A journey of teaching and learning with wikis

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Abstract: This paper outlines one lecturer’s exploration of the educational applications of wikis in tertiary education and reflects on its outcomes. Covering both undergraduate and postgraduate students, a total of five studies were conducted in a Hong Kong university over a period of four years on how wiki was used in group project work. Rather than allowing students to do group project work using the more traditional word processing applications, the teacher used various types of wikis where students co-constructed their group project work online. The results from these five studies suggest that when used appropriately, wikis have the potential to enhance teaching and learning activities. It is hoped that the experience reported in this paper would enrich the knowledge base on how wikis can be applied in the educational context.

1. Introduction
There has been a long-standing agreement among researchers and practitioners that technology has a rich potential for promoting a variety of educational outcomes (Becker, 2000; Cooper & Brna, 2002; Godfrey, 2001). For instance, Godfrey (2001) stressed the potential of technologies to create powerful learning environments that could cater to individual differences and foster knowledge construction in different domains. Recently, the advent of Web 2.0 has brought changes to the way technology is used in education. A poster child example of Web 2.0 technologies would be wiki, which has been generally regarded as a tool that can enrich learning processes in the educational context (Parker & Chao, 2007).

However, despite the acknowledgement that wikis have the potential to create optimal learning environments (e.g. Chu, 2008, 2009; Mader, 2008; Richardson, 2006), there is still a dearth of papers that specifically explore how different types of wikis have been used in teaching. Thus many teachers are at a loss when they start to attempt incorporating wiki into their work. In addition, there is also a lack of empirical research on the factors that make these different wiki variants a potentially rich learning environment with many of the papers confining themselves to anecdotal evidence (e.g. Mader, 2008; Richardson, 2006). Therefore, this paper outlines my exploration of the
educational application of various wikis in the higher education context. I have used wiki for courses with both undergraduate and postgraduate students in a Hong Kong university over the past four years in seven different courses. It is hoped that through sharing these reflections and empirical findings related to wiki use in the classroom, teachers can have some road map as they begin to explore the possibilities of wiki in their own pedagogy.

My motivation for incorporating wiki into my teaching practice came with the recognition that I needed a better way for students to engage in collaborative learning as they engage in their group projects. A lot of the courses I teach involve group project work that demand extensive writing. In the past, students would just use a regular word processor (e.g. MS Word) to do their group project. Students usually divided the work into sections with each student working on a specific section. Afterwards, they will then compile these together and email the documents to each other. This results in a lot of inefficiency and mistakes. For example, old documents may inadvertently replace the newer ones as students compile their work together. In addition, students are confined to working on their own section and are unable to comment on each others’ work real-time thus defeating the purpose of organizing them into groups. Many students also complain about the fact that only 1 or 2 students do most of the work and teachers have no way of taking into account who has done what. Using wikis for the project work offers a way of addressing these myriad problems.

2. Literature review

2.1. Wikis

Wikis are Web-based online software programs where users with access can add, edit or delete content (Ebersbach et al., 2006). Users can add and edit Web pages without the need for programming or HTML knowledge. Wikis have a history function that can record previous versions, and they offer a simple editing and publishing interface that can be used and understood easily (Leuf & Cunningham, 2001; Kille, 2006; Wagner, 2004; Tonkin, 2005). The prime example of wiki technology in use would be Wikipedia, perhaps the most influential wiki-based project and now one of the most widely used encyclopedias in the world (Richardson, 2009). It is unlike other encyclopedias however, because it is not reviewed by professional reviewers, but is instead reviewed by peers or other online users (Long, 2006).

Wikis originated as communication tools designed to promote exchange of ideas (Haley, Collins, & Coe, 2008). They are now considered optimal online environments for collaborative projects (Engstrom & Jewett, 2005). Wiki users can create wiki pages and fill them with a variety of content (e.g., text,
images, graphs, maps). They can then edit the content as needed or desired (Raitman et al. 2005), while application tracks the revisions made. Through the use of a wiki, groups of people with a common goal can work collaboratively and simultaneously on a project by jointly creating one single (potentially) hypertext document, thus facilitating knowledge construction (Fuchs-Kittowski & Kohler, 2005).

