A Tale of Two Wikis: TWiki and Wikibooks

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Abstract

Although Wikipedia has become one of the ten most visited websites in the world, most people are not familiar with the tool that has caused the wiki phenomenon. Regarded as the "flagship of the wiki variants" (Ebersbach, Glaser, & Heigi, 2006, p. 147), TWiki is a web-based collaboration platform. On the other hand, Wikibooks is for collaborative writing of open-content textbooks and other non-fiction works (Klobas, 2006). Both wikis enable a group of people to co-construct a piece of work wherever they are, and whenever they contribute to their work. Besides, members can edit different parts of a group work simultaneously.

It has always been problematic for teachers to know if all group project members have contributed fairly to the work or whether one or two students do most of the works. Both wikis keep all versions of the students' work online. This enables teachers to identify who has contributed to the various versions of the group work. Even the specific changes made by each student can be uncovered. This helps teachers monitor students' progress more effectively.

This study compares TWiki and Wikibooks in terms of their functionalities and ease of use. In addition, it will report a survey of 41 undergraduate students' opinion on using TWiki and Wikibooks for their Knowledge Management course's group project. It will discuss whether the wikis helped improve the collaboration among the group members, enhanced the quality of the group project, and if wikis are suitable tool for students to co-construct their work online.

1.   **Introduction**

Most of collaborative learning approaches involve working cooperatively in groups (Smith & MacGregor, 1992). Due to the nature of the approaches, both teachers and students may worry about the issue of fairness, and sometimes students were reluctant to engage into group project work (Knight, 2004). To overcome such issues, collaboration tools play an essential role. In addition, these tools are important for co-construction work (Finger, Gelman, Fay, Szczerban, Smailagic & Siewiorek, 2006). Furthermore, many collaboration tools such as Twiki and Wikibooks for facilitating group works were developed over the recent years. It is important to evaluate these tools so that the appropriate tools can be used for the appropriate situation.

Ebersbach, Glaser, and Heigi (2006, p. 147) claimed that "TWiki is without doubt the flagship of the wiki variants". Meanwhile, Wikibooks (2007) emphasizes that it is a free collection of open-content textbooks that anyone can edit, and it has more than 27,171 titles so far. Thus, this study selects TWiki, a web-based collaboration platform (TWiki, 2007), as the choice for building the wiki templates, and Wikibooks, an open-content textbooks collection platform (Wikibooks, 2007), as the choice for building an online book. The purpose of this study is to evaluate the effectiveness of using customized online collaborative spaces with TWiki and Wikibooks in facilitating students' learning through knowledge building activities in an undergraduate course.

Data from 41 undergraduate students of a knowledge management course who participated in a group project that required them to create book chapters on an organizational case study are

considered. These students were required to form groups of 4-5 members. Each group worked on a chosen book chapter for the online book titled as "Knowledge Management Cases in Asia" (http://en.wikibooks.org/wiki/Knowledge_Management). The initial drafts of the chapters were produced first in TWiki which was set up on an intranet environment so that inappropriate materials (e.g. confidential information regarding the organizations) would not be released to the public. After the works have been "cleaned up" and the good drafts had been prepared, their works were copied onto the Wikibooks for worldwide readership.

By investigating the students' works and having interviews with students, this paper focuses on the comparison of the usefulness and functionalities of both the TWiki and Wikibooks in facilitating students' knowledge building.

2.   Literature Review

2.1.   Collaborative Learning and Group Works

Group works are common learning phenomenon in classroom or workplace. Knowlton (2001) commented that knowledge construction is best accomplished through collaboration and that students learned more effectively through the give-and-take activities among classmates, i.e. discussion. Most collaborative approaches required students to work cooperatively in groups of two or more, mutually searching for understanding or solutions, or for creating a product (Smith & MacGregor, 1992).

Although the benefits of group works are obvious, there are obstacles of using such approaches. One of the major setbacks is the fairness concerns from both the teachers and students. Knight (2004) found that instructors worried that some students might be the "free riders". In addition, he found that most students preferred individual work, although his students had recognized the advantages of group work were much more than the disadvantages, meanwhile organizational and group dynamics discouraged them to engage into group work. Students also felt troublesome in organizing or distributing works between group members, because not all the students had the same working attitudes in contributing efforts in the group work.

Besides, Finger et al. (2006) also mentioned that collaborative learning was shown to increase individual learning through co-construction and personal reflection; however, collaborators often had the pressures that undermine the coordination of co-construction, due to unstable meeting spaces and schedules, and also non-central repository.

2.2.   Group Works and Collaboration Tools

To facilitate group works such as creating an online centralized repository, quite a number of collaborative tools have been developed. Sofia Pereira and Soares (2007) defined collaboration tool as a space which could be located by the participants to exchange messages, and share documents, applications, workflows, and others.

Technology may be one of the solutions to overcome the obstacles in the group works. Finger et al. (2006) pointed out in their paper that collaboration tools were important to the co-construction work of student engineering design team, because unlike the experts (in her

study, they were the professional engineering team), students were novices in both domain (basic) knowledge and design process. Her colleagues and she found that collaboration tools helped students learning and the accumulation of shared knowledge through co-construction and reflection.

2.3.   Two Collaboration Tools: TWiki and Wikibooks

Collaboration tools can help students to learn through co-construction and reflection from peers and experts. Wikis are one of the most famous tools. Among the wiki projects, Wikipedia probably is the most famous one; however, most people are not familiar with the tool which has caused the wiki phenomenon.

Wiki is the web content management systems that allow creating, linking and editing the contents collaboratively (Neus & Scherf, 2005). Wiki has several unique characteristics, which seemingly favor its usage. Wagner and Prasarnphanich (2007) stated some Wiki key characteristics, which are applicable to TWiki and Wikibooks, as follows:

- Wiki enables web documents to be authored collectively without individual ownership of the documents (editable World Wide Web).

- Wiki uses a simple markup scheme (usually a simplified version of HTML, although HTML is frequently permitted).

