INFORMATION SYSTEMS EDUCATION JOURNAL

In this issue:

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ISEDJ is published online (http://isedjorg) in connection with ISECON, the Information Systems Education Conference, which is also double-blind peer reviewed. Our sister publication, the Proceedings of ISECON (http://isecon.org) features all papers, panels, workshops, and presentations from the conference.

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Editors

Wiki Mass Authoring for Experiential Learning: A Case Study

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Abstract

Web 2.0 services include sharing and collaborative technologies such as blogs, social networking sites, online office productivity tools, and wikis. Wikis are increasingly used for the design and implementation of pedagogy, for example to facilitate experiential learning. A U.S. government-funded project for system security risk assessment was conducted using a wiki powered by MediaWiki. Participants were geographically disbursed students, faculty, and industry partners with highly diverse backgrounds and expertise. The focus of this research was the experiential learning practiced by students carrying out the work of the project. Through the use of a wiki as a mass authoring tool, students constructed knowledge in the form of an annotated bibliography of extant systems security literature. Results from a student survey offered convincing support for the use of the wiki's influence on students' experiential learning, particularly through the benefit of observation and reflection, as well as the motivational influence of social norms. Lessons learned and possible extensions of the approach described in this study to other educational settings are discussed.

Keywords: wiki, experiential learning, mass authoring, social norms

1. INTRODUCTION

The proverb, "experience is the best teacher" has been reincarnated in multiple forms by various authors since Julius Caesar (52 B.C.) recorded the earliest known version; "experience is the teacher of all things." The idea that one's experiences can be incorporated into a formal educational approach is the foundation for experiential learning theory (Kolb, 1984). The professional baseball player Vernon Law (n.d.), with his humorous rewording of the proverb as, "experience is a hard teacher because she gives the test first, the lesson afterwards" reinforces the idea that a feedback loop is an integral part of the experiential learning process. A problem faced by educators seeking to incorporate experiential learning into classroom activities is a lack of tools to support their inclusion; however, the introduction and use of Web 2.0 technologies has opened new avenues of instruction which were previously unavailable. New pedagogical

models founded on experimental learning theory and supported by
Web 2.0 mass-authoring and social-networking tools have emerged (Huang and Behara, 2007). Web 2.0, a term coined as a result of a brainstorming session between O'Reilly and MediaLive International, encompasses the use of World Wide Web technologies which seek to improve web users' creativity, collaboration and sharing, and communications. The underlying core competencies listed on O'Reilly's Web 2.0 Meme Map include "services, not packaged software; architectures of participation; cost-effective scalability; remixable data source and data transformations; software above the level of a single device; and harnessing collective intelligence" (O'Reilly, 2005). These competencies represent the common features and characteristics of Web 2.0 web services and technologies.

Web 2.0 services and technologies include web logs (blogs), video-sharing and social networking sites, online productivity applications, and wikis. One of the most widely used of these Web 2.0 technologies is the wiki-- a web site designed to create a collaborative working environment or knowledge management community.

The remainder of this paper is organized in the following manner. First, we provide a brief literature review on the use of wikis in education and experiential learning theory. Next, a case study of a United States (U.S.) government-funded project for system security risk assessment is described where mass authoring was conducted through the use of a wiki. The results of a survey of student participants are described and discussed. Finally, we discuss the lessons learned and possible extensions to the approach used on this project.

2. BACKGROUND

The use of wiki technology as a teaching tool is well documented in the literature (Bergin, 2002; Bower et al, 2006; Konieczny, 2007; Parker and Chao, 2007).The first published use of wiki technology in education was the CoWeb wiki built in 1997 by researchers at the Georgia Institute of Technology (Leuf and Cunningham, 2007). This wiki became a standard part of course delivery at Georgia Tech and has been adopted by many other universities. The adoption of wikis in education has grown

