

Cited As: Zhao, B., Zhou, M., Chu, S.K.W., Feng, D. & Chin, Y.K. (2011). Supporting Secondary School Students' Group Project Works with the Wiki. Paper presented at *CITE Research Symposium 2011*, The University of Hong Kong, Hong Kong.

Supporting Secondary School Students' Group Project Works with the Wiki

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This study examined the use of the Wiki for group projects among secondary school students. Participants included Form 1-2 students ($n=329$) from a local secondary school who used Google Sites for online co-construction of group projects. Upon completion of group projects, students answered a questionnaire on the pedagogical value of the Wiki. The questionnaire examined five aspects: learning/pedagogy, motivation, group interaction, technology, and knowledge management. Follow-up focus-group interviews were conducted with selected student groups. Preliminary findings showed students' positive perceptions on the pedagogical value of the Wiki technology, and qualitative analysis of interview data further supported the use of Wikis in secondary schools.

Introduction

The application of Web 2.0 technologies such as blogs and wikis in education has become increasingly significant in the past several years (Chu, Chan & Tiwari, 2012; Education Bureau, 2007). The Wiki technology is an emerging tool among Web 2.0 applications, which are able to meet the new needs of higher education (Secundo & Grippa, 2010). The Wiki is a knowledge management tool to facilitate the creation, sharing, discussion and revision of knowledge artifacts (Lio, Fraboni, & Leo, 2005). Compared with traditional methods, the distinguishing feature of the Wiki technology raises the academic interest in the integration of the Wiki technology and collaborative group projects (Chu, 2008; Chu, Cheung, Ma, & Leung, 2008; Woo, Chu, Ho, & Li, 2010). Therefore, this study focuses on the application of the Wiki technology in group project work in a Hong Kong secondary school. Google Sites is chosen as the Wiki technology tool to facilitate local students doing their group projects.

This study applies both quantitative and qualitative data to explore the challenges and potential benefits that the Wiki technology may bring to the local secondary school's students in doing their group projects. The findings may improve the service of the Wiki technology and imply a more extensive use in education.

Literature Review

Wiki Technology

Wiki is a Hawaiian word meaning quick (Lamb, 2004), and the Wiki technology is so named because it combines reading and writing within one web browser. The Wiki technology supports easy text-editing, webpage creation and linking, thus making it extensively deployed in group projects (Lio, et al., 2005).

Wiki Technology in Education

Reasons of the use of the Wikis in education, as described by Engstrom and Jewett (2005), Lamb (2004) and Raman et al. (2005), consist of the following: (1) The Wiki is an open-source technology which is easy to install and learn. (2) Users are able to update information in wiki pages. (3) Wiki pages are organized by content, and students are able to decide how to structure the information. (4) With the wiki's function that traces the project progress, it is easy to go back to earlier versions if problems occur.

Although the Wiki technology has the above obvious advantages, attention needs be paid to apply it in practice. For example, Cole's (2009) research reports a comparatively negative result stating that "(the) Wiki had little impact on student engagement simply because the participating students chose not to post to the Wiki ... Students suggest that the fault lay not with the technology but with an unattractive

course design” (p. 146). The Wiki should be regard as a potential tool to facilitate teaching and learning in education, rather than simply reading content. Also, the effectiveness of wikis’ application in learning and teaching depends on careful planning and training of both students and teachers to familiarize them with the technology (Engstrom & Jewett, 2005).

Application of Wiki Technology in Group Project

Researchers have frequently reported that the Wiki technology does play a positive role in group projects. The accessibility, simplicity and transparency of the Wiki technology helps with information and resources sharing among team members and across groups, which facilitates group projects (Nicol, Littlejohn, & Grierson, 2005). Students in universities also give positive comments on how the wiki can improve their collaborative group work (Chu, et al., 2008; Chu & Kennedy, 2011).