- Wiki content is not reviewed by any editor or coordinating body prior to its publication, and is usually immediately published upon being saved.

- Wiki maintains a temporal database (database that records its historical content), thus enables version management.

Although the characteristics of wiki showed supports of group collaboration, the investigation of particular wikis are seldom found. In this paper, TWiki and Wikibooks are being compared in terms of their functionalities and end user opinions on usefulness based on surveying participants via a questionnaire and certain individual interviews.

3.   Research methods

3.1.   Instructional design

Both tools, Twiki and Wikibooks, were accessible by the students wherever and whenever they access to the Internet. TWiki (http://twiki.cite.hku.hk/bin/view) was available at the university server, and Wikibooks (http://en.wikibooks.org/wiki/Knowledge_Management) was in public domain.

There were two phases in the group work. In the first phase, students were required to register in TWiki, and then every group used a pre-defined template provided by the instructor to create their own part of content in TWiki. Group members were responsible for inputting and editing the same piece of work. The progress of the works was tracked by the system. Peer groups and instructors were allowed to access the document and give comments. In certain cases, representatives from the organizations who were interviewed by students also contributed their thoughts on the students' chapters. In the second phase, students were also asked to register in Wikibooks. Then all the groups copied their latest version of works from TWiki to Wikibooks to form their online book. The e-book was then viewable and

searchable by the open public. Group members were still able to edit and contribute to their works anytime hereon.

3.2. Survey

Participants in this study were 41 students, 19 from year 3 and 22 from year 2, of an undergraduate course on knowledge management. All students in the course were surveyed via telephone interview and/or a questionnaire about their experience with TWiki and Wikibooks. Questions regarding ease of use, enjoyment of use, suitability as a collaboration tool, ability to improve collaboration, ability to enhance quality of group project were asked. Students were asked to answer those questions in a 1 to 5 rating scale. In addition, textual comments were also collected.

3.3. Data Collection

Both TWiki and Wikibooks recorded all the versions of students' works and so they could be tracked. These records were collected for this study. In addition, data from students' surveys and the grades of the students' works were also collected. Data from the questionnaires were stored and summarized using Microsoft Excel. In addition, written comments on the questionnaires and the data from interviews were analyzed using a qualitative data research tool, NVivo version 7.0.

3.4. Analysis

Comparisons between the two tools were made on functionalities including system

flexibilities and features such as content creation and history tracking. Based on the survey data, the end user opinions on usefulness were also compared in terms of "ease of use" and "enjoyment of use."   In addition, the end user opinions on the suitability of wikis as collaboration tools, whether wikis could improve collaboration and enhance quality of group project, and the use of TWiki and Wikibooks for knowledge management were also analyzed.

4.　　**Findings and Analysis**

This section will first discuss the functionalities of both TWiki and Wikibooks in terms of their system flexibility and features. How students like or dislike using TWiki and Wikibooks will then be discussed through comparing students' comments on "ease of use" and "enjoyment of use". After that, students' comments on the suitability of using TWiki and Wikibooks as the collaboration tools for knowledge co-construction, and how wikis help them to improve the collaboration among group members and enhance the quality of the group project will also be discussed.

4.1.　　Comparison on the Functionalities of TWiki and Wikibooks

It is important to compare the functionalities of TWiki and Wikibooks as they may influence the user's acceptance and satisfaction; and hence, similar to any other information systems, they may impact whether users will continue to use the systems. The comparison of the functionalities of TWiki and Wikibooks are discussed in terms of system flexibility and features in the subsequent sections.

4.1.1. System Flexibility

System flexibility discussed hereon for TWiki and Wikibooks will be in terms of customization, authentication, and public accessibility.

Not every system is suitable, and/or usable, to all users because different users have different needs. The flexibility to customize the setting and layout is very crucial for users to select a system.   In this perspective, TWiki is more controllable, manageable, and flexible than Wikibooks. TWiki requires the system administrators to install and manage the program in their own server.   Moreover, the system administrators, according to specific needs, can customize TWiki. Hundreds of plug-in and add-on provided by TWiki can be downloaded and installed to customize the setting and layout. However, Wikibooks is an open content management system placed on the Internet. Though Wikibooks can be accessed remotely by users, it cannot be customized by users.

The authentication requirement is quite different between TWiki and Wikibooks. TWiki can be set up to require all participated users to register at the first time, and to login the system every time when they intent to access the content.   Because of the measures on user registration, system administrators hence can assign and apply various types of access control to individual users so to regulate the activities in the TWiki. On the contrary, there is no such control in Wikibooks. Although Wikibooks also has the feature of user registration, users can edit and/or publish anything without login.

The rapid growth of Wikipedia reflects that the convenience of information dissemination of wikis is a favorable characteristic. However, proper control of information dissemination is

often needed to maintain the quality of the information. The control of public accessibility is one of the major factors influencing information dissemination. Using TWiki, the system administrator will assign the access right of the web contents to the users. This provides the control of whether the web contents can be accessed publicly. Access to web contents in TWiki is more controllable and manageable. However, there is no such access control in Wikibooks. All online books can be accessible anywhere, and be searchable by search engine.

4.1.2. Features

As a content management system, the main features of wikis are contents creation and history tracking.

4.1.2.1.   Contents Creation

Both wikis are capable to add, edit and delete contents.   However, TWiki may be more flexible than Wikibooks because TWiki has two editors while Wikibooks has only one.

Figure 1 shows the two content editors in TWiki. The WYSIWYG editor is in left-hand-side and the plain text editor is in right-hand-side. WYSIWYG is an acronym for "What You See Is What You Get", used in computing science to describe a system in which content being processed during editing appears much close to the final product (Wikipedia, 2007). With WYSIWYG editor, TWiki helps users to edit the content more easily, effectively and efficiently. With its formatting toolbar, users are not necessary to remember or to familiarize with any HTML coding. Plain text is a kind of textual material in a computer file which is unformatted (Wikipedia, 2007). When using the plain text editor in TWiki, users have to use

HTML codes to format the contents.