dramatically since 1997 if the number of publications related to wiki technology in education is a valid indicator. A Google Scholar search of the terms "wiki education" returned 83 results for the year 1997 and 15,400 results for 2009 (see Figure 1). For a sample of recent publications, see (Banks et al, 2010; Chidanandan, 2010; Every et al, 2010; Hastie et al, 2010; Meishar-Tal and Gorsky, 2010; O'Connor, 2010; Walsh, 2010).
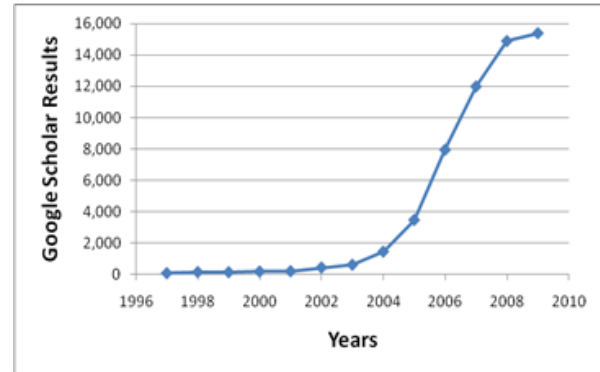
Figure 1. Google Scholar Results for "wiki education"

Because of the wiki's wide, transparent, and easy access (Leuf and Cunningham 2001), experiential learning theory is an excellent theory to explore the benefits of the wiki as a facilitator of learning. Kolb (1984, pp. 41) defines learning as, "the process whereby knowledge is created through the transformation of experience." This transformative experience view of learning is likewise supported by Kaagan (1999). Kolb (1984) derived his experiential learning concepts from the learning models developed by Lewin, Dewey, and Piaget.

Experiential learning is learner-centered, relying on learning from experience, rather than teacher-centered, emphasizing content delivery. Furthermore, experiential learning involves tangible learning activites as opposed to merely abstracted knowledge exposure (Pimentel, 1999). Learner-centered teaching emphasizes a coach-facilitator role for the professor, rather than information giver, and emphasizes learning from mistakes rather than assessment of right and wrong answers (Saulnier et al, 2008). The learner-centered paradigm is important for IS education for a variety of reasons (Landry et al, 2008). Most notably, the current project's use of learner-centered, that is, experiential learning, should

develop the students' learning-related skills important to the dynamic IT profession. These skills include technology evaluation, innovation adoption, and lifelong learning.

3. CASE STUDY: MASS AUTHORING AN ANNOTATED BIBLIOGRAPHY

The U.S. government-funded system security risk assessment project used a wiki, loosely referred to as "the project wiki" as a basic Intranet-based project portal. The wiki served as an information repository for the project team and sponsor, featuring the project solicitation, proposal, plan, team directory, and other content. This case study describes the use of the project wiki for creating a mass authored annotated bibliography. The case illustrates how the wiki supported an approach that used experiential learning concepts. Each of four subsections of the case contrasts the collaborative, wiki-based experiential approach to an issue with a more traditional educational approach considered. A fifth subsection summarizes the major contrasts in the educational approach used. Perceptions and interpretations of the faculty participants (co-authors) are interspersed with feedback from a student survey given at the end of the project.

Working with students—group collaboration vs. independent research

Once the university was awarded the government systems security risk assessment project, the project's principle investigator (PI), who also serves as dean of one of the university's colleges, assembled a team of three faculty members, all professors of various ranks, for a meeting. The PI wanted to get a fast start on the first of several project phases. The goal of this phase was to develop an annotated bibliography of literature relevant to the project. The bibliography the group was to assemble dealt with government systems security, and consisted of publication sources that included government reports, scholarly articles and books, newspaper articles, and political activist web sites. The government agency sponsoring the contract agreed to fund a team of ten students to work on the project. Although the PI was pleased with the resources obtained and opportunities for students, the three professors had reservations about managing so many students on a project with such a large scope. Their main concerns were with the amount of time required to train and

oversee the mixture of undergraduate and graduate students with varied backgrounds, and whether these students were capable of meeting the quality demands of the sponsor.