According to De Pedro (2007), using the Wiki technology for group projects can benefit both students and teachers with the following reasons: (1) students are allowed to participate in their own learning process, giving them greater opportunities for self-regulation; (2) teachers are given quantitative data to assess the contribution of each individual of a work group; (3) personalized teaching can be facilitated; and (4) each student is given a clear understanding of his/her learning progress.

In order to enhance the use of the Wiki in education, it is important to introduce the Wiki technology for students’ group project using. (Raman, et al., 2005). Furthermore, a grading policy should be established to ensure students are willing to learn collaboratively (Raman, et al., 2005).

In the case of applying the Wiki technology in Hong Kong, studies have been done on examining the use of the Wiki in university and primary school contexts (Leung & Chu, 2009; Woo, et al., 2010). In the secondary school context, the Wiki has been proved to enhance students’ writing skills and performance in examination (Mak & Coniam, 2008). However, it seems that very few studies have been done on testing the usefulness of the Wiki in supporting group projects in local secondary school context. Therefore, this research attempts to fill the literature gap by investigating Hong Kong secondary school students’ perceptions of a Wiki technology tool, Google Sites, for producing group projects.

Research Method

Based on the research gaps identified in the literature review, the main research questions of this study are:

- 1) Is Google Sites effective in facilitating student group project work at the secondary school level?
- 2) What are the similarities and differences of the use of Google Sites between Form

- 1 students and Form 2 students?
- 3) What problems did students face when they used Google Sites to conduct and evaluate group projects? What solutions can be offered to improve these problems?

This study used mixed research methods, quantitative and qualitative, to explore these research questions and analyze the data.

Participants and Intervention Programme

The Form 1 and Form 2 Chinese students (totaling 329 students, 64 groups) from a secondary school participated in this intervention programme for six months. The intervention programme was designed to require students, in groups of five to six students, to conduct their group project work about social focus in their general education courses, using a Wiki tool called Google Sites (<http://sites.google.com/>). Google Sites is a platform in which people can work together to add file attachments, information from other Google applications (like Google Docs, Google Calendar, YouTube and Picasa), and new free-form content. (Google Sites overview, 2011) In Google Sites, an index comprising twelve categories guided students in writing their drafts. Figure 1 is a sample of the project index from S2HGroup8¹.

The screenshot shows a Google Sites page titled 'QCLS2CGp8'. On the left is a sidebar with a table of contents listing sections from 'Welcome!' to 'Link to Delicious'. The main content area features a 'Welcome!' message, a 'Welcome to our site of LS Project!' message, and a 'Namelist of members' table. The table lists the group leader and members with their Chinese and English names and class numbers.

2C Group 8	Chinese Name	English Name	Class No.
Group Leader	[blurred]	[blurred]	22
Group Members	[blurred]	[blurred]	17
	[blurred]	[blurred]	19
	[blurred]	[blurred]	28

Figure 1. Framework of the project from S2HGroup8

¹ S2HGroup8 refers to Form 2 Class H (a fake name) Group 8.

The drafts on Google Sites were then copied to Word documents for further revision. The contents from the resulting final draft were presented on panels during the school open days. Teachers graded the group project work based on the final draft version in Google Sites, the final version of Word files and the presentations.

Data Collection

A questionnaire-based survey was conducted to examine students' perceptions on the use of Google Sites. All 329 students participated in the questionnaire survey. The questionnaire consists of 15 questions, addressing five categories: learning/pedagogy, motivation, group interaction, technology, and knowledge management. (Hazari, North, Moreland, 2009) Students rated their opinions on a scale from "Strongly Disagree" to "Strongly Agree" for questions in the questionnaire. A Chinese version of this perception questionnaire was given to avoid language misunderstanding.

Results from an analysis of data collected from the survey were used to design questions for interviews conducted with students from groups who received the highest grades for their group project work and those who used Google Sites more. Two Form 1 groups and three Form 2 groups were invited to be interviewed for about 20 minutes each. All interviews data was sound recorded.

