Wikis and Collaborative Learning

YUN-KE CHANG, ykchang@ntu.edu.sg
School of Communication and Information, Nanyang Technological University

MIGUEL ANGEL MORALES-ARROYO, osornoyk@yahoo.com
IIMAS, UNAM

HLA THAN, mahlathan@gmail.com
ZARCHI TUN, zarchitun@gmail.com
ZHUJUN WANG, wang0656@e.ntu.edu.sg
School of Communication and Information, Nanyang Technological University

ABSTRACT

Wikis have been used as a supporting tool for students' learning and collaboration. Tasks such as collaborative writing, joined glossaries creation, document discussion and review, group projects, reflection journals and others have been tried out using wikis as a facilitating tool (Ben-Zvi, 2007). However, few studies have reported how students actually perceive some well-claimed benefits. This study investigated the perception of learning activities facilitated by wiki, and the effectiveness of several roles wiki might play in constructive and collaborative learning. This study tried to answer the following questions. How do students perceive a wiki as a learning tool? How does a wiki support constructive learning skills? How does a wiki support student's collaborative learning skills? How does collaboration in wiki facilitate students' content learning and project work? The study was conducted using a survey method to examine the perception of wiki usage and collaborative and constructive learning. In the reported study, a questionnaire was used to collect data from 92 students in higher education. The results suggest that using wikis were perceived to enhance collaborative knowledge building among students, but it did not contribute much to learning the subject matters although students were more involved in the learning process than with conventional teaching methods. In another word, it indicates that students may not obtain better return of investment on the time spent in using wiki as a learning tool. While wiki did contribute to enrich the learning experience, further study is needed to investigate how to link learning process with learning outcome using this type of collaboration tools.

Keywords: Knowledge sharing; Collaborative learning; Constructivist learning; Wikis; Web 2.0.

INTRODUCTION

Wiki means "quick" or "informal" in the Hawaiian language. Wikis are popular web sites that allow users to create, publish and share web contents without much programming skills. User can link keywords within a document to existing or new documents, which allows the growth of wiki pages, while editing privileges may also be extended to all users or restricted to selected users to the wiki sites. Moreover, Wikis have been reported as a supporting tool for students' learning and collaboration. Tasks such as collaborative writing, joined glossaries creation, document discussion and review, group projects, reflection journals and others have been tried out using wikis as a facilitating tool (Ben-Zvi, 2007). However, few studies have reported how students actually perceive those well-claimed benefits.

As higher education has been experiencing various new Web 2.0 applications to facilitate deeper learning, wikis have been one of the most appraised tools for collaborative learning. Students can use a wiki to support individual learning (e.g. using online encyclopaedia) or to contribute to the learning of others. In the context of learning activities, wikis can be used as an ideal tool that promotes cooperation among students to accomplish a specific task or an assignment (Johnson and Johnson, 1994). Moreover, Wikis was thought to be a great tool for facilitating group learning by supporting information dissemination and idea exchange, facilitating communication, encouraging generating documents of the shared knowledge of the learning group (Augar et al, 2004). It was also reported that wikis can promote cooperation rather than competition (De Pedro et al, 2006).

Like other social networking software, wikis offer new ways for students to interact with their classmates and the wider world (Bryant, 2006). The functions of wikis are capable to promote knowledge sharing and collaborative knowledge construction with the educational environments (Fuchs-Kitowk & Kohler, 2002; Raman et al. 2005).One of the main advantages of

wikis is that they allow students both interaction and simultaneous working on the joint outcomes.

However, many studies stated that interaction in wikis was a very narrow way. For example, Bold (2006) points out that the use of wikis does not improve discussion more than the threaded discussions like blackboard. Reman et al (2005) conducted a case study to investigate the use of wiki as an tool for knowledge sharing and creation in an academic environment. They used TikiWiki, an open source product, as a knowledge management tool. While expecting wiki as a effective tool for creating and extracting knowledge relevant to the class, they found that wiki demonstrated very limited capacity of facilitating collaborative knowledge creation and sharing. Engstrom & Jewett (2005) studied whether wiki could facilitate a large school project. They claimed that although wiki was good for posting information, it did not effectively support sharing information and exchanging ideas.

While most previous studies were conducted from the point of views of instructors, in the reported study, we investigated students' perceptions and experience of using wiki as a supporting tool in their learing process. Figure 1 shows the research framework used to answer the following questions.