The mental model used by the professors was one of mentored, independent research. Such a formal approach, used in dissertations, theses, directed study projects, and term papers, features heavy guidance and control by a professor as authority with a view towards creating an independent researcher producing high quality work. The student is responsible for the whole project, but progresses under close scrutiny by the professor. No work is released for public consumption unless the very high quality standards set by the professor are met, and the student has to rigorously defend every decision made. Mentored research had required a large commitment on the parts of both the professor and student.

The PI had a more collaborative approach in mind, and suggested a different kind of mentoring approach, using a wiki for support. There were more students than professors, so a one-on-one mentoring model would be too time-consuming for professors, and there was insufficient time to conduct multiple interdependent projects and then integrate them into a coherent whole. The PI suggested a less formal, more collaborative, relationship among professors and students. He viewed the students as co-collaborators that could be quickly trained and would help out in various ways as needed, but not necessarily equally in effort or result.

The professors were unsure if enough qualified students could be found to fit into such a collaborative model, and if a minimal training approach would adequately prepare students for the task. The professors left the meeting apprehensive, but proceeded with the task of recruiting students. The professors recruited students from late afternoon classes for ten-minute interviews, and in just over two hours, ten students were successfully selected.

Training student annotators—experiential learning vs. structured guidance

The initial project goal was to complete a detailed literature search that would provide the foundation for all further project activities. The PI thought that an annotated bibliography consisting of about 200 entries would be more

than adequate. The schedule goal was an ambitious three weeks. The PI was already familiar with what articles needed to be annotated, and he called on a team of colleagues to generate a list of articles. One of the professors took charge of this phase of the project, and was encouraged to use one of the students to post to the list of articles and perform additional keyword searches to find more. A professor selected an experienced graduate student for this task and began directing him.

As for writing the annotations on the articles, the PI suggested that any of the remaining students could accomplish the work with little guidance. The PI suggested a training approach in which the professors and students would separately write an annotation for the same article, and compare results. The students would compare their annotation to the professor's and vice-versa. The professors would give helpful feedback, and if necessary, repeat the process on a second article. The combination of experience and observation and reflection—the first two stages of the experiential learning model, would guide the students in the learning process.

Still unsure of whether this could be accomplished expeditiously with the whole group, the professors decided to put this approach into practice, using a group training session. Although the wiki could have been used at this point, the large, face-to-face meeting provided a richer context for group *forming* (Tuckman and Jensen, 1977), in which groups are initiated and introduced. A distinct forming stage is even more important for virtual groups who potentially will complete much of the work using lean technologies. At the training session, held the following day, the professors followed the PI's advice and kept the project overview brief. One professor gave an explanation of the main goals of the project and how to write an annotation. Another professor distributed a 12-page seminal article and assigned each person in the group, including the professors, the task of reading the article, then writing a 100-200 word annotation that covered key points of the reading while emphasizing its importance to the project. The guidance was to make evaluative comments in addition to writing an objective, abstract-like summary. Following the collaborative approach, the students were instructed to learn by doing. Some of the annotators worked in

the training room, but most left and then sporadically returned until all had reassembled. Copies of each annotation were distributed to all participants. It was important to observe the performance of the others in the group, as an additional source of experiential learning.

Having received all of the annotations, the professors sought to provide the students with feedback. One of the professors read and assessed the annotations submitted by the students. He provided summary feedback, specific guidance on how to write the remaining bibliographic entries, and remarks intended to provide encouragement. The professor pointed out examples of phrases thought to be good evaluative comments by quoting from the articles, and encouraged everyone to write similar comments. The professor then fielded questions. In less than 90 minutes, the professors had trained—in an experiential, collaborative manner—all ten students.

The professors wrote a half-page of guidance for the group, based on what was learned from the meeting, and posted this guidance on the wiki. The guidance included the one-hour approximate time to complete one annotation, the encouragement to write evaluative comments, the instruction to write 5-10 keywords to describe the reading, and the suggestion of using their own judgment to add any cited readings to the bibliography. The students were guided by their own experience, by observing others, and finally, by informal and formal feedback given to the group. The students did not receive individual feedback, nor were they "graded" individually, as students would be in a traditional classroom environment. The written guidance posted on the wiki would end up being detailed and structured, but the structure and detail came as a result of experiential learning and was written after the shared experience, not before.

