Collaborative Writing with a wiki in A primary Five english classroom

MATSUKO WOO, SAMUEL CHU, ANDREW HO and XUANXI LI

Faculty of Education, The University of Hong Kong
E-mail: matmuku@hku.hk, SAMCHU@HKU.HK, a_ho_1@yahoo.com, xuanxi6@hku.hk

Many studies have been conducted on the application of Web 2.0 technologies (e.g., wikis) in an educational environment including: exploring the potential of their use, the effects they have on student learning and their effectiveness when combined with appropriate instructional practices. However, whether or not these findings at the tertiary and high school levels are applicable to young learners at the primary level, have yet to be determined. Through case study design, this small-scale study explored the challenges and potential benefits that a wiki may bring to students and teachers in a Primary five English class. The study examined the wiki's key affordances for collaboration that may have an impact on students' writing abilities, through the analysis of collaborative writing projects. To understand human activity in a complex classroom environment, Activity Theory was used as an analytical lens to help examine students' learning processes and outcomes. The study found that the use of a wiki in a class of primary five students in a Hong Kong Chinese primary school was perceived positively. Students enjoyed using the wiki, and the overall perception was that it helped foster teamwork and improved writing. The tracking functionality of the wiki gave in-depth information about the types of edits the students were making and helped the teachers to assess students' collaboration and development. Findings from this study may help provide practical recommendations for primary school English language teachers and help illustrate the potential that Web 2.0, specifically wikis, can bring to influence young language learners.

1. Introduction

The current educational setting emphasizes the integration of Web 2.0 technology in language teaching and learning (Education Bureau, 2007; Richardson, 2009) and teachers in this current technology-driven climate are being pressured to integrate technology into their teaching. This study aims to address research problems at both a theoretical and a practical level. At the practical level, how can we integrate Web 2.0 technology, (e.g., wikis) into daily English language writing lessons with primary school students? What are the benefits and potential of this technology for teachers and students in Hong Kong where English is taught as a second language (L2)? Does wiki technology enhance students' writing and in what way? How can we harness the power of collaborative technology into an effective teaching tool?

At the theoretical level, many studies have started to appear on the application of Web 2.0 in education involving collaborative tools called wikis. These studies focus on the application of wikis and explore their usage potential, the effects they have on student learning, and their effectiveness when used with appropriate instructional practices. They occur across different subject disciplines, including English language, geography,

engineering, and library and information science, at both the tertiary and the secondary level (Chu, 2008; Engstrom & Jewett, 2005; Mak & Coniam, 2008; Nicol, Littlejohn, & Grierson, 2005). However, whether or not these findings are applicable to young learners at the primary school level and whether they are transferable to L2 learning for young learners needs further investigation. Wiki's tracking system provides teachers with information on how students collaborate within their group, which is difficult to assess in a traditional classroom environment. Peer feedback has been found to help improve L2 students' writing (Yang, Badger, & Yu, 2006). Providing a genuine audience enhances learner motivation, which helps L2 students become more engaged writers (Lo & Hyland, 2007). If implemented properly, these are some of the factors that a wiki technology may help enhance through a platform of sharing, peer commenting, and co-constructing (Richardson, 2009).

This study intends to investigate the relatively less visited area of primary schools to examine whether or not the findings of other researchers are applicable to young learners of English as a second language. The study used a case study approach to explore the challenges and potential benefits that a wiki may bring to students and their teacher in a local Hong Kong upper primary English language class. Through collaborative writing, the study examined how a wiki's collaborative affordances may have an impact on students' writing outcomes. The findings may illuminate the potential that Web 2.0, specifically wikis, can bring to influence young learners, and help provide practical recommendations for primary school English language teachers.

2. Literature Review

Literature on collaborative learning in second language (L2) acquisition strongly supports the importance of social interaction and collaboration in L2 learning (Saville-Troike, 2006) and writing (Hyland, 2003). Most of the literature views technology supported collaborative learning using computer-mediated communication in L2 learning in a positive light (Jones, Garralda, Li, & Lock, 2006). New technologies have had a tremendous impact on the teaching and learning of writing in the last few decades (Goldberg, Russell, & Cook, 2003; Hyland, 2003), and there are both advantages and disadvantages for L2 writing. Although, some researchers have been critical of computer aided/assisted instruction in language learning (Angrist & Lavy, 2002; Hyland, 2003), generally, the literature seems to point to web-based collaborative learning as potentially promising technology in L2 learning as well as L2 writing (Goodwin-Jones, 2003).