Data Analysis

The data were analyzed by SPSS (Windows version 16.0). Students' opinion on the use of Google Sites was rated from 1 to 5 and with 1 being "Strongly disagree", 2 being "Disagree", 3 being "Neutral", 4 being "Agree" and 5 being "Strongly agree". Mean and median were used to analyze students' perceptions on the use of Google Sites. For each question in the questionnaire, one-sample Kolmogorov-Smirnov test was used to examine the distribution of rating by students (i.e., if $p < 0.05$, the data showed a non-normal distribution). Since the result of the normality of data was questionable, non-parametric tests needed to be used. The data from Form 1 and Form 2 students were analyzed by Mann-Whitney U test, since these two groups were independent (i.e., if $p < 0.05$, the significant difference between the data from the two groups could be supported).

Finding and Discussion

Effectiveness of Google Sites in facilitating the group projects work

Generally, both Form 1 and Form 2 mean values and total mean value were all over 3, which means Students of Form 1 and Form 2 believed Google Sites to be an effective tool for facilitating their group projects. (See Table 1) Kolmogorov-Smirnov test

examined the distribution of data. The p value is less than 0.05, and it proves that the distribution of data was not normal.

Table 1. Frequency of students' conceptions

Categories	Survey Questions	Form 1	Form 2	Total	Results from Mann-Whitney test: p-value [#]
		Mean; Median (95% CI ^a) (N ₁ =148)	Mean; Median (95% CI ^a) (N ₂ =181)	Mean; Median (95% CI ^a) (N=329)	
Learning/Pedagogy	-Enhanced interest ^b	3.22; 3	3.10; 3	3.16; 3	0.541
	-Participate more ^b	3.30; 3	3.30; 3	3.30; 3	0.794
	-Achieve objectives ^b	3.61; 4	3.50; 4	3.55; 4	0.415
Motivation	-Effort & time is worth ^b	3.31; 3	3.25; 3	3.28; 3	0.676
	-Prefer Google Sites ^b	3.26; 3	3.07; 3	3.16; 3	0.113
	-Continue to explore ^b	3.32; 3	3.17; 3	3.23; 3	0.176
Group Interaction	-Promote collaborative learning ^b	3.47; 4	3.45; 4	3.46; 4	0.873
	-Interact more ^b	3.34; 3	3.25; 3	3.29; 3	0.565
	-Come to a consensus faster ^b	3.08; 3	3.24; 3	3.17; 3	0.148
Technology	-Interface clear ^b	3.55; 4	3.55; 4	3.55; 4	0.752
	-Technical features enhance learning ^b	3.30; 3	3.27; 3	3.28; 3	0.790
	-Benefits outweighed challenges ^b	3.3; 3	3.21; 3	3.25; 3	0.518
Knowledge Management	-Tool for knowledge creation ^b	3.16; 3	3.03; 3	3.09; 3	0.213
	-Tool for knowledge sharing ^b	3.47; 4	3.77; 4	3.63; 4	0.002
	-Tool for knowledge dissemination ^b	3.47; 4	3.72; 4	3.61; 4	0.021

Notes:

^aCI stands for confidence interval calculated from the given sample set. It is an estimated range of plausible values of the true value, or the true mean of the population, A 95% CI means that there is a 95% probability that one will find the true value in the estimated range. The width of the CI indicates the reliability of the estimation. A narrower CI indicates more reliable result than a wider CI (Dalgaard, 2002)

^bThe respondents were answering according to a 5-point agreement scale, with 1 as "Strongly disagree" and 5 as "Strongly agree".

[#]Mann-Whitney test was used to compare the rate of agreement between Form 1 and Form 2 students.