Figure 1. Two editors in TWiki: WYSIWYG editor (left) and plain text editor (right).
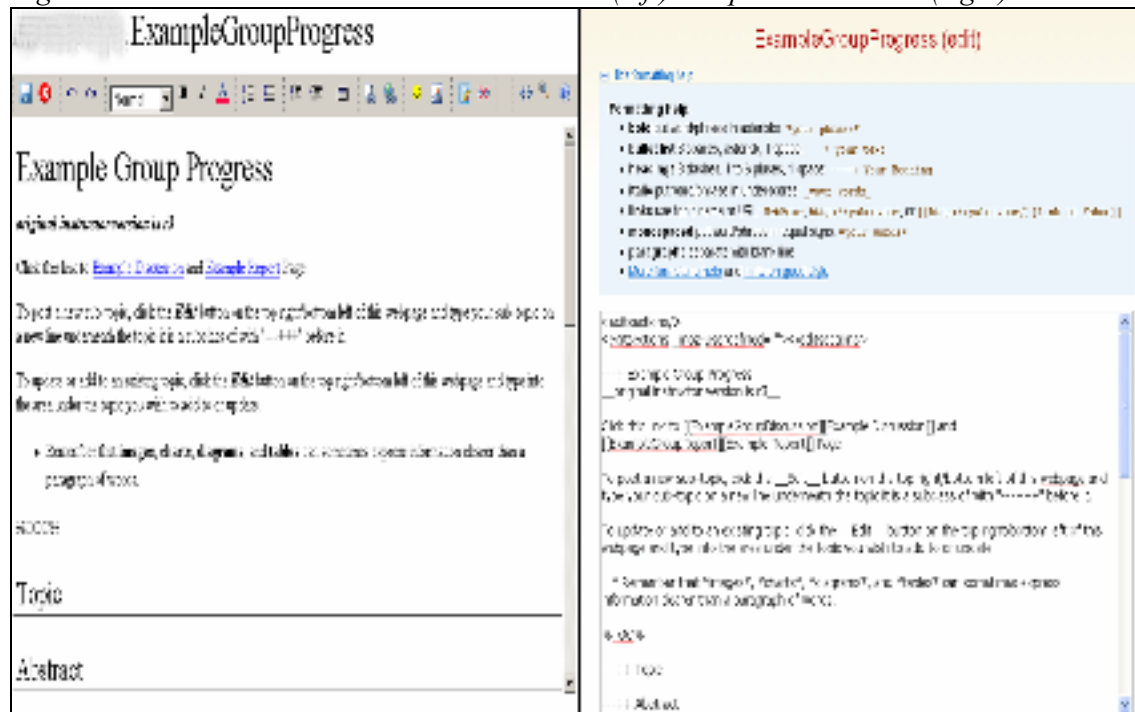
The WYSIWYG editor seems better than the plain text editor. Most of the students still used the plain text editor with HTML code for formatting, since there is a problem in adding graphics through WYSIWYG editor. On WYSIWYG editor, there is a button for adding image into the content; however, there is only a link of the image will be inserted. If students want to paste the picture (not a link) into the content, they must go back to the plain text editor to add HTML code. That is one of the reasons why the students use most the plain text editor instead of the WYSIWYG editor.

Students expressed that there were quite a lot of difficulties when they used TWiki to edit the contents. The major problems encountered by the students related to the editors in TWiki were:

o   Needed to type HTML codes for formatting that students may not be familiar with.

(Comments from Student 5, 8, 24, and 34)

o Could not perform editing at the same time by two members of the same group. (Comments from Student 3, 9, 11, 18, 23, 24, 26, 27, 29, 34, 36, 40, and 41)

Figure 2 shows the editor in Wikibooks. Wikibooks only equipped with one editor for users to edit the contents. The editor of the Wikibooks was simply a plain text editor with a formatting toolbar. Users can use HTML code directly if they are familiar with it. Otherwise, users may use the formatting toolbar ideally for formatting contents. When clicking on the buttons on the toolbar, some special designed characters for formatting (not the HTML code) will be added to the contents.

Figure 2. Editor in Wikibooks.
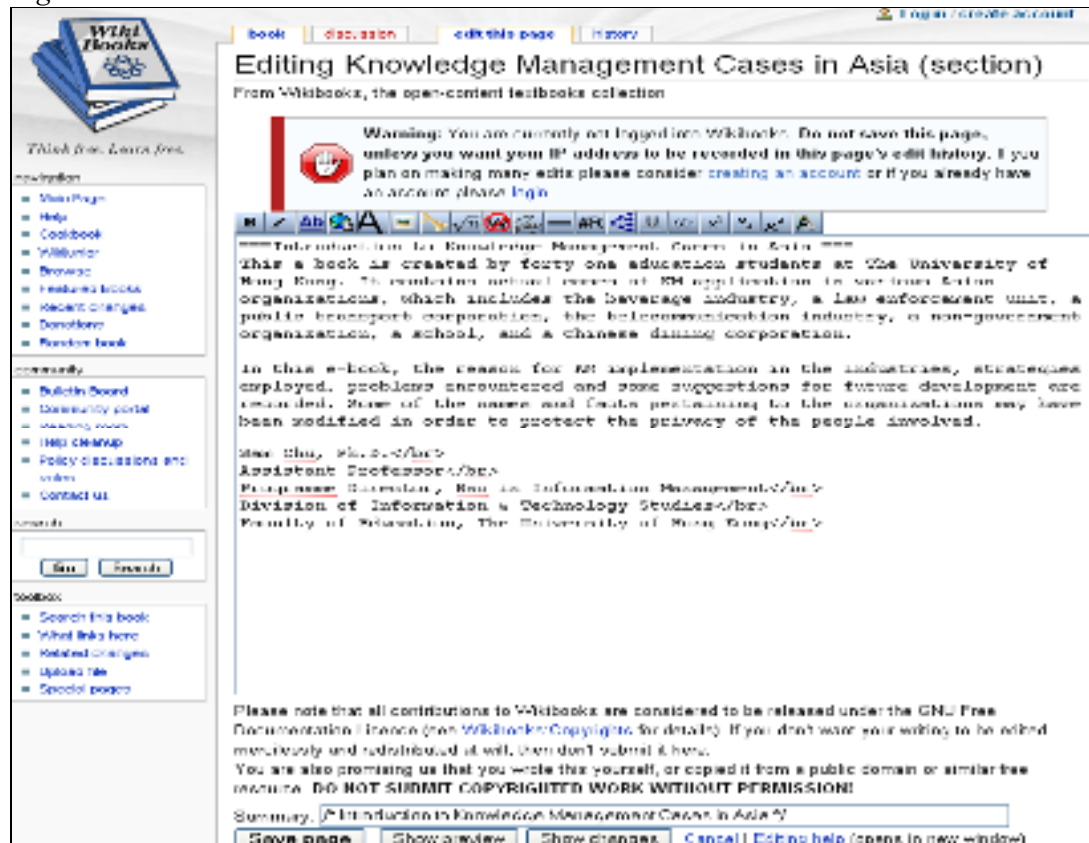
With experience in using TWiki, students had fewer problems when using Wikibooks. The