2.2. Various types of wikis
There are currently 45 various types of wikis listed in Wikipedia (Source: http://en.wikipedia.org/wiki/Comparison_of_wiki_software). In my own work, I have used the following: TWiki, MediaWiki, PbWorks, and Wikibook, thus discussion will focus on these four types of wiki.

Table 1
Different Wiki Variants and Their Features

<table>
<thead>
<tr>
<th>Wiki variant</th>
<th>Installation requirements</th>
<th>Multilingual</th>
<th>Open source</th>
<th>Programming language</th>
<th>Software license</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWiki</td>
<td>Needed</td>
<td>Yes</td>
<td>Yes</td>
<td>Perl</td>
<td>GPL</td>
</tr>
<tr>
<td>MediaWiki</td>
<td>Needed</td>
<td>Yes</td>
<td>Yes</td>
<td>PHP</td>
<td>GPL</td>
</tr>
<tr>
<td>PBWorks</td>
<td>Not needed</td>
<td>English only</td>
<td>No</td>
<td>PHP</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Wikibook</td>
<td>Not needed</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: GPL = General Public License

2.3. Collaborative learning and knowledge management
Collaborative learning has been shown to be an important factor in academic achievement, personal development, and student satisfaction (Elogort, Smith, & Toland, 2008). It is an important form of classroom teaching that has shown to benefit students through enhancing their learning and improving their interpersonal skills (Coyle, 2007; Oxford, 1997). Collaborative learning is an umbrella term for various pedagogical approaches in education that involve a situation where two or more people attempt to learn something together (Dillenbourg, 1999). Deeply rooted in Vygotsky’s views that learning is inherently social, collaborative learning assumes that knowledge can be created within a group where members actively interact by sharing experiences and taking on different roles (Mitnik, Recabarren, Nussbaum, & Soto, 2009).

Wikis have the potential to facilitate collaborative learning (Notari, 2006). Initially, I saw wikis as a mean by which I could enhance the learning of the students as they co-construct their group projects. I felt that this practice would help students improve the quality of their collaborative learning. In addition, wikis could also serve as a useful knowledge management tool by
helping in the creation and sharing of knowledge given that Web 2.0 technologies (of which wiki is a poster child example) has been touted as beneficial for sharing information in group contexts.

In all the wiki studies, I focused on how the following:
(1) Whether the wiki improved the level of collaboration
(2) Whether the wiki improved the quality of group project work
(3) How much the students enjoyed using the wiki
(4) How much they thought wiki was suitable in group project work
(5) How wiki was useful as a knowledge management tool in terms of knowledge creation and knowledge sharing.

Wiki Study 1
In the first wiki research study, I used TWiki in an undergraduate course in knowledge management. In this course, the students were asked to conduct a case study on a particular organization and how they applied knowledge management principles. This case study would eventually be uploaded on a wikibook (See Study 2 for details). I first created a wiki workspace for students divided into three sections: “group progress,” “group discussion,” and “group report.” The “group progress” section was where students put their draft reports while the “group report” section was where students placed their final reports. The “group discussion” section was where students can discuss any issue related to their project. Questionnaires and interviews were used to assess the effectiveness of wiki in facilitating group project work.

To encourage knowledge sharing between students, each group was also asked to make or suggest changes to another group’s work in TWiki over a period of about two weeks. I also read and commented on students’ work at various stages. Students found comments from their classmates and me useful (mean score of 3.3 in a 5 point Likert scale with 5 being the highest and 3 being the midpoint). They considered my comments more valuable compared to classmates’ comments. As some of the students believed that I had professional knowledge and can thus offer effective and functional comments, whereas other group members may possess neither adequate knowledge nor incentive to provide comments.