Many studies have shown that: (a) the easy accessibility, simplicity, openness and transparency of wiki pages helps learners share information and resources across the groups and among their group members, and makes it easier for students to work at their own pace (Nicol, et al., 2005); (b) students have positive perceptions about how wikis can improve collaborative group work and the quality of their work (Chu, 2008); (c) the effectiveness of wiki application in learning and teaching depends on careful planning and training of both students and instructors to familiarize them with the technology, on class

size, and on motivating students to learn from one another based on discovery or project learning principles (Engstrom & Jewett, 2005; Raman, Ryan, & Olfman, 2005); and (d) affordances provided by a wiki and affordances required by a learning task need to match for technology implementation to be effective (Bower, 2008). Researchers (Hazari, North, & Moreland, 2009) found that university male students tend to have higher satisfaction with wiki technology than their female counterparts. However, whether or not gender plays any role with young L2 writers using a wiki technology is yet to be examined.

Wikis have been used across different subject disciplines, as mentioned in the Introduction at both the tertiary and the secondary level, but a research gap exists in that it is not clear whether or not these findings can be applied to young learners at the primary level and are transferable to L2 learning for young learners.

3. Conceptual Framework

The literature in the three broad areas of: (1) collaborative and cooperative learning, (2) L2 learning and writing, and (3) computer-supported collaborative learning (CSCL) and online collaboration seems to indicate that the common prevailing learning theories in these paradigms tend to be mainly from constructivism (Parker & & Chao, 2007) and from a socio-cultural perspective (Hyland, 2003; Lantolf, 2000). Specific learning theories developed from them include: knowledge creation (Lipponen, Hakkarainen, & Paavola, 2004), knowledge building (Scardamalia & Bereiter, 2006), the process-oriented method (Strijbos, Martens, & Jochems, 2004), and expansive learning based on activity theory (Engestrom, 2001). One of the underlying theories in L2 writing is from a socio-cultural perspective (Hyland, 2003), which is also prevalent in CSCL and online collaboration (Crook, 1994). The literature also shows that activity theory with its socio-cultural perspective seems to be applicable to all these paradigms on which this study is based: collaborative learning, L2 writing, and CSCL with online collaboration.

As a result, a theoretical framework of the activity system was chosen for this case study to help interpret how a tool, a wiki technology, mediated students' activity in a collaborative environment, where the objective of the task was to create a piece of writing, with the ultimate goal being to improve students' writing abilities and the whole learning outcome. Activity theory, which has its roots in the works of Vygotsky and his protégée Leont'ev (1978), consists of three components: *mediating artifacts or tools* (e.g., instruments, signs, procedures, machines, and methods), the *subject* of the activity (e.g., individuals or groups), and the *object* (e.g., the subject's purpose of the activity), which leads to the ultimate *goal or outcome* of the activity. Engestrom (1987) expanded this triadic model further into a more complex model of an activity system by adding three other dimensions: *rules* of conduct within the social context of the activity, the *community* of participants involved in the activity, and a *division of labour* that imparts roles to the participants within the social context of the activity.

4. Methodology

To explore how collaborative writing using wiki technology influences the development of students' L2 writing abilities in the complex and continuously changing dynamics of a classroom environment, a case study design was chosen using both quantitative and qualitative data. Activity theory was used as the conceptual framework. Based on the research gap identified in the literature review, an overarching research question was proposed: How does collaborative writing involving the use of the wikis influence the development of students' writing abilities in upper primary English language classrooms? The following four sub-questions were formulated to guide in data collection: (1) What are the perceived benefits and challenges for students and teachers using wikis in a collaborative writing environment? (2) What are the key affordances in the use of wikis that encourage and support students in collaborating actively in the co-construction of their writing assignments? (3) How might the learning outcome of students' writing using wikis differ from that of the normal collaborative writing without wikis? (4) Does gender influence the student learning outcomes when using a wiki technology?