major problems encountered by the students related to the editor of the Wikibooks were:

o It might not be able to transfer content directly, since TWiki formatting were different from Wikibooks. (Comments from Student 3, 13, 19, and 26)

o All of the book chapters from the whole class were grouped together, then, it is quite confusing to look for or edit their own parts. It was very easy to accidentally erase the works from other groups since all book chapters were put together in the same box when editing. (Comments from Student 22 and 29)

4.1.2.2.   History tracking

History tracking is a very important function provided by wikis. This function enables users to trace back all the actions taken in the past. Figure 3 shows the history tracking function of both TWiki and Wikibooks.

Figure 3. History tracking function in TWiki and Wikibooks.
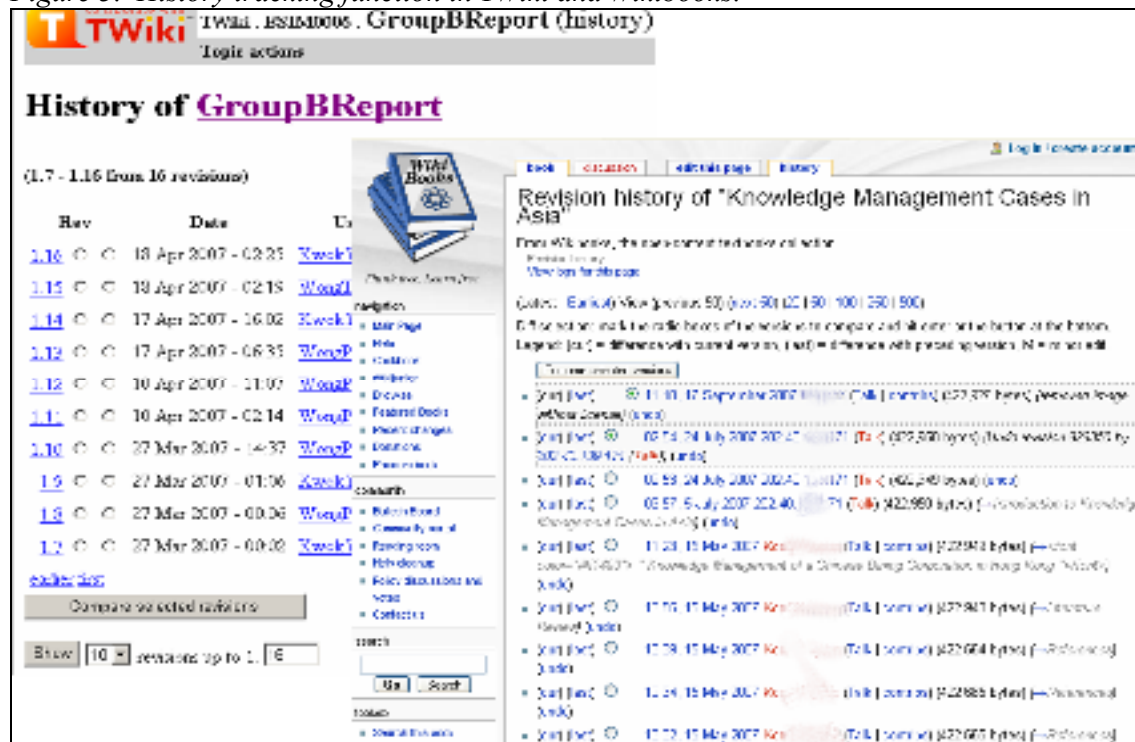
With the history tracking feature, all previous versions of students' work can be traced, the contents can be recovered effectively to the previous version when accidentally edited or deleted. In addition, the feature also enables group mates and instructors to trace the contributions to the contents. Instructors can then evaluate the individuals according to their contributions to the group project.

Besides, the history tracking function also enables users to compare the difference between two versions. Figure 4 shows how comparison between two versions be displayed in both TWiki and Wikibooks. TWiki would show the newer version on the left and the older version on the right; whereas Wikibooks would show the older version on the left and newer version on the right.