Overall, the results from both the questionnaires and the interviews indicated that students saw TWiki as a good tool for facilitating group project work and knowledge management in terms of creating and sharing knowledge. The questionnaire responses contained both positive and negative comments on TWiki and the more traditional method of using word processor (e.g. MS Word) in doing the group project. Most students reported that TWiki was able to facilitate collaboration in group projects. Students noted that it helped in
keeping track of others’ work progress, giving comments to each other and sharing knowledge, and made it possible to work at any time, from any place. These characteristics are not available when doing a group project using MS Word. However, it was also noted that the interface of TWiki was less user-friendly than MS Word and it took time to get used to the platform in TWiki.

The questionnaires indicated that TWiki helped improve the level of collaboration and improved the quality of the group project. Students generally found TWiki to be suitable for doing their group project work.

**Wiki Study 2**

Study 2 was an extension of Study 1. The participants were the same students who participated in Study 1. For the second phase of the study, the students used Wikibook to keep the final draft of the case studies that they did using TWiki in Study 1. Students were asked about their experiences in using Wikibook. Generally, I found that they enjoyed being an author for a Wikibook which has a real worldwide audience.

I also compared the responses of the students on TWiki and Wikibook with regard to

- How much they enjoyed using the wiki
- Their perception on the ease of using the wiki
- Their perception of wiki as a suitable tool for co-constructing their group projects

Results indicated that students did not perceive any significant differences with regard to these two types of wikis.

**Wiki Study 3**

In this study, I used TWiki both for undergraduate and masters’ students. This was done because few studies have compared the use of TWiki between different levels of study and there has been no previous research that examined whether wiki is useful or not for part-time students. The aims of the study were to compare the use of TWiki at undergraduate and postgraduate levels and to determine the usefulness of wiki for part-time postgraduate students. Students worked in groups of 3-5. They conducted a small research project and compiled a report using TWiki. I designed Wiki templates which could be modified by the students according to their needs.

The masters’ students were all part-time students taking up MSc in Library and Information Management. Both the MSc students and the BSc students positively rated (mean scores of 3.2 and 3.3 respectively in a 5-point Likert
scale where 5 is the highest score and 2.5 is the midpoint) the use of TWiki in improving collaboration among group members. No significant difference was found between the two groups of students, suggesting that both found TWiki to be quite effective in facilitating their group projects by providing them an open workspace.

In terms of how TWiki helped improve the quality of group reports it received a mean rating of 3.2 from both groups (minimum = 1, maximum = 5). The lack of difference between these two ratings suggests a general improvement of quality of group projects, despite the difference in their levels of study. In terms of TWiki’s ease of use, the ratings were 3.0 and 3.2 respectively. Again, there is no significant difference between the mean scores across the two groups. In terms of perceiving wiki as a suitable tool in doing group project work, both groups strongly agreed that TWiki is a suitable tool (mean scores of 3.6 and 3.5 respectively).

I also asked students to respond to open-ended questions asking their opinions on TWiki and word processor (e.g. MS Word). In general, both MSc and BSc students found TWiki better than a word processor for the co-construction of their group project work. However, MSc students had less pleasant experiences with TWiki and gave more negative comments than BSc students regarding this wiki tool. More MSc students mentioned difficulties in formatting (65%) compared to BSc students (12%). Additionally, 20% of the MSc students expressed that TWiki was time-consuming to learn compared with only 10% of BSc students. This was contrary to my initial expectation that part-time masters’ students would find TWiki more useful since they had less chance to meet and since TWiki can supplement their face-to-face discussions and physical workspace with an online work environment. It is possible that the differences were attributable to age. The MSc students are older (25 to 35 years old) than the BSc students (about 20 years old). In general, younger people are well-versed with new technology so the BSc students could become familiar with TWiki quickly.