4.1. *Participants and Intervention Programme*

A class of 38 primary five students and their English subject teacher were selected for this case study by the purposeful sampling method. The school was selected from Chinese primary schools of mid to high level in terms of students' ability to write in the English language. This was to ensure that the primary five students of ages 10 to 11 years were able to write a minimum of 100 words in English so that a sufficient quantity of writing could be produced to examine the effect of the collaboration using the technology.

The students and their teachers participated in an intervention programme for approximately six weeks, only during their English writing lessons. The intervention programme was based on the integration of a wiki in their existing English language curriculum (HKCECES, 2008) in collaborative writing within project-based learning. The teacher chose for its user friendliness, one of the wiki tools available from various vendors called PBwiki at the time, but now renamed PBworks. During the project, students were asked to co-construct their writing on PBworks pages created for each group, and exchange their comments through its platform. The students worked collaboratively in mixed ability and gender groups of four to six to produce a general description on a topic of their choice from different animals. The lessons were planned for both face-to-face learning situations in the classroom or the computer laboratory, and online learning outside their normal classroom. The writing process lessons were planned collaboratively with the teacher and the researcher during the study to ensure the wiki technology implementation. Although the study focused on just one classroom, for ethical reasons, the intervention programme was offered to other classes and their English teachers on a voluntary base.

4.2. *Data Collection and Analysis*

The data was collected and examined through a triangulation method using multiple sources of evidence, such as student and teacher questionnaires given after the intervention programme, a semi-structured interview with the teacher, focus group discussions with selected students, and editing information recorded in the wiki system. The teacher questionnaire consisted of open-ended questions, while the student questionnaire consisted of both open-ended and closed-ended questions. Responses to the closed-ended questions were given according to a five point Likert scale to examine the participants' perceptions, the wiki's collaborative affordances, and the learning outcomes. The interview and group discussions were conducted after the questionnaires to clarify the respondents' answers, or to probe further to understand better the learning phenomenon.

Editing information generated by different groups was collected automatically online through the wiki system, and analyzed and sorted by type of revision or contribution. The types of revision were categorized using an adapted version of Mak and Coniam's (2008) four identifiers. The four identifiers from their study with secondary students were: (1) adding ideas, (2) expanding ideas, (3) reorganizing ideas, and (4) correcting errors (e.g., grammar, spelling and punctuation). Group writings were analyzed using a score sheet adapted from Lo and Hyland's (2007) study on Hong Kong primary five students composition writing. To verify the accuracy of coding by categories and evaluation of the group writing, two raters double coded and marked independently, and discussed the results for a consensus. Tests scores from pre and post-tests and school writing exams assessing writing skills were given before and after the intervention programme to examine any significant improvement in the quality of the students' writing. Pre and post-tests were adapted from the Territory Wide System Assessment for Primary 6 English Language Reading and Writing (Education Bureau, 2008). Activity theory was used as an analytical lens to interpret the data for final analysis from a broader picture within the social cultural context of the study.

5. Findings and Discussion

5.1. *Student and Teacher Perceptions*

Data from student questionnaires indicate that students generally perceived the use of a wiki in their group writing positively, addressing the sub-research questions (1) - (3). This is supported by Chu's (2009) findings that primary four students regarded the use of information technology (IT) positively in their inquiry project-based learning. In the questionnaires, the students were asked whether they enjoyed using the wiki (Q1), whether the wiki helped them work better as a team (Q2), whether the wiki helped them write better (Q3), whether commenting on the wiki helped in improving their writing (Q6), and whether the wiki was useful for group work online (Q7). Table 1 shows the responses to these closed-ended questions, to which students indicated their responses using a five point Likert scale. All the questions had ratings over 3 from the lowest of 3.5

(Q2) to the highest of 3.8 (Q6 and Q7). One of the highest positive responses concerned how comments from peers posted on the wiki platform helped in improving the students' writing (Q6). This was also echoed in the students' answers to the open-ended questions:

"We can share our comments and teach other." (Student=S27)

"We write comments to correct our mistakes." (S15)

"Others can give comment to me and help me make it better." (S18)

"They give me some message and I feel so happy." (S24)

"When I don't know how to write, somebody can comment on your   work." (S39)

Table 1. Students' Perception of a Wiki

Question Items	Mean Rating
Q1: Enjoy using PBwiki	3.6
Q2: Work better as a team	3.5
Q3: Write better in groups	3.6
Q6: Commenting on PBwiki improves writing	3.8
Q7: Useful for group work on-line	3.8

Note 1: Rating based on a 5 point Likert scale ranging from 1, 'not at all' to 5, 'very much so', where 3 is the mid-point.