Figure 4. Versions comparison in TWiki and Wikibooks.
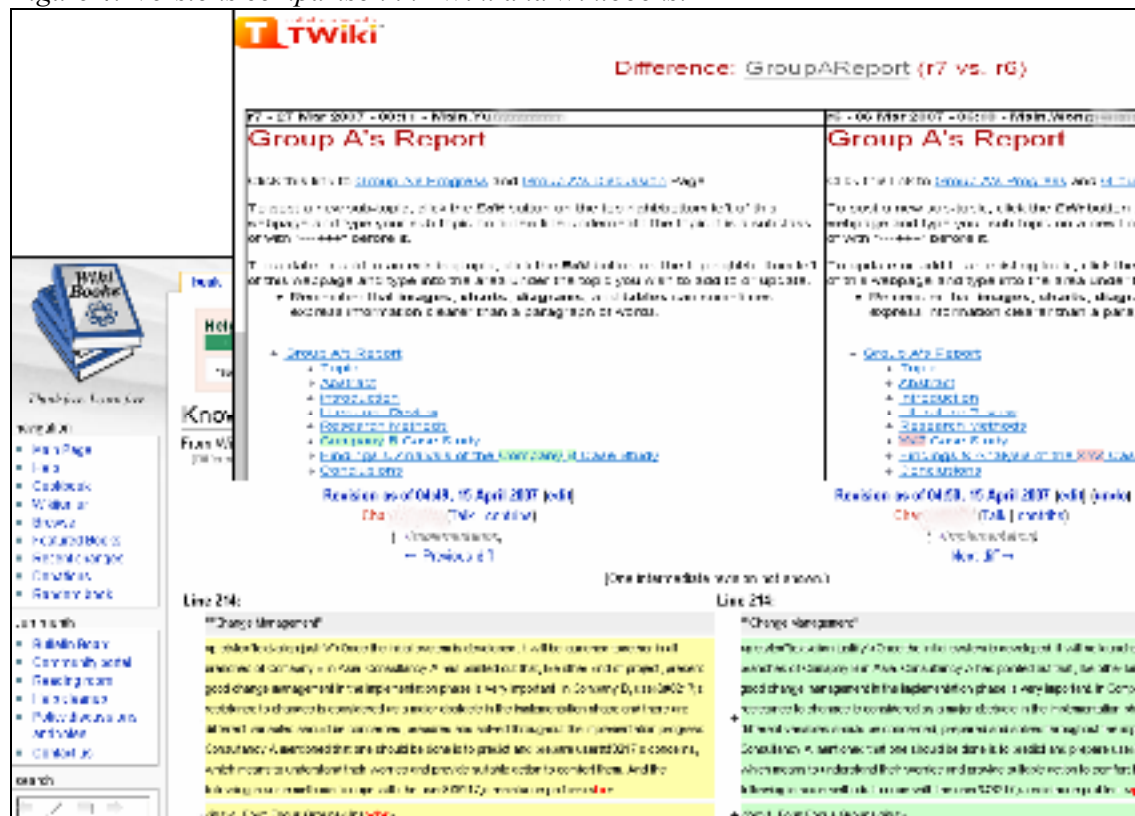
By comparing the differences of two versions, users are able to find out what have been changed, altered, amended or replaced, no matter how large in size the contents are. All the changes will be indicated by different colors on both wikis.

TWiki allows users to install an add-on[1], so that it is easier to compare the changes being made in any two versions in more details (Figure 5a). When doing the comparison of two versions, contents being deleted from an older version will be crossed out and be highlighted in pink, while contents being added into the newer version will be highlighted in green. When comparing two versions in TWiki without the add-on installed, the changes were simply showed side-by-side without specific indication of the details of the changes (Figure 5b).

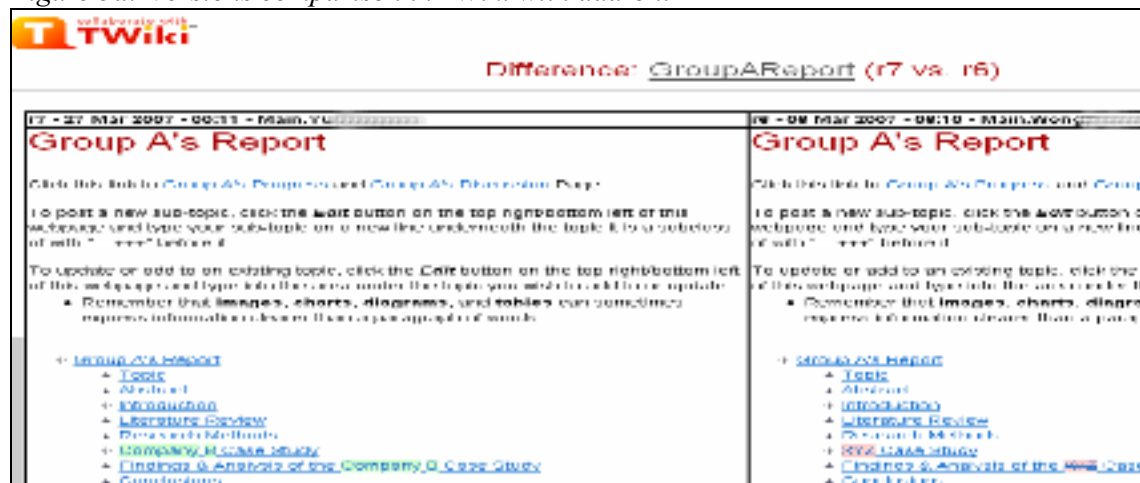*Figure 5a. Versions comparison in TWiki with add-on.*

Figure 5b. Versions comparison in TWiki without add-on.

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[1] Add-on here is referring to the software available from TWiki web which can provide more functions to enhance the effectiveness of TWiki.

Wikibooks has no such enhancement, and so the changes being shown can be quite confusing (Figure 6). When doing the comparison of two versions, contents being deleted from the older version will be shown on the left hand side, in red, while contents being added into the new version will be shown on the right hand side, but also in red.