The professors were more encouraged, but not sure what to expect when they assigned students the articles, books, technical papers, and political activist content to be annotated. The students would be self-managing their time and work, and using the project wiki.

Posting to the wiki—autonomy vs. authority

After the training session, the students and professors were assigned articles whose

citations had been posted on the wiki. Each person was assigned four or five articles at a time, and given more after completing their current batch. The professors questioned whether the annotators should post articles directly to the wiki, or if the annotators' intermediate work should be reviewed first. Taking advantage of the ease with which the wiki enabled students to post content, and the collaborative approach encouraged both by the PI the students directly posted annotations. One of the professors reviewed and edited annotations as needed, which primarily involved fixing typos. The professor rarely edited content, resisting the tendency to overly control as a formal authority mechanism, and gave the students autonomy. Unfortunately, the students were unable to review each other's entries as well due to time constraints. When the quality of annotations seemed adequate, the reviewing professor found it acceptable to cease reviewing the entries altogether.

The very nature of the wiki as a tool that is easy to use for uploading and tagging web page content, emphasized collective effort without authoritative control. The wiki provided an easy way to upload annotations, and also to support the editorial process with submission and review tasks. See Figure 2 in the appendix.

The wiki allowed the professor to instruct students to upload their work directly rather than e-mailing documents for review. Direct uploading meant more trust and less control, and more efficiency. The wiki also maintains a page edit log with user name, date of change, and summary of change information. If mistakes or corrections were made, the history could be traced or even undone. By keeping track of edits, collective ownership rather than individual ownership of work was encouraged.

The professors considered the quality of the work to be very good. The professor who was the primary contact person for student questions on writing annotations reported that the most common questions asked by students, via e-mail and face-to-face, were about exceptions. For example, several students reported that they had been assigned articles much longer than the practice article. Other students asked about annotating articles that were of a different style, such as an activist web site with links to many articles rather than a single academic article. The professor

reported that these questions were easy to answer, because he had himself experienced the activity, and had seen many examples of what the students could do. The professor, in following an experiential learning paradigm, did not want to give a lot of guidance, but wanted the students to reflect on experience. Invariably, the professor's responses fit the form of "look at so-and-so's example on the wiki for a model of how to do it." The professor also forwarded individual responses to the group for guidance, and thought that the responses might even be something that could be posted to the wiki itself in the guidance section.

Staying on task—virtual vs. proximate

Although the quality of work using the virtual, collaborative model was very good, the quantity was not. The use of the wiki alone was not effective in maintaining a rapid pace of work. Obstacles to learning experienced by students included time pressure and difficulties reading the lengthy articles while keeping the abstract short. As the project was taking place during the academic year, the students and professors were distracted by coursework demands and teaching assignments. Students, consequently, tended to work in sporadic intervals. Mass e-mails were sent out with status updates on the number of articles reviewed ("82 articles have been posted and 66 of them reviewed and tagged") and intermediate goals ("let's reach the 100 mark by Friday—yes we can do it!"). The use of the wiki was also supplemented by face-to-face meetings, which kept the students and professors involved in the ongoing progress of the project, and made them more personally connected. The goal of annotating 200 articles in three weeks was not met, however progress was made. Although status updates and meetings were needed to maintain pace, the use of these tactics was believed to be less than if there were no wiki. In fact, students reported that they were motivated by observing the posted entries of their fellow students.

Mass authoring process—a summary

At each step of the mass authoring process, the professors challenged traditional mindsets, opting for a newer, more collaborative and experiential approach. In working with students, the professors opted for more group collaboration over independent research. In

training student annotators, the professors allowed experiential learning to flourish, while refraining from excessively structured guidance and only then to document the collective learning experience. The process used to post to the wiki granted autonomy that superseded unnecessary authority. Despite the virtual environment of the wiki, the use of proximity was still needed. However, proximity, in the form of meetings, was for connecting with students to keep them on task, and not for task guidance, task delivery, or quality control.