The teacher's perceived benefits from the open-ended questionnaires provide some answers to the sub-research question (1): "… students will be more motivated to find the information they look for from the Internet" and "They will exchange their ideas via the platform as well as it is more efficient and convenient". Table 2 shows how actively the students exchanged their ideas on a wiki platform as observed through its tracking system. The frequency of comments during the study period ranged from a high of 28 to a low of nil. Comments varied from: (a) simple positive and negative feedback to full elaborated feedback, (b) simple suggestions of form and content in providing ideas, and (c) miscellaneous responses to the above (a)/(b), or commenting on issues irrelevant to the writing topic.

Table 2. Activities Recorded in Wiki's Tracking System

Group	A	B	C	D	E	F	G	H	Total
No of posted edits	14	10	10	27	13	4	1	3	82
No of posted comments	28	14	9	4	11	0	16	0	82
Total activities	42	24	19	31	24	4	17	3	164
Duration in days	28	17	35	34	23	4	8	14	
Evaluation of group writing	47	42	43	48	20	23	29	26	
Word count	207	123	325	171	562	244	593	353	

Note 1: Evaluation of writing rated by 2 markers, based on accumulative score for content, organization, language, and graphics or pictures with a maximum of 65 points.
Note 2: Word count denotes the number of words in the group writing.

Responses to open-ended questions in student questionnaire concerning problems and challenges showed some technical problems that students encountered while using a wiki during their project. For example, they cited the computer being slow, not being able to edit at the same time, having difficulty in creating pages, or taking a long time in loading

information. This is not surprising when a new technology is introduced into classrooms. Other challenges were on collaborative perspectives and some may not be specific to wiki technology, but the technology afforded an environment that encouraged students to engage in collaborative behaviour as illustrated below, where, whatever challenges the students encountered, they solved their problems in their own ways:

"Someone will change our work and we talked to the teacher and the teacher to cancel this problem. Sometime the computer isn't working so we call each other." (S3)

"Our ideas may be different, but we use 投票 [votes] to choose the title." (S35)

Some of the problems and challenges that the teacher reported were: (1) uneven gender distribution of this class (13 boys and 27 girls) created conflict in gender grouping; (2) job distribution among group members; (3) technical problems such as slow loading time when students were using PBworks simultaneously; (4) some students had restricted or no access to computer or Internet at home; and (5) inadequate training of skills, such as scanning and skimming, note-taking, and translation of information, all of which are necessary to handle the large amount of information from the internet to accomplish the tasks. Her solutions to these challenges were reported in the order mentioned above: (1) she created a student preference table to facilitate even gender distribution and foster better understanding of gender differences within the groups, thus enhancing effective peer learning; (2) each group chose a member in their group to write and collate information while the other members collected new information and commented on the writing; (3) students saved their findings and comments in their personal USB as a back-up, or e-mailed them to the members in charge of collating and organizing the ideas; (4) those having problems accessing computers at home were encouraged to use computers at school, in the public library, or at other members' homes; (5) skills were taught after the problem had been identified (e.g., the use of the online dictionary for translation).

Focus group discussion was conducted with eight students and their English subject teacher. Eight students were selected, as evenly as possible, to represent both genders as well as positive and negative respondents. Although the students in the focus group discussion mentioned the difficulties and challenges that they faced, overall, they were positive about their experience with the wiki technology. This is in line with the findings from the student questionnaires. Similarly, teacher's comments recorded in the open-ended questionnaire reflected what the students had reported. She felt that the students had improved their writing skills, as she commented: "Students read more and they learnt and used some new vocabulary and language forms". Other skills that she observed were, "Improvement in reading, IT, collaboration skills and subject knowledge was observed". This teacher perceived her primary five students using a wiki technology in a collaborative writing to improve in skills involving writing, reading, IT, collaboration and subject knowledge, which were also supported in the findings from a study with primary four students in Chinese writing project using IT (Chu, 2009).