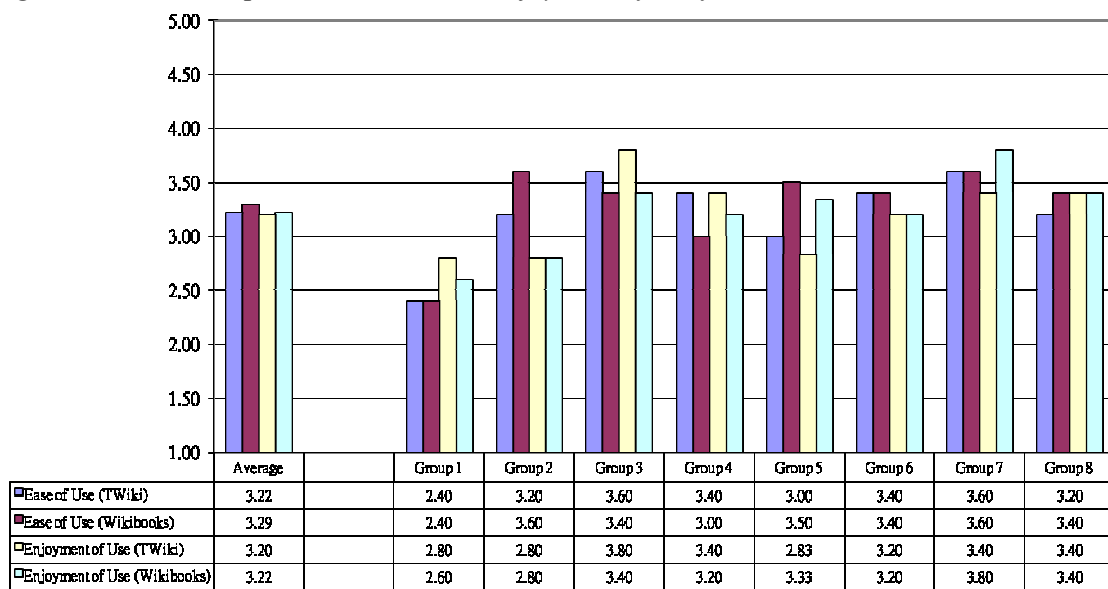*Figure 6. Versions comparison in Wikibooks.*

4.2.   Ease and Enjoyment of use on TWiki and Wikibooks

"Ease of use" and "enjoyment of use" are critical to determine how students like, or dislike,

wikis as the collaboration tools in their current and future tasks. Students' comments on both TWiki and Wikibooks regarding these two items were gathered.

Figures 7 shows their comments on the feelings about the two wikis on "ease of use" and how they enjoy using the two wikis for the group project. Generally, students rated Wikibooks higher than TWiki on both the "ease of use" and "enjoyment of use". Interestingly, in the break-down of the comments by groups, it was found that different groups had different opinions.

Figure 7. Students' opinions on ease and enjoyment of use for TWiki and Wikibooks.

	Average		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Ease of Use (TWiki)	3.22		2.40	3.20	3.60	3.40	3.00	3.40	3.60	3.20
Ease of Use (Wikibooks)	3.29		2.40	3.60	3.40	3.00	3.50	3.40	3.60	3.40
Enjoyment of Use (TWiki)	3.20		2.80	2.80	3.80	3.40	2.83	3.20	3.40	3.40
Enjoyment of Use (Wikibooks)	3.22		2.60	2.80	3.40	3.20	3.33	3.20	3.80	3.40

4.2.1. Ease of use

One of the eight groups (Group 1) felt that wikis were not quite easy to use (2.40 out of 5 for both TWiki and Wikibooks, with 5 as "very easy"). Student 30 of Group 1 felt that "platform is difficult to be understood, and very hard to change the format." Three of the eight groups (Group 2, 5, and 8) felt Wikibooks were easier to use than TWiki, whereas two of the eight

groups (Group 3 and 4) felt TWiki were easier to use than Wikibooks. Comparatively speaking, more students felt Wikibooks was easier to use than TWiki. Students commented on that TWiki does not allow more than one user in editing the same piece of work at the same time[2]. This is the main problem of using TWiki engaged by the students in doing their project. Student 23 expressed that "TWiki is not user-friendly… moreover, the system cannot allow two persons to edit the text at the same time… I cannot edit the text before the group members finished their editing…." In contrast, most of the students emphasized that they had no problem in using Wikibooks.

Generally, most of the students felt Wikibooks was a little easier to use than TWiki (3.22 out of 5 for TWiki, with 5 as "very easy"; and 3.29 out of 5 for Wikibooks). Student 41 expressed that, "Both TWiki and Wikibooks represent a quick and popular means to share peoples' knowledge with the world. They are simple to be created and edited".

4.2.2. Enjoyment of use

Generally, students enjoyed using both wikis in their group project (3.2 out of 5 for TWiki, with 5 as "very much so"; 3.22 out of 5 for Wikibooks), and there was very little difference on the feelings between TWiki and Wikibooks. Student 32 enjoyed using both TWiki and Wikibooks. She expressed that she enjoyed using TWiki because "all members could know and think of the questions that being raised". In addition, she also enjoyed using Wikibooks because "the sense of satisfaction was really strong when I saw the [product] (i.e. the online book)".
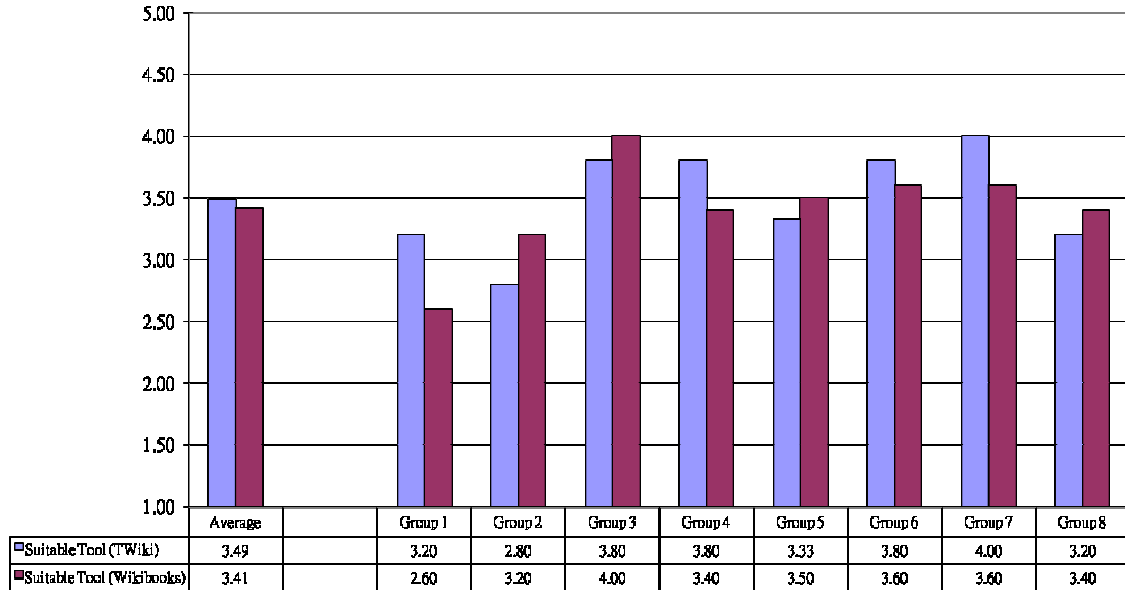
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[2] The feature of simultaneous editing was tested in TWiki. In fact, TWiki allows simultaneous editing even in the same document. It was found that the changes made by different users at the same time will be merged, even though the system noted that form data cannot be easily merged.