**Study 4**

Study 4 was conducted among masters’ students in order to complement the studies conducted mostly among undergraduate students in the previous three studies. This study compared the perceived effectiveness of using TWiki and
MediaWiki in terms of: improving collaboration, improving the quality of group project work, ease of use, enjoyment, suitability, and the facilitation of knowledge creation and knowledge sharing.

Research participants included 21 postgraduate students of Master of Science in Library and Information Management (MScLIM), who were enrolled in the Information Behavior (IB) course, and 16 postgraduate students for the Master of Science in Information Technology in Education (MScITE), who were enrolled in the course on Designing Shared Virtual Environments for Learning (DSVEL). All students were part-time students with full-time employment. For the IB course, the collaborative group project consisted of a small study on the information behaviour of a specific user group. The research report was co-constructed using TWiki. The work consisted of submission in four phases: (1) research proposal with relevant literature, (2) draft of the study design, (3) preliminary results, and (4) final report that includes discussion of previous studies in the area of interest. Students enrolled in DSVEL were required to use MediaWiki on a regular basis during the course to communicate and collaborate with other students on the subject, and used the tool to complete a major project at the end of course. This study aimed to address the following questions: 1) What are some of the similarities and differences in user experiences when using TWiki and MediaWiki? 2) What are some of the perceived effectiveness of using the two wikis for collaborative learning? 3) How effective is wiki as a knowledge management tool to enable knowledge creation and sharing? 4) What positive/negative values are perceived by the students when Wiki is compared with popular word processing tools in collaborative learning?

Table 2

<table>
<thead>
<tr>
<th>Comparison of TWiki and Medaiwiki</th>
<th>TWiki</th>
<th>Mediawiki</th>
<th>Mann Whitney Test: p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved collaboration</td>
<td>3.23 (1.06)</td>
<td>3.63 (0.81)</td>
<td>0.33</td>
</tr>
<tr>
<td>Improved quality of group project</td>
<td>3.23 (1.13)</td>
<td>3.20 (0.78)</td>
<td>0.71</td>
</tr>
<tr>
<td>Easy to use</td>
<td>3.00 (1.08)</td>
<td>3.75 (0.93)</td>
<td>0.05</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>2.90 (1.02)</td>
<td>3.63 (0.96)</td>
<td>0.04*</td>
</tr>
<tr>
<td>Suitability</td>
<td>3.60 (0.81)</td>
<td>3.94 (0.77)</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Note: Answers were on a 5-point Likert scale with 1 as the lowest, 5 as the highest, and 2.5 as the midpoint.

The results indicate that ratings are all above the middle of the scale. No significant differences were found between TWiki and MediaWiki in most of
the dimensions except enjoyment. Students who used Mediawiki enjoyed it more compared to those who used TWiki. However, a cursory look at the mean scores seems to indicate that MediaWiki had higher ratings in terms of improved collaboration, ease of use, enjoyment, and suitability compared to TWiki. The qualitative interviews also support this. For example, one student (MScITE2) mentioned that MediaWiki released her from the formatting problem that she encountered when using the word processor. On the other hand, one TWiki user (MScLIM3) pointed out that doing formatting work in TWiki was time-consuming, while another student (MScLIM19) noted the difficulties with posting materials on TWiki. It appears that there is much room for TWiki to improve in terms of providing an interface that will increase users’ enjoyment. This may be a reason for the lower enjoyment in using TWiki compared to MediaWiki. In addition, I also asked students to rate the wikis in terms of knowledge creation and knowledge sharing (See Table 3).

<table>
<thead>
<tr>
<th></th>
<th>TWiki</th>
<th>Mediawiki</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge creation</td>
<td>3.45</td>
<td>3.69</td>
</tr>
<tr>
<td>Knowledge sharing</td>
<td>3.92</td>
<td>4.31</td>
</tr>
</tbody>
</table>

Note: The scale was 1-5 with 1 as the lowest and 5 as the highest

A look at the mean scores indicates that Mediawiki has higher scores on both aspects compared to TWiki. A Mann Whitney test was performed to follow up these differences but the results were not statistically significant. This indicates that TWiki and Mediawiki seem to be equally helpful in fostering knowledge creation and knowledge sharing.