5.2. *Analysis of Revisions*

Wiki's tracking system provided information that helped understand in depth what kind of editing was taking place and how that would affect student collaboration and writing skills, addressing sub-research questions (2) and (3). Table 2 shows the number of activities recorded in the tracking system varying from 1 - 27 for the number of edits posted and 0 - 28 for the comments posted during the first edits on Jan 22nd to the last edits on March 14th, 2009. Most groups from A - E were actively involved in either editing or commenting as seen from the table of recorded activities in wiki's tracking system. Some groups posted more comments than editing to accomplish their group writing, while others frequently edited through the platform rather than commenting, as in the case of group F and H, which had no comments recorded. Group G actively contributed to the group writing through comments, but constructed their group writing on Microsoft word before pasting onto a wiki, thus showing a low frequency count on the editing record. The active groups spent more days working on their group work as seen from the number of days counted from the first edits to the last edits. Those groups that spent more days on their work tended to have higher evaluation on their written work based on a scoring method adapted from Lo and Hyland (2008).

A detailed analysis of the edits shows that most concern content, such as the adding; reorganizing; replacing; and elaborating of ideas, rather than form, such as syntax; spelling; punctuation; and formatting. Table 3 shows the types of editing done by eight different groups as recorded in wiki's tracking system, categorized according to Mak and Coniam's (2008) adapted version of identifiers. The fact that there were more edits on the content of ideas may be due to the spell checks that are built into PBworks system and the access to the internet. The spell checks helped students ease their cognitive load, thus allowing them to concentrate on the content. Similarly, a host of ideas and information was made available through the internet, freeing the students to focus on analyzing and evaluating the content and extract the main points for their own writing. Other reasons might be that the students tended to feel at ease communicating through their familiar domain of technology, as was found in a study with peer tutoring for L2 writers using ICQ (Jones, et al., 2006). The local study found that online interaction tended to produce more discussions concerning content and process, while face-to-face peer tutoring focused on forms such as syntax, vocabulary, and style. Although the study was conducted with university students, the results may be applicable to primary students who are familiar with MSN technology. As one student wrote on an open-ended questionnaire: "We can use the Wiki like an MSN to talk"(S14). Another reason might be that students are more actively involved in the self-correction process when they have doubts or reservations about the feedback from their peers, while feedback from teachers is believed to be correct and will not lead to further self-initiated correction, as was reported in a study of L2 writers' peer-feedback (Yang, et al., 2006).

Since the text type for this group writing was a general description, most of the first and second edits show new ideas being added, with the new ideas not being students' original ideas, but new information from the internet. While exploring the use of the wiki platform, students frequently visited to change their spacing, fonts, and other formats for pictures as recorded under the formatting. Surprisingly, common edits concerned other content such as elaborating, reorganizing and replacing ideas. This is a good sign in encouraging good writing skills, especially in L2 writing, where many students tend to focus on form rather than content (Hyland, 2003). Those groups that edited frequently tended to revise more, as in Group D, which recorded 27 visits and had 65 revisions on their work. On the other hand, frequent visits did not mean that quality revisions were taking place, as in the case of Group B, who had 10 visits but recorded 12 content revisions. This compared to Group F, who had only 4 visits, but also had a greater number of content revisions, 16. Here, we are assuming that quality revisions mean content revisions rather than changes in forms. Table 3 shows that Groups A, B, C and D, with a higher number of revisions, tended to have better writing scores compared to the other groups, who had a lower number of revisions.

Table 3. Types pf Revision by Groups

| Group	A	B	C	D	E	F	G	H	Total by Types
Content edits:									
Adding new ideas	12	10	17	21	13	6			79
Elaborating on existing ideas	2		1	6					9
Reorganizing existing ideas		2	1	3	2	4			12
Replacing existing ideas	5		3	5	3	6		6	28
Sub-total	19	12	23	35	18	16	0	6	136
Form edits:									
Grammar	1		1	4		1			7
Spelling		2		1					3
Punctuation		1		2		1			4
Formatting	14	11	10	23	7	4		1	70
Sub-total	15	14	11	30	7	6	0	1	84
Total revision by Groups	34	26	34	65	25	22	0	7	
No of posted edits	14	10	10	27	13	4	1	3	
Evaluation of group writing	47	42	43	48	20	23	29	26	

Note: Due to difficulty in deciphering individual efforts, two students without the consent forms in Group A and D were not singled out from their group work, thus N= 40.