However, not all the groups enjoyed using wikis in their group project. Two groups (Group 1 and 2) rated their enjoyment below 3, representing they were not really enjoying to use wikis. In addition, three of the groups (Group 1, 3 and 4) enjoyed using TWiki more, but another two groups (Group 5 and 7) enjoyed using Wikibooks more, while the remaining groups felt no difference in the enjoyment of both wikis.

4.3.   Suitability of wikis (TWiki and Wikibooks) as collaboration tools for group project.

The use of collaboration tools aims at providing collaboration space for groups of people working together on the same piece of knowledge. This section will discuss the suitability of the wikis as the collaboration tool for students' group project, and, how wikis helped to improve the collaboration among the group members and enhanced the quality of the group project. Figure 8 shows the students' comments on whether they felt the two wikis were suitable tools for their group project. It appears that the students felt both TWiki and Wikibooks were suitable tools for co-constructing their group project.

Figure 8. Students' opinions on TWiki and Wikibooks as suitable tool for their group project.

	Average		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
Suitable Tool (TWiki)	3.49		3.20	2.80	3.80	3.80	3.33	3.80	4.00	3.20
Suitable Tool (Wikibooks)	3.41		2.60	3.20	4.00	3.40	3.50	3.60	3.60	3.40

Generally, students thought that TWiki was more suitable than Wikibooks as the tool for their group project (3.49 out of 5 for TWiki, with 5 as "very much so"; 3.41 out of 5 for Wikibooks). However, when breaking down by groups, the results showed that there was no consistency. Group 1 felt that Wikibooks was not a suitable collaboration tool (3.20 out of 5 for TWiki; and 2.60 out of 5 for Wikibooks), whereas Group 2 felt TWiki was not a suitable collaboration tool (2.80 out of 5 for TWiki; and 3.20 out of 5 for Wikibooks). Besides, four groups (Group 1, 4, 6 and 7) preferred TWiki than Wikibooks, and the other four groups (Group 2, 3, 5 and 8) preferred Wikibooks than TWiki.

Figure 9 shows that the majority of the students (78%) would prefer to use wikis as the tool in the group projects in the future. The students found wikis was the suitable tools for their Knowledge Management group project, because they thought wikis was related to knowledge management and facilitated knowledge sharing (see Table 1).

Figure 9. Students' preference on the use of wikis for the group project of the Knowledge Management course in the future.
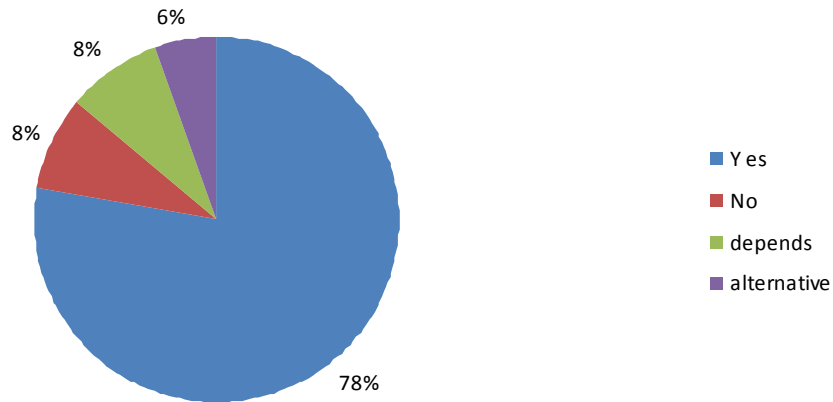

Table 1. Reasons for students who preferred wikis as the tools for group project.

Reasons for students who choosing wikis	Number of students
Wiki is related to Knowledge Management	5
Facilitating knowledge sharing	4
Able to follow students' progress	3
But use either TWiki or Wikibooks	2
Easier management	2
Use both wiki and MS Word	2
Feedback from lecturer to students	1
Look for new technology	1

4.4. Improvement of collaboration and Enhancement of quality.

The main objective of the collaboration tools is on improving the collaboration among individuals when the group members work together on the group task. With good collaboration tools, the quality of group work should be enhanced. Therefore, when evaluating wikis as collaboration tools for co-constructing group project work, the improvement of collaboration among group members and the enhancement of quality of the students' group project should be reviewed. Figure 10 indicates how students felt wikis could help them to improve the collaboration among the group member, and figure 11 shows how they felt wikis could enhance the quality of their group project.