- How do students perceive a wiki as a learning tool?
- How does a wiki support constructive learning skills?
- How does a wiki support student's collaborative learning skills?
- How does collaboration in wiki facilitate students' content learning and project work?
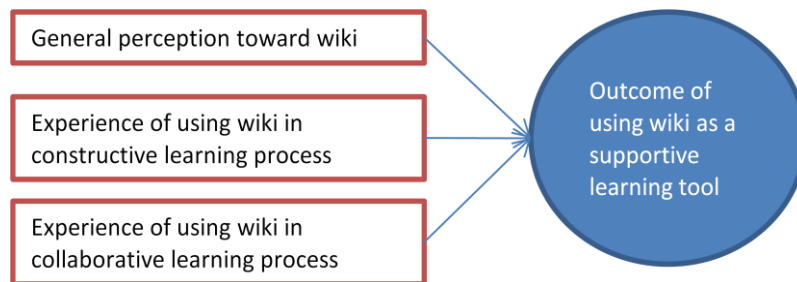
Figure1: Students' perception of wiki on perceived learning outcome

LITERACTURE REVIEW

In this section, we will present some key concepts of constructive learning and collaborative learning. Together, they provided key items to guide our investigation on the inclusion of wikis in classrooms.

Collaborative Learning

According to Johnson, Johnson, and Smith (1998), there are five fundamental elements that are necessary to construct a successful collaborative learning experience. They are Positive Interdependence, Promotive Interaction, Individual and Group Accountability, Interpersonal and Small Group skills, and Group Processing. These were reviewed to guide our investigation on Wikis' impact on the process of learning.

Positive interdependence exists when group members shares a common goal, (Johnson, Johnson, & Smith, 1998). The success of an individual is affected by the success of the group. Positive interdependence includes sharing resources, role and task, and these are overlapping each other's (Johnson & Johnson, 1996). Wiki technology is able to support this aspect of collaborative learning by making it possible for individual to participate towards the accomplishment of common goals, such as composing a team paper.

Promotive interaction exists when group members work together to promote each other's success. That means students can support, encourage, and facilitate each others to achieve their goals when they are doing the school works (Johnson, Johnson, & Smith, 1998). Wiki is

able to support the visibility of everyone's contribution. Students can compare their work with the work of others. In this way, they can correct their mistake, and learn new ideas from better groups. The feedback of instructor can also motivate individuals to contribute to the group work.

Individual and group accountability is required when the performance of individual member and overall performance of the group are assessed. It exists when the results are given back to individual and the group to compare against the standard of performance, and when an individual takes responsibility his/her fair share of work that are assessed individually (Johnson & Johnson, 1996). Wiki can facilitate the group assessment, and make more transparent the quantity and quality of each group member's contribution. That also makes it possible to check some common problems of group work such as some students attempt to dominate group work, or others attempt to get a free ride.

In cooperative learning, interpersonal and small group skills are required so that the group members can work effectively with each other and function as a team. The greater the teamwork skills, including communicating, supporting and resolving conflicts with each other, the higher the quality and quantity of learning will be achieved (Johnson, Johnson, & Smith, 1998). One advantage of wiki technology is making communication within the group easier.

Group processing required when group members discuss how they are achieving their goals and maintaining effective working relationships within the members, (Johnson & Johnson, 1996). Group processing is important for maintaining good working relationship and providing feedback to each other (Johnson, Johnson, & Smith, 1998). In this aspect, wiki enables group memebers to provide prompt response and feedback to each others. Moreover, wiki provides students self-monitoring facility by keeping track of revision history.

Constructivist Learning

Since the concept of collaborative learning has its root on constructivism in learning, features of constructivist learning were also examined in this study. The main characteristics include *critically thinking*, *reflecting*, and *using the knowledge* as well as *knowledge creation* (Tynjal, 1998). Moreover, the process of constructive learning involves *making connections between existing experiences and new experiences*, *sharing ideas*, *negotiating problems and discussing solutions* (Willis, Stephens, and Matthew, 1996).

In recent years, wikis have become the interesting tools in education because wikis' features and activities approach from a variety of perspectives to constructivist online learning environments including reflective learning and collaborative learning. "Reflective learning enables students to reflect upon their learning and to understand their own learning process" (Parker & Chao, 2007, P59). As wikis allow students to participate in collaboratively building resources, students can reflect upon their learning. It may also help them to quickly develop their understanding on learning objects. In addition, the features of wiki such as low technical barriers, rich and flexible functionality make available the opportunity to offer collaborative learning and constructive learning more extensively in education.