4. STUDENT FEEDBACK

In order to test students' perceptions of the wiki for experiential learning, the authors constructed a 15-item questionnaire, approved for use with human subjects by the university's institutional review board, and administered the questionnaire to the students at the conclusion of the project in March 2010. Eight of the 11 student participants completed the survey, consisting of 12 close-ended and three open-ended items. The close-ended items used a 7-point, disagree-agree scale. See Table 1 in the appendix for a complete summary of the results for closed ended items. The students who completed the survey were all employed on the government-funded project. One was an undergraduate computer science major, another was a recent alumnus of the master's program in information systems, and the others were all currently enrolled in the information systems master's program. There were two females and six males, and seven of eight were international students.

We interpreted the results in terms of the experiential model of learning. See Table 2 in the appendix for a summary. Although these are not intended to be constructs, we wrote and organized the survey items in terms of: *observation, structured guidance, learning appropriations of the wiki, social influence, and obstacles*. *Observation* is the degree to which the wiki facilitated experiential learning by allowing students to observe the work of other students. *Structured guidance* is the degree to which learning came from guidance and feedback from the professors as authorities as opposed to unstructured and experientially from the collaborative use of the wiki. *Learning appropriations of the wiki* is the degree to which wiki features were used by students to support experiential learning. *Social influence* measures whether observations of other student's work

motivated and inspired higher quality outcomes. As the project wiki is not assumed to be a technological "silver bullet," we asked students about o*bstacles*, which measure the influence of difficulties encountered using the wiki on learning outcomes.

From our analysis of the results, only one item appeared to confuse the study participants. Apparently the term "features" in item 6 was confusing because even those that strongly disagreed with the close-ended item 6 supplied an answer to 15. One of the strongly disagreeing (value=1 on item 6) students actually admitted that the "chance to look at the entries done by the other members and could get an idea of writing entries" helped him learn, but said the project "wiki had no specific features of helping us in writing a bibliographic entry." The other strongly disagreeing student stated that posted guidance helped him learn, but that that was not a feature. Both, in fact, are features as intended by the item.

5. DISCUSSION

A major factor in the success of the experiential learning process was that the acquisition and creation of knowledge was social and situational. That is, the wiki enabled the effort to be truly collaborative. By widely dispersing the task assignments, doing very little editing and reviewing, and posting as you go, a collective "intelligence" emerged from appropriating the wiki for experiential learning. The relevance of the literature to the project was a function of the collective efforts, and did not simply feed downward from the PI as project visionary. Through a form of Web 2.0 mass authoring (wiki), the meaning and relevance of each article was implicitly negotiated by members of the social group through cycles of reviews and revisions. Further, the wiki became a social resource or social accumulation of knowledge. An implication is that teachers should embrace and foster a sense of student ownership of the process and results.

The shared experience was useful and effective for reasons pointed out by the experiential learning model. The students were trained as much by the concrete experience of writing an annotation as they were by guided instruction, which was minimal. The students, in fact, did not receive very much feedback. The results of this case study supports a limited, efficient,

one-hour training, and then learning by doing, on the wiki, providing more opportunities for concrete experience, focused awareness, observation, and testing. An implication for teachers is to reduce the instructive component, and feedback, while enabling collaborative, shared learning experiences instead.

The use of the wiki enabled the establishment of social norms. In particular, students and faculty had to develop a working level of trust within the social group. Because each person's work was essentially public and under scrutiny, there had to evolve a tacit social norm that no one's work would be "attacked" or ridiculed. In the initial meetings, there was a general sense of apprehension about having one's work undergo public review. But soon it became apparent that everyone was learning from the experience and that no one was writing "perfect" annotations. In fact, everyone was learning from each other's struggles with the annotation process. Mass authorship is not simply a technical or technological process; successful mass authoring requires inter-personal trust. An implication of this is that the teacher must recognize, plan for, and foster the development of trust as part of the learning process.