**Study 5**

Study 5 was designed as a longitudinal study. The class was divided into 4 groups (5-6 students per group) and each group conducted a small-scale study over a period of 10 weeks. In contrast to the previous four studies, I gave more scaffolding support to the students because the previous studies have shown that students need scaffolding as they use wiki for their group project work especially for the MSc students. This was made very clear in Study 3 where participants complained that they found wiki time-consuming to learn. For the scaffolding, I asked students to read an article on the use of wiki for education and asked them to write some comments after reading the article. Students were also given tutorial sessions (one formal and two informal) on the use of wiki. Each group came to meet with me twice regarding how they used the wiki for their group project. In order to understand how they used wiki to facilitate the group project work, I asked them to use wiki for their project in
my presence. I also captured their interaction with the wiki platform on Camtasia for future research.

Unlike MediaWiki and TWiki that require the installation of the wiki software on your own server, such installation is not needed for PBWorks. Thus, I tried PBWorks for this study to alleviate the reliance on technical support for using the wiki software in the course. I conducted this study to identify the affordances and constraints of wiki. I also expanded the study by looking at the psychological factors underpinning the use of wiki. More specifically, I examined how approaches to learning influenced the use of wiki among students.

I gave students a modified version of the Pedagogical Value of Wiki Questionnaire (PVW Questionnaire, Hazari et al., 2009) during the beginning of their group project work and at the end of their group project work. The PVW Questionnaire assesses four components of wiki: learning, motivation, group interaction, and technology. Learning assesses information about students’ perception of interest in the course, retention of material, active learning, and the use of course material to meet learning objectives. Motivation assesses student’s perception about motivation to use wikis. Group interaction assesses students’ group interaction, consensus building, collaborative and cooperative learning. Technology assesses students’ perception about ease of use, user interface, and technical issues.

I also compared the pre and post-test scores of students. Dependent samples t-tests indicated that there was a significant increase in terms of learning and motivation. A look at the mean scores indicates that there was also an increase in group interaction and technology though the increase was not statistically significant.

Table 2
Pre-test and post-test scores on the Pedagogical Value of Wiki Questionnaire

<table>
<thead>
<tr>
<th></th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>21.35</td>
<td>23.18</td>
<td>Significant</td>
</tr>
<tr>
<td>Motivation</td>
<td>20.71</td>
<td>23.76</td>
<td>Significant</td>
</tr>
<tr>
<td>Group interaction</td>
<td>22.82</td>
<td>24.65</td>
<td>Not significant</td>
</tr>
<tr>
<td>Technology</td>
<td>22.65</td>
<td>23.59</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

Aside from using the PVW, I also asked the students to their perceptions of PBWiki in terms of knowledge creation and knowledge sharing on a scale of 1-7 with 1 being the lowest and 7 being the highest. The mean score for
knowledge creation was 4.94 and 5.41 for knowledge sharing. Both these scores were significantly above the midpoint of 4.00.

**Conclusion**
The results of the five studies provide converging evidence that wikis were helpful in promoting effective group project work. This study makes a stronger case for the systematic integration of wikis in the higher education setting. Wikis have the potential to promote positive learning outcomes such as improved collaboration and improved quality of the group project work. Students also enjoyed using wiki and found it suitable for doing their work. In addition, the various wiki variants have been found to be useful for fostering both knowledge creation and knowledge sharing.

However, the teacher who wants to integrate wiki into his/her pedagogy also has to be aware of certain difficulties. The most salient would be the unfamiliarity of students at the beginning. Usually, students are more used to the traditional MS Office platform, thus some form of training and scaffolding is necessary to help get students acquainted with the wiki platform. Once this is dealt with, however, the potential of wikis can be harnessed for improving learning in higher education contexts.

**References**


http://www.ariadne.ac.uk/issue42/tonkin/(accessed December, 2010).