METHODOLOGY

The study was conducted in November 2010 with a survey method using a questionnaire to examine the perception of wiki use and collaborative and constructive learning. Students were recruited from two graduate LIS courses to participate in this survey. These two courses were ideal choices because wiki was heavily used in these courses for students' collaborative learning. 29 questions were used to get students opinions in four areas: perceptions of wiki in learning, perception of constructive learning in wiki, perception of collaboration in Wiki, Wiki experience in the course. Other demographic information including age, gender, nationality, prior experiences with wiki and so on were also collected. Yes/No questions and the multiple choice questions were applied to demographic questions. The remaining parts of the questionnaire used 5-point Likert scale. Statistics analysis was conducted to provide descriptive information and co-relations between perceptions of wiki activities and learning outcome.

106 students participated in the survey. After excluding the imcompleted data, we analyzed data collected from 92 respondents. Table 1 shows the age composition of the participants. There were 48 (52.2%) full-time students, and 44 (47.8%) part-time students.

Table 1: Frequency and Percentage of participants' age

Age	Number of participants
20-24	19(20.7%)
25-39	39 (42.4%)
30-34	23(25.0%)
35-39	5(5.4%)
>=40	6 (6.5%)

RESULTS

According to the survey result, over two-third (80.4%) of students prefered working in a group when they were studying to complete their assignments. In terms of activities involving using wiki include, 62% of the participants reported "conducting group discussion", followed by 46.7% "compose group's paper", 46.7% "review other's work", 40.2% "generate glossary related to the course, and 37% "receive feedback from fellow classmate". In addition to these main purposes, 6.5% participants presented other purposes, including reflection, posting entries related to what's being taught in class, information sharing, and project management, consulating the answers and course assignment.

Perception of Wiki in Learning

Table 2 shows the participant's views on using the wiki in learning in general. Overall there was a positive attitude toward using wiki. It seems a good platform to collaborate as a learning environment. However, while the nature of wiki is fully editable, which can empower the user with a sense of ownership and authority, wiki was not perceived to have attractive features or unique design that make learning activites more enjoyable.

Perception of Wiki in Constructive Learning

Table 3 shows student's perception of wiki in terms of constructive learning characteristics. Again, positive perception is prevailing in all items related to constructive learning process.

Table 2: Participants' views on using the wiki in learning

	Question	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
1	Wiki is an ideal supporting tool for learning.	0 (0.0%)	3 (3.3%)	16 (17.4%)	65 (70.7%)	8 (8.7%)	92
2	Wiki promotes learning both inside and outside of classroom.	2 (2.2%)	1 (1.1%)	22 (23.9%)	59 (64.1%)	8 (8.7%)	92
.	Wiki is a useful tool to organize group knowledge.	0 (0.0%)	2 (2.2%)	17 (18.5%)	64 (69.6%)	9 (9.8%)	92
4	Wiki facilitates document distribution.	0 (0.0%)	6 (6.5%)	31 (33.7%)	49 (53.3%)	6 (6.5%)	92
5	Wiki allows people to express themselves freely	2 (2.2%)	5 (5.4%)	30 (32.6%)	51 (55.4%)	4 (4.3%)	92
6	It is easy for me to participate in learning activities that involves using wiki.	1 (1.1%)	1 (1.1%)	32 (34.8%)	53 (57.6%)	5 (5.4%)	92
7	It is enjoyable for me to participate in learning activities that involves using wiki.	1 (1.1%)	9 (9.8%)	42 (45.7%)	37 (40.2%)	3 (3.3%)	92
	Wiki is not a place to write.	6 (6.5%)	42 (45.7%)	31 (33.7%)	11 (12.0%)	2 (2.2%)	92

Table 3: Participants' views on using wiki in constructive Learning

	Question	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
1	The construction of knowledge in wiki facilitates my understanding of course contents.	2 (2.2%)	5 (5.4%)	32 (34.8%)	52 (56.5%)	1 (1.1%)	92
2	Wiki encourages all group members to contribute in the construction of knowledge.	0 (0.0%)	7 (7.6%)	26 (28.3%)	55 (59.8%)	55 (59.8%)	92
3	Wiki enables me to integrate my new ideas with prior knowledge.	1 (1.1%)	4 (4.3%)	35 (38.0%)	49 (53.3%)	3 (3.3%)	92
4	Wiki helps me to reflect other students' ideas posting on wiki page.	0 (0.0%)	3 (3.3%)	19 (20.7%)	66 (71.7%)	4 (4.3%)	92
5	Wiki helps me think critically about other students' ideas.	0 (0.0%)	0 (0.0%)	42 (45.7%)	43 (46.7%)	7 (7.6%)	92
6	Wiki helps me to share the acquired knowledge with my classmates.	0 (0.0%)	0 (0.0%)	18 (19.6%)	67 (72.8%)	7 (7.6%)	92
7	Wiki is useful for me to respond to other students' opinions about my work.	0 (0.0%)	4 (4.3%)	31 (33.7%)	56 (60.9%)	1 (1.1%)	92

Perception of Wiki in Collaborative Learning

Table 4 shows the student's perception of wiki in terms of collaborative learning characteristics. Among other functions, wiki plays a less important role in helping to resolve conflict among team members.