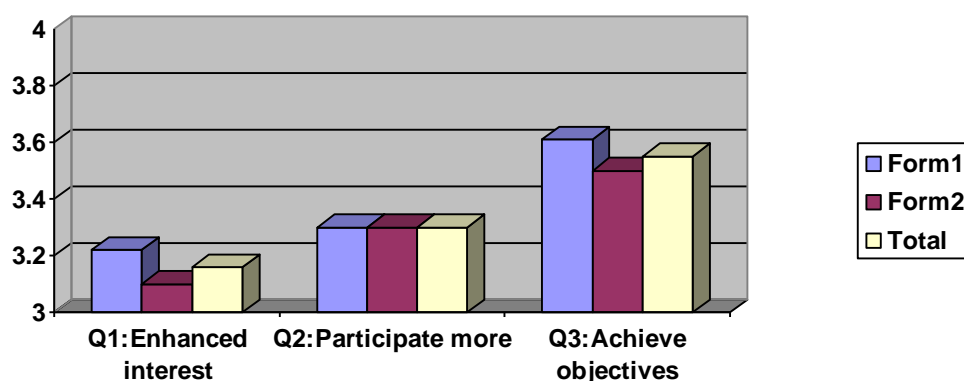
Learning/Pedagogy

Three questions about learning/pedagogy in the questionnaire were designed to examine the promotion of learning/pedagogy by Google Sites. The result shows that students believed Google Sites could promote their learning. The mean values for these three questions were all over 3. (See Figure 1) The third question, "Use of Google Sites aided me in achieving project objectives", achieved especially high mean value of 3.55, suggesting that students' perceptions for this question were positive. This result also shows De Pedro's opinion that each student is given a clear

understanding of his/her learning progress (de Pedro Puente, 2007).

Students' opinions from the interviews also supported the survey results. S2GGroup5 StudentA said, "We just created an account in Google Sites, and all team members can register it. All people can view the site, which makes us do our project faster."

Figure 1. Recognition of Google Sites promoting Learning and Pedagogy

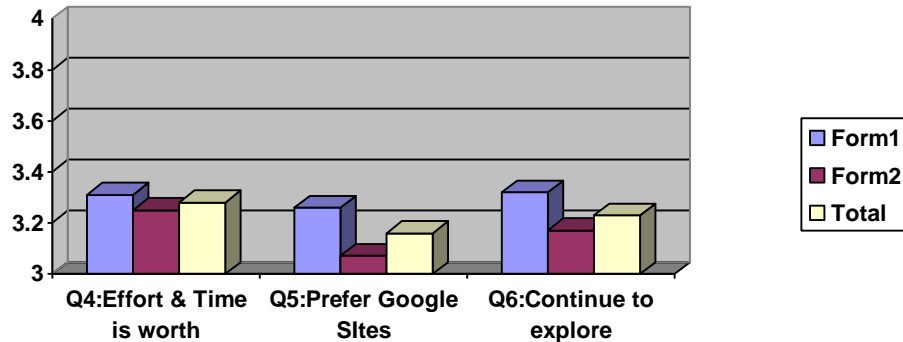


Motivation

Questions about motivation in the questionnaire were designed to gauge the effect by Google Sites on students' motivation for working on their projects. These questions received mean values of 3.28, 3.16, and 3.23 respectively, showing that students believed Google Sites could motivate them in their group project work (See Figure 2). In addition, the result shows that more Form 1 students preferred to use Google Sites than Form 2 students.

S1JGroup4 StudentA's opinions from the interviews also supported the survey results. The student said, "I had to spend more time on taking phone call or sending Emails before, but now, I can use Google Sites as a platform, which makes us do our project more efficiently." Also, S2GGroup5 StudentB said, "Google Sites provides a framework, which can help us to do the project. I like using this framework."

