control group

	Experiment Group		Control Group	
Question	Mean	S.D.	Mean	S.D.
Q1	4.46	0.65	4.25	0.64
Q2	3.86*	0.99	3.47	0.94
Q3	3.80*	0.95	3.40	0.88
Q4	4.09**	0.77	3.66	0.73
Q5	4.17*	0.65	3.77	0.90
Q6	4.14*	0.83	3.66	0.82
Q7	4.09**	0.81	3.66	0.87

*$p < .05$, **$p < .01$

The experimental group and the control group obtained a total of 26 and 39 different Web resources respectively. The average numbers of different Web resources acquired by each student in the experimental group and the control group were 2.88 and 3.54 respectively. Experimental group obtained less but better quality set of different Web resources because students could read the shared resources via the social bookmarking system. For the control group, students obtained a more diversified Web resources, but the average quality was less satisfactory. This illustrated that students using social bookmarking obtained a more focused set of good resources. This is particularly useful if students are asked to have group discussion during classes after studying these resources because they have a better common ground for discussion. In light of this, social bookmarking can be effective for after-school learning. Students can access the social bookmarking system via the Internet and collaboratively search for Web resources. After-school learning activities can be carefully designed so that students can leverage

social bookmarking to receive useful information and knowledge. For examples, tasks of searching for resources of a particular topic can be designed as after-school learning activities for students. Such tasks can help students obtain additional information and deep knowledge outside classes.

4. Conclusions

This study conducted an experiment to investigate the use of social bookmarking to acquire quality Web resources. The results indicated that the students can obtained a more focused and better set of Web resources in terms of different dimensions such as relevance, trustworthiness, etc. The findings suggest that social bookmarking can be effective for after-school learning. Particularly, social bookmarking can be integrated into project-based learning or inquiry-based learning. Project-based learning aims at engaging students investigating and tackling challenging problems. The objective of inquiry-based learning is to construct knowledge via generating, investigating and answering questions. Social bookmarking can help students obtain good resources in a collaboratively to analyze the problems and make decision, facilitating project-based learning and inquiry-based learning.

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References

[1] Metzger, M. J., Flanagin, A. J., & Zwarun, L. (2003). College student Web use, perceptions of information credibility, and verification behavior. *Computers & Education*, 41 (3), 271-290.
[2] Kubiszewski, I., Noordewier, T., & Costanza, R. (2011). Perceived credibility of Internet encyclopedias. *Computers & Education*, 56 (3), 659-667.
[3] Lee, Y.-J. (2005). VisSearch: A collaborative Web searching environment. *Computers & Education*, 44 (4), 423–439.
[4] Mangina, E., & Kilbride, J. (2008). Evaluation of keyphrase extraction algorithm and tiling process for a document/resource recommender within E-learning environments. *Computers & Education*, 50 (3), 807-820.
[5] Huang, S.-L., & Yang, C.-W. (2009). Designing a semantic bliki system to support different types of knowledge and adaptive learning. *Computers & Education*, 53 (3), 701-712.
[6] Durlak, J.A., & Weissberg, R.P. (2007). *The impact of after-school programs that promote personal and social skills*. Chicao IL: CASEL.
[7] Kong, S. C. (2008). A curriculum framework for implementing information technology in school education to foster information literacy. *Computers & Education*, 51 (1), 129-141.
[8] Kong, S. C., & Li, K. M. (2009). Collaboration between school and parents to foster information literacy: Learning in the information society. *Computers & Education*, 52 (2), 275-282.
[9] Brandt, S. D. (1996). Evaluating information on the Internet. *Computers in Libraries*, 16 (5), 44-46.
[10] Barnes, S. B. (2003). *Computer-mediated communication: Human-to-human communication across the Internet*. Boston, MA: Allyn and Bacon.
[11] Berge, Z., & Collins, M. (1995). Computer-mediated scholarly discussion groups. *Computers & Education*, 24 (3), 183-189.
[12] Cavus, N., Bicen, H., & Uzunboylu, H. (2011). The efficient virtual learning environment: A case study of web 2.0 tools and Windows live spaces. *Computers & Education*, 56 (3), 720-726.
[13] Cole, M. (2009). Using Wiki technology to support student engagement: Lessons from the trenches. *Computers & Education*, 52 (1), 141-146.
[14] Hrastinski, S. (2009). A theory of online learning as online participation. *Computers & Education*, 52 (1), 78-82.