Table 4: Participants' views on using the wiki in Collaborative Learning

	Question	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
1	Wiki is very helpful in our group's collaborative writing.	2 (2.2%)	7 (7.6%)	34 (37.0%)	43 (46.7%)	6 (6.5%)	92
2	Wiki is very useful for me to communicate with my group members.	2 (2.2%)	10 (10.9%)	35 (38.0%)	41 (44.6%)	4 (4.3%)	92
3	Collaboration in wiki helps me to acquire knowledge that would not be obtained alone.	0 (0.0%)	4 (4.3%)	21 (22.8%)	61 (66.3%)	6 (6.5%)	92
4	Collaboration in Wiki facilitates our team members to support each other.	0 (0.0%)	3 (3.3%)	29 (31.5%)	56 (60.9%)	4 (4.3%)	92
5	Collaboration in wiki helps our team members to resolve conflicts with each other.	2 (2.2%)	12 (13.0%)	48 (52.2%)	29 (31.5%)	1 (1.1%)	92
6	Collaboration in Wiki helps me to assess the progress of my group's work.	2 (2.2%)	4 (4.3%)	31 (33.7%)	52 (56.5%)	3 (3.3%)	92
7	Collaboration in Wiki promotes accountability among my group members.	3 (3.3%)	6 (6.5%)	30 (32.6%)	45 (48.9%)	8 (8.7%)	92

Perception of Wiki in Learning Outcome

Table 5 shows the results of survey regarding student's perception of how helpful wiki was to their learning behavior and outcome. Overall, students' perception of wiki experience in their respective courses was positive, and the majority of the students perceive that collaboration in wiki activities facilitated their content learning, and it was beneficial for their learning. However, more students held neutral attitude, comparing to their perception to the learning process as presented at the above sections.

Correlations between Perceptions of Learning Process and Learning Outcome

Person's correlation coefficient was used to address the degree of correlation between students' perception of wiki in learning activities and their experience in the courses(Table 6), between students' perception of constructive learning and their experiences in the courses (Table 7), and between student's perception of collaborative learning and their experiences in the courses (Table 8). The level of significance is set up at $p < 0.005$. There are many different ways to interpret correlation coefficients; however, we adopted Pallan't guidelines. Pallant (2007) suggested that a correlation between 0.10 and 0.29 is typically considered "weak", a correlation between 0.30 and 0.49 is considered to be "moderate", and a correlation between 0.50 and 1.00 is considered to be a strong correlation.

     Based on Pallant's suggestion, among pairs of variables, there were strong correlation between QII8 and QV7 (r=0.50), QIV5 and QV3 (r=0.54), QIV6 and QV1 (r=0.50), QIV7 and QV1 (r=0.50). Thus, the results suggested students who thought wiki was not a place to write tended to perceive that participating in wikis' activities were wasting their time, those who perceived collaboration in wiki helped their team members to resolve conflicts with each other tend to perceive that using wiki in the course helped them to be better thinkers, and those who believed that wiki provides access to the progress of group work and thoses who thought that wiki promoted individual accountability tended to perceive wiki activities helped to meet their learning needs.

Table 5: Frequency and Percentage of st*udents'* satisfaction in terms of wiki experience

	Question	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
1	Wiki activities involved in this course meet my needs as a learner.	0 (0.0%)	2 (2.2%)	34 (37.0%)	55 (59.8%)	1 (1.1%)	92
2	Wiki activities involved in this course help me to be a more effective learner.	1 (1.1%)	3 (3.3%)	39 (42.4%)	45 (48.9%)	4 (4.3%)	92
3	Wiki activities involved in this course help me to be a better thinker.	1 (1.1%)	11 (12.0%)	44 (47.8%)	33 (35.9%)	3 (3.3%)	92
4	Wiki activities involved in this course help me learn the subject matters more efficiently.	0 (0.0%)	4 (4.3%)	44 (47.8%)	41 (44.6%)	3 (3.3%)	92
5	Wiki activities involved in this course do not give good result.	2 (2.2%)	24 (26.1%)	49 (53.3%)	16 (17.4%)	1 (1.1%)	92
6	Wiki is helpful to complete my group project in this course satisfactorily.	0 (0.0%)	7 (7.6%)	40 (43.5%)	42 (45.7%)	3 (3.3%)	92
7	Contribution in wiki page in this course is wasting time.	9 (9.8%)	41 (44.6%)	26 (28.3%)	13 (14.1%)	3 (3.3%)	92