Figure 2. Recognition of Google Sites promoting motivation

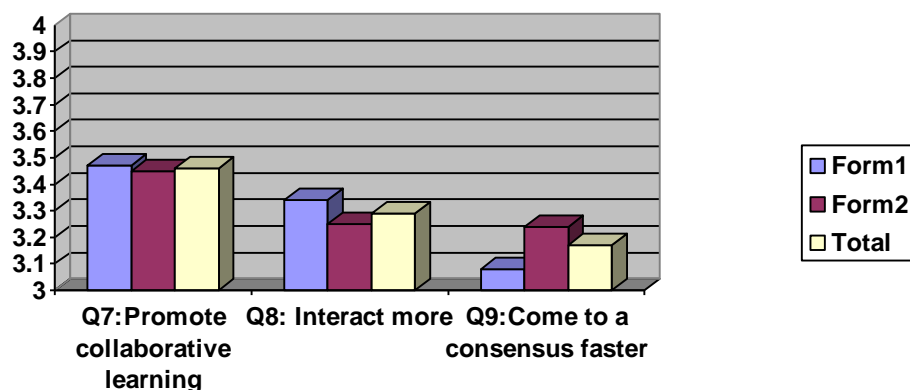


Group Interaction

Questions about group interaction in the questionnaire were designed to evaluate the promotion of the group interaction by Google Sites. Mean values of all three questions were over 3, especially for the question about more interaction, which median reached 4, this suggestions that most students believe that Google Sites with functions for collaborative learning is beneficial to group interaction (See Figure 3).

In the interviews, the S1JGroup2 StudentA said, “I think Google Sites can help us to finish the group project more easily because we can just communicate online and don’t need to go out to do discussions.” Also, the S1JGroup2 StudentB said, “We can find some information. We can put them on Google Sites. Other group mates can see them and it can help us to do the project.”

Figure 3. Recognition of Google Sites promoting group interaction

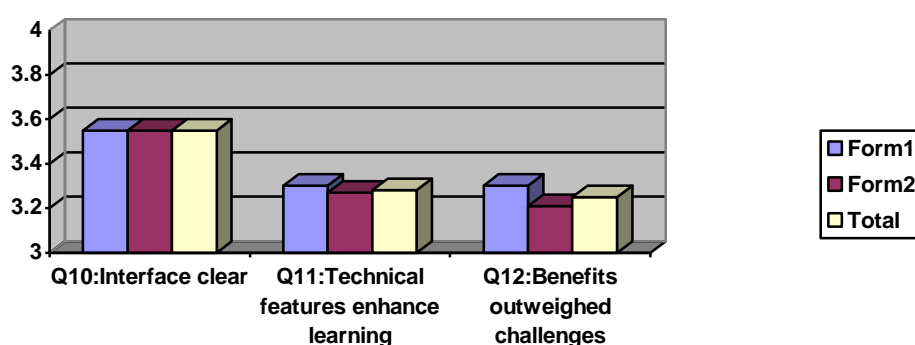


Technology

In the questionnaire, questions about technology were designed to examine the usability of Google Sites for students conducting their projects. The mean values of all three questions were over 3, which mean that students agreed that Google Sites was easy to use and learn. The mean of question 10 reaches 3.55, suggesting that the interfaces and functions of Google Sites were quite user-friendly. (See Figure 4)

In the interviews, S1GGroup2 StudentC said, “In Google Sites, it’s quite convenient for me to find the part I did, and the reference information can be uploaded into it.”

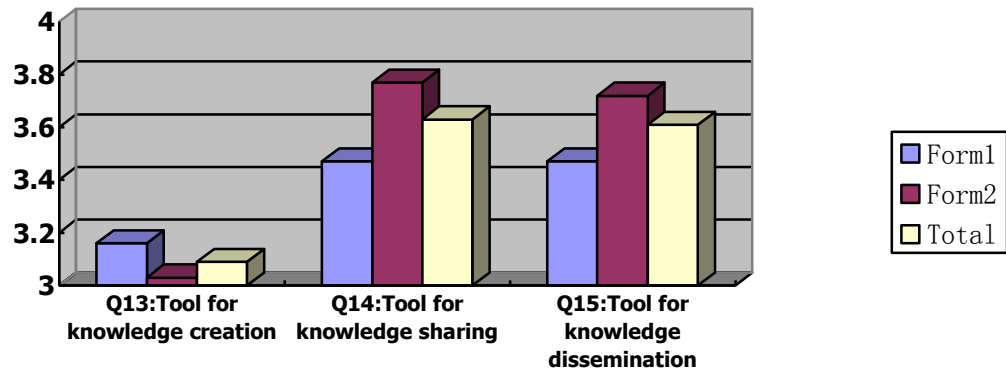
Figure 4. Recognition of Google Sites is good in technology