The experiential learning process was fluid and dynamic. What we learned from this experience is that the process is very difficult to conduct 100 percent online using only a wiki. Periodic face-to-face meetings were essential. We needed pep talks to keep students motivated, face-to-face meetings when productivity flagged, and meetings where students could be reminded of the larger goal and the alignment of their efforts with this goal.

We learned best practices for use of meta-tags in the wiki. Firstly, we use meta-tags to construct relationships among content on the wiki, meta-data about the data. We used meta-tags for keywords, author names, and other bibliographic content. This use of the meta-tags enabled students to form abstractions and generalizations beyond the individual bibliographic annotations they were writing. Secondly, we used meta-tags to manage work. Tags were effectively used to identify the responsibilities for bibliographic entries still requiring an annotation.

Finally, we learned that we should have incorporated use of the wiki in our training sessions. Had the team installed and had the wiki operational at the training meeting, it would have facilitated the student's posting of training entries. This approach is recommended for research-based experiential learning.

A future direction for this study is the generalization of the process to other educational situations and courses. We believe this approach can be extended to, for example, cultural immersions, professional practice, and service learning/civic engagement. See Ithaca (2007) for a discussion of experiential learning in other educational contexts.

In thinking about other courses in the IS curriculum, the success of our project suggests that the use of wikis could be effective at augmenting traditional classroom delivery of content and extend the functionality of current online offerings. Wikis could be used to create experiential learning processes within a systems analysis and design or database course. In addition to formal education in Entity Relationship modeling, students could be given a concrete example to work with and learn from and then work collectively to review and revise homework problems.

A wiki-based experiential learning process could enhance the core IS survey course by having students construct and maintain a course Wikipedia (Kane and Fichman, 2009). Students would directly experience the use of information technology to improve the performance of people in organizations (McNurlin, Sprague, and Bui, 2009). In this course, performance would be related to the acquisition of knowledge as measured on exams and assignments.

6. CONCLUSION

The success of our system security risk assessment project depended initially on the professors' ability to rapidly educate a loosely coupled, diverse group of students on how to create an annotated bibliography of a very technical and rich body of literature. The scope and scale of the task was tantamount to the initial literature review for a PhD dissertation. However, there was no time for months of formal education on research methods. The students needed to begin work immediately. The students were presented with a brief

overview of the concepts and process prior to giving them a concrete example from which to work and learn. Wikis were then used to create an environment where each student could directly experience the process of creating an annotated bibliography by performing the work collectively as a member of a social group or network.

The results of this case study suggest that wikis can be successfully used to facilitate experiential learning of a mass authoring task in a time-pressured environment requiring high levels of quality by enabling collaboration and the establishment of social norms. An additional finding is that teachers, although not needed as much, were not totally removed from the learning process once the students were engaged in experiential learning. Experience is not, as it turns out, the teacher of all things— teachers still have a role in experiential the learning process.

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Editor's Note:

This paper was selected for inclusion in the journal as a ISECON 2012 Distinguished Paper. The acceptance rate is typically 7% for this category of paper based on blind reviews from six or more peers including three or more former best papers authors who did not submit a paper in 2012.

Appendix

Figure 2 - Editorial Process

USING WIKIS TO MIMIC AN EDITORIAL PROCESS

Wikis have a feature called Categories. You can add a tag on a page just by entering something like this: [[Category : *Category_name*]]. The phrase *Category_name* then shows up in a list on a page with other category names that were tagged elsewhere. The category names are listed in alphabetical order. Clicking on any of the category terms brings you to a page that lists all wiki pages with that category tag. This is a way of indexing pages in various ways.

In the systems security risk assessment project, category tags were used on the annotated bibliography for assigning and reviewing articles. Using category tags served as a very easy means of mimicking an editorial process for the mass authoring project, supporting the interrelated roles of editors and authors.

To assign an article, a professor, acting as editor, would add the tag.

 [[Category: Assigned *Last First*]], for example [[Category: Assigned Smith John]]

, to a page containing a citation and blank annotation block.