Table 6: Correlation between student's perception of wiki in learning activities and their experiences in courses

Question	QV1	QV2	QV3	QV4	QV5	QV6	QV7
QII1	0.30	0.40	0.33	0.35	-0.16	0.14	-0.19
QII2	0.17	0.30	0.23	0.30	-0.15	0.26	-0.33
QII3	0.24	0.19	0.20	0.22	-0.11	0.17	-0.14
QII4	0.39	0.25	0.21	0.35	0.04	0.24	-0.13
QII5	0.18	0.36	0.23	0.04	-0.13	-0.01	-0.18
QII6	0.28	0.34	0.22	0.21	0.10	0.18	-0.16
QII7	0.42	0.31	0.35	0.42	0.07	0.25	-0.14
QII8	-0.27	-0.10	-0.27	-0.25	0.33	-0.10	0.50

Table 7: Correlation between students' perception of wiki in constructive learning and their experiences in courses

Question	QV1	QV2	QV3	QV4	QV5	QV6	QV7
QIII1	0.33	0.39	0.33	0.41	-0.02	0.40	-0.07
QIII2	0.27	0.13	0.11	0.17	0.11	0.30	-0.01
QIII3	0.34	0.36	0.36	0.38	-0.06	0.49	-0.08
QIII4	0.19	0.19	0.10	0.23	-0.13	0.32	-0.24
QIII5	0.19	0.29	0.18	0.29	-0.21	0.27	-0.15
QIII6	0.25	0.18	0.14	0.17	0.02	0.25	-0.08
QIII7	0.19	0.18	0.19	0.20	0.00	0.19	-0.03

Table 8: Correlation between students' perception of wiki in collaborative learning and their experiences in courses

Question	QV1	QV2	QV3	QV4	QV5	QV6	QV7
QIV1	0.38	0.39	0.40	0.28	0.01	0.30	-0.01
QIV2	0.43	0.38	0.32	0.35	0.12	0.40	0.00
QIV3	0.30	0.45	0.26	0.32	-0.06	0.46	-0.29
QIV4	0.47	0.32	0.32	0.24	0.02	0.46	-0.12
QIV5	0.37	0.35	0.54	0.42	-0.03	0.33	-0.04
QIV6	0.54	0.41	0.33	0.32	0.03	0.39	-0.11
QIV7	0.56	0.43	0.22	0.40	0.14	0.43	-0.02

Further analysis were also conducted to compare students of different study preference and status. The results of Chi-Aquare tests indicate that, in terms of Wiki Experience in a course, there is no difference between part-time and full-time students, and no difference between students who prefer working in groups and those who prefer working individually.

DISCUSSION AND CONCLUSION

Finding from this study suggests that the overall experiences of the participants regarding to the wikis use was positive. Wiki supported students in collaborative learning as well as being perceived as supportive tool during studying process. Using wiki tool certainly made communication and contribution more easily for users to participate in collaborative learning activities. Moreover, most of the participants found that wiki was easy to use to some extent, and it helped to develop students' abilities in connecting new knowledge with their personal experience in online learning environment.

This preliminary study was reflected from the perception of constructive and collaborative learning in wiki that it provides a unique learning environment to facilitate participation and to enhance learning during the learning process. In addition, wiki provides a platform for any individual learners to work alone or work in group, with the help of the complete editing record, and it formed a platform for all the community users in the wiki environment to interact with each other and to learn from each other. Many of the wiki-based activities presented above can be used as formal and informal opportunities for student assessment, self-reflection, and feedback to the instructor. This article, provides better understanding of wiki's potential to support

collaborative learning, and the results have shed some light on how to realize that the potential while considering different teaching or learning goals. Thie results may aid appropriate uses of wiki to improve students' learning experience. However it is still unknown how well students use wikis as collaborative learning tools without emperical data. Future study should also consider comparing different platforms to understand the essential characteristics of Web 2.0 tool in supporting collaborative learning and constructive learning activities.

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