Knowledge Management

Questions about knowledge management in the questionnaire were designed to examine the promotion of knowledge management by Google Sites. The mean values were all over 3, which mean most students agreed that Google Sites could promote knowledge management when they conducted the group projects. (See Figure 5) However, the highest and the lowest mean values were both in this group. For the question “Google Sites is an enabling tool for knowledge creating”, the mean was only 3.09. Compared with other functions, the function of knowledge creation was perceived to be weak. Question 14 “Google Sites is an enabling tool for knowledge sharing” received the highest mean of 3.63 with 4 being the median value. Students believed that Google Sites was useful in knowledge sharing. The median for the question about knowledge dissemination was also 4, which shows that students also thought Google Sites could help knowledge dissemination.

Figure 5. Recognition of Google Sites promoting knowledge management



Comparison of the use of Google Sites between Form 1 and Form 2 students

We used the Mann-Whitney test to compare student perceptions between two forms. The p-value, a result of Mann-Whitney test being less than 0.05, indicates that the two samples groups were different in their answers. According to Table 1, it is easy to find that the p-value is less than 0.04 for the question about knowledge sharing and question about knowledge dissemination.

When analyzing these two questions in detail, more Form 2 students believed Google Sites was beneficial to knowledge sharing and knowledge dissemination than Form 1 students. Compared with other categories, the concept of knowledge management was more sophisticated, and more difficult to understand and develop. It also suggested that the use of Google Sites could promote knowledge management, especially for older students.

The S2HGroup1's opinions also supported the results. Student A in this group said, "Google Sites provides a platform for us to share our ideas." Student B said "Google Sites also share the soft copy of our project. If I write our project in Google Sties, every member of our team can manage it."

Conclusion and Implications

In general, students gave positive responses to the use of the Wiki technology in their group projects. Students agreed that with the assistance of Google Sites, they were more interested and more productive in group project work. They emphasized the important role that Google Sites played in achieving project objectives. Students also agreed that Google Sites enhanced their learning motivation and group interaction, especially on the collaboration of learning. They agreed that Google Sites was easy to

learn and abundantly functional for their group projects. As a knowledge sharing tool, Google Sites was also reported positively. But for knowledge creation, the feedback from students was just above neutral.

No significant difference has been found between feedback from Form 1 and Form 2 students. With respect to their opinions on information sharing and knowledge dissemination, Form 2 students gave more positive responses. Since Form 2 students had more experience in doing group projects, it is reasonable to assume that they had a clearer understanding on the importance of information sharing and knowledge dissemination than Form 1 students. This may be the reason why they gave higher recommendation for Google Sites.

The suggestions that students gave focus on the technological function of Google Sites:

- (1) Multi-user editing: More than one user is allowed to edit the page at the same time. Currently only one user is allowed to edit one page at any given time.
- (2) Online chatting on the same page: Permission of online chatting, or even video conversation, on the same page can facilitate online group discussion. Such kind of function is already available in Google Documents.
- (3) Interface templates: More templates for customizing webpage design can allow students to easily change the outlook of their group projects.
- (4) Stable service: The save button is occasionally dysfunctional, giving higher risk to group members who may forget to save their current work frequently.

Limitation and Future Research

The samples of this study were Form 1 and Form 2 students from a top-level, all-boy secondary school in Hong Kong. The following characteristics of the sample bring several limitations to this study: no difference in gender can be examined as all the students are male; this research might not represent the general circumstances of regular secondary schools in Hong Kong; the effect of age was not obvious because only two forms participated in this research.

Future research can be done on a larger scope to wider the gender gap. More differences of a wider range of ages may be found between junior secondary school students and senior secondary school students. Studies including regular schools can also increase the understanding of Wikis' application on a broader base.

Acknowledgement

This research has been supported by a General Research Fund administered by Research Grants Council (project code: HKU 743510H) of the Hong Kong SAR Government.

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