Figure 10. Students' opinions on wikis with regards to improving the collaboration among the group members.
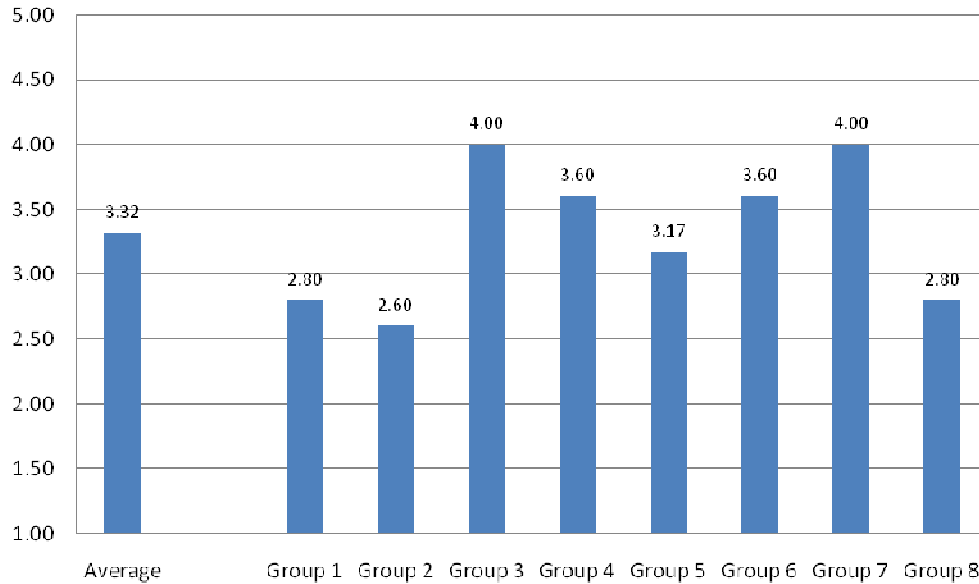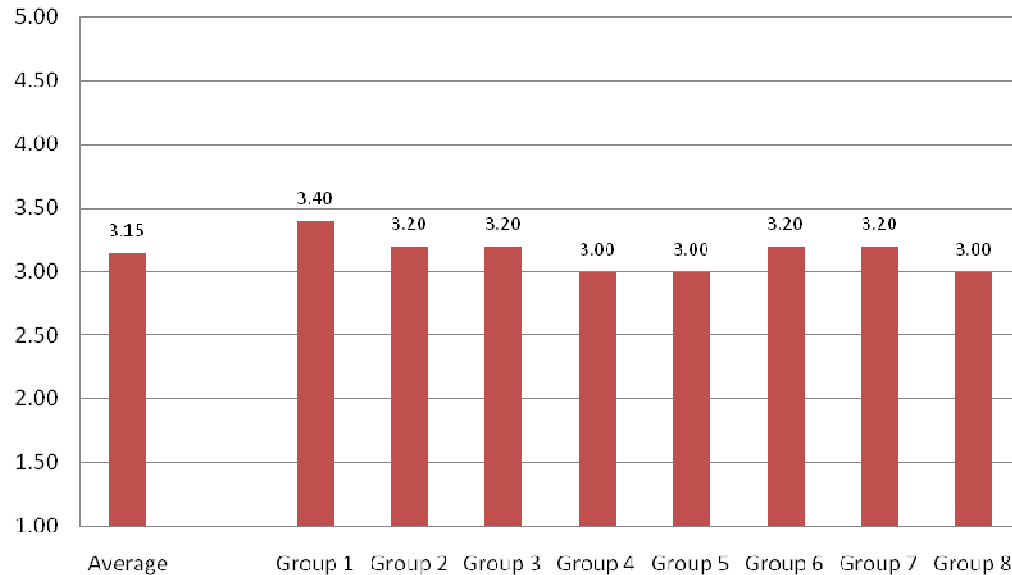

Figure 11. Students' opinions on wikis with regards to enhancing the quality of the group project.

Generally, students felt that wikis helped them to improve the collaboration among the group members (3.32 out of 5, with 5 as "very much so"). However, not all the groups thought that wikis helped them in improving collaboration. There were three groups (group 1, 2 and 8) rated at below 3, and that means they did not think so. Student 12, a member of group 8, felt

that students just wanted to get their job done, and did not care about the collaboration. She felt wikis created trouble to them, such as not allowing editing at the same time and hard to do formatting.

Students also generally felt that wikis helped them to enhance the quality of their group project (3.15 out of 5, with 5 as "very much so"). Shown in figure 11, all the eight groups agreed that wikis had positive influence in improving the quality of collaborative task. Both Student 32 and Student 40 emphasized that the visibility of members' participation helped on improving the quality of the group projects, since wikis would show the names of the participants.

5.   Conclusions and Implications

Both TWiki and Wikibooks have their own strengths and weaknesses. Through the analysis, there is no consistency on students' preference. Both of them are useful tools for the students although not so user-friendly. Students encountered difficulties in handling graphics and editing the same document simultaneously. These findings show that both wikis have not provided sufficient instructions in guiding users. In light of this, enhancement of user interface and improvement in instructions and guidance are needed for both TWiki and Wikibooks to enable more smooth usage of tools.

On the other hand, the analysis also shows that wikis as collaboration tools have positive influence in the improvement of the collaboration between group members and the quality of group works. To optimize the advantages of wikis using in classroom, instructors should

provide more instructions and guidelines to the students. More training should also be given as well. Therefore, students would be easier to familiarize with the tools, and, hence they would not feel frustration in using the wikis on their works.

6.　Limitation and Further Studies

The sample size of this study, which involved 41 undergraduate students in the Knowledge Management course, is comparatively small. During the three month's time for the process of their group project, the parallel comparison between TWiki and Wikibooks could not be carried out because students involving in the two wikis were in different phases. The order of using TWiki before Wikibooks also made it difficult to have fair comparisons based on students' opinions. Besides, it is difficult to compare the two wikis because of their similarities, although comparison should be on the similarities. Furthermore, it is suggested to compare wikis with some other kinds of collaborative content tools, like knowledge forum.

7.　Author's Information

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