The students and professors authoring an annotation would go to the Categories page to find their assignments. For example,

- Assigned Doe Jane (2 members)
- Assigned Smith John (4 members)
- Assigned Thomas Jim (1 member)

The "member" refers to the number of pages with the tag, and thus, the number of articles assigned. Annotators were instructed to edit the tag when the uploaded their annotations, changing the category tag to [[Category: Summary written]].

This action would take away one member from the "Assigned" tag that was removed and add one to the "Summary written" tag. The professor as editor, making a review, would then access the "Summary written" page, by clicking on the hyperlink on the Categories page, to access all of the annotations available for review, changing the "Summary written" tag to "Summary reviewed." Once all 140 articles were uploaded and reviewed, the summary review category had 140 members and appeared as follows on the Category page:

- Summary reviewed (140 members)

Table 1 - Student Survey Results for Closed-Ended Items

Item	Disagree						Agree	Mean
	1	2	3	4	5	6	7	
1. I learned to write entries through my own experience of writing my entries.	2		1	2		1	2	4.13
2. I learned to write entries by observing the wiki entries written by others.	1					3	4	5.88
3. I needed better feedback from professors on my entries.	2	1	1	1	2		1	3.50
4. I needed to see more examples of entries written by others	1	1	1		2		3	4.63
5. I needed more guidance by professors up front on how to write entries.	3	1	1		2		1	3.13
6. The features of the wiki tool helped me learn to write entries.	2				2	1	3	4.88
7. Seeing my entries posted on the wiki got me more engaged in the project.	1			1	2	1	3	5.25
8. Knowing that other students and professors would read my entries motivated me to do a better job.	1					2	5	6.00
9. Seeing the entries of others gave me concrete examples from which to learn.						3	5	6.63
10. Seeing the entries of others inspired me to work harder.		1			1	2	4	5.88
11. Seeing the entries of others gave me confidence that I could do it too.	1			1		2	4	5.63
12. I primarily learned to write entries from the initial 1-hour bibliographic training.				5	1		2	4.88

Table 2 - Interpretation of Results

Item Composition	interpretation
Observation Items 2 (5.88) and 9 (6.63)	The data provide convincing support for the wiki's facilitating effect on experiential learning. Students learned through observation and reflections, which lead to the formation of abstract concepts and generalizations in the Lewinian model.
Structured guidance Items 3 (3.50), 5 (3.13), and 12 (4.88)	The moderate to low numbers on the structured guidance items provides evidence that suggests students learned as much or more in the collaborative wiki environment through observation, reflection, and social norms, rather than from the structured guidance coming from professors.
learning appropriations of the wiki Items 6 (4.88), 15 (N/A)	Modest but very positive agreement to item 6 and the open-ended responses suggest the wiki helped participants learn. The most common features listed were *access to the entries of others* and the *guidance posted on the wiki by professors*. The evidence, including positive responses to item 6, and open-ended responses to item 15 that included two responses contrary to the negative responses to item 6, support learning appropriations of the wiki. Specifically, appropriations of the wiki to access the entries of others and to seek guidance posted on the wiki by the professors support learning appropriations of the wiki.
Social Influence Items 10 (5.88) and 8 (6.00)	There was strong agreement among participants that the public nature of the wiki inspired and motivated them. The data support the idea that influential peers and authority figures can influence an individual's intentions, self-efficacy, and behavior, according to attitudinal theories of motivation. Furthermore, the evidence in this case supports the idea that behavioral norms can emerge from collective use of a technology.
Obstacles Items 13 (N/A) and 14 (N/A)	The primary obstacle reported was struggles with producing quantity while maintaining a high standard of quality on articles that varied widely in length, format, and difficulty. Similar to the findings of Forte and Bruckman (2007), students sometimes had difficulty navigating links on the wiki and trouble with figuring out the right format for a given bibliographic entry, given apparent inconsistencies between entries seen, and between articles and books, for example. Responses to item 14 support the idea that instructors, although not needed as much, were not totally removed from the learning process once the students were engaged in collaborative learning because nearly half the participants listed "asking professors for help".