All the groups were able to write 309.8 words on average, with the lowest word count being 123 and the highest count, 593. With these students, length was not a problem, especially when they reported that with access to the Internet, they were able to produce so much information. As stated by their teacher: "… with the use of Internet resources, students tend to write more than they used to on paper." They needed to exercise their critical thinking skills to choose the appropriate information for their writing, as one student commented, "It was too difficult to group too much information when we were doing the work. We chose the main point in each information"(S29). Another skill they

needed was to paraphrase the information in their own words to avoid plagiarism, which the teacher realized as the project progressed. During the teacher interview, the teacher mentioned that she had noticed students cutting and pasting the information straight from the internet. Subsequently, the teacher gave a mini-lesson on how to paraphrase information taken from other sources in their own words and to acknowledge the source of information.

Although a wiki platform seems to provide affordances for writers to focus on content, this doesn't necessarily happen automatically, as shown by differences in the quality of revision for Groups B and F. Quality content still needs to be encouraged and enforced through teacher instruction, and some groups may need more support in content revision than others. The tracking system provides teachers with windows of information on what is happening in each group's editing process. The teacher in this study was beginning to realize the usefulness of the tracking system, as she commented: "I could easily know and check who worked and edited on their work as there were email notifications to remind me of every change my students made in their work in PBwiki", and "I usually give them general comments on their work in lesson, orally".

5.3.   *Gender Differences*
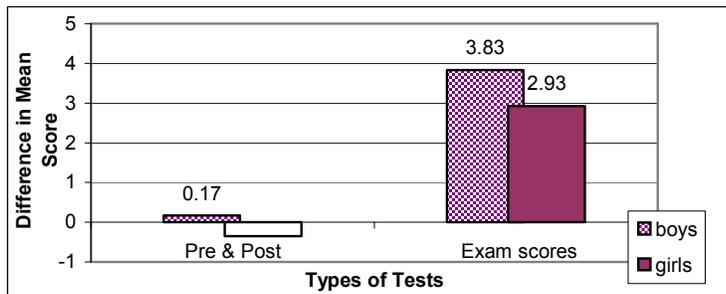
Note 1: Pre and post test scale ranging from 0 to 7 and exam score scale from 0 to 60.
Note 2: A blank bar indicates negative value of –0.35.

Fig 1: Graph Showing Difference in Mean Score by Test Types and Gender

Fig. 1 shows both the difference of mean scores between pre and post-tests assessing the students' writing skills (boys' mean difference =0.17 and girls' mean difference =-0.35 in a scale of 0 to 7) and school writing exams given before and after a wiki intervention (boys' mean difference=3.83 and girls' mean difference=2.93 in a scale of 0 to 60). In both instances, the scores were higher for boys than for girls. However, paired t-test by statistical software SPSS showed that boy's pre and post test scores did not show any significant difference while the girls' decrease was significant with p=0.023 where p $\leq$ 0.05. Similarly, paired t-test on boys' school exam scores before and after the intervention was not significant while the girls' increase was significant with p=0.002

where p⬚ 0.05. Some girls tend to shy away from a new technology and this may hamper their writing. This came to light during the focus group discussion as a girl commented that she is not good at IT skills and thus it takes her a long time to type and that she prefers paper and pencil. This sentiment was echoed by few other girls in the group. Boys, on the other hand, have shown positive perception towards a wiki as seen from some of their written comments in student questionnaires. When asked if PBworks helped them to write better in their own writing, few boys responded: "Yes, because I love using computer to do writing" (S14), " I can be faster with internet than writing on paper" (S13). The boys' mean rating on the Likert scale, ranging from 1 to 5 described in section 5.1, was higher than the girls in all the closed-ended questions from the questionnaires, though an independent t-test for each question showed no significant difference between boys and girls. These findings are inconclusive due to the limitations of the study involving short time frame. An unbalanced gender distribution in the class, where less than one third of the class is boys (12 out of 38) may have also influenced the outcome. Whether there is any gender factor for teaching implication using a wiki may need further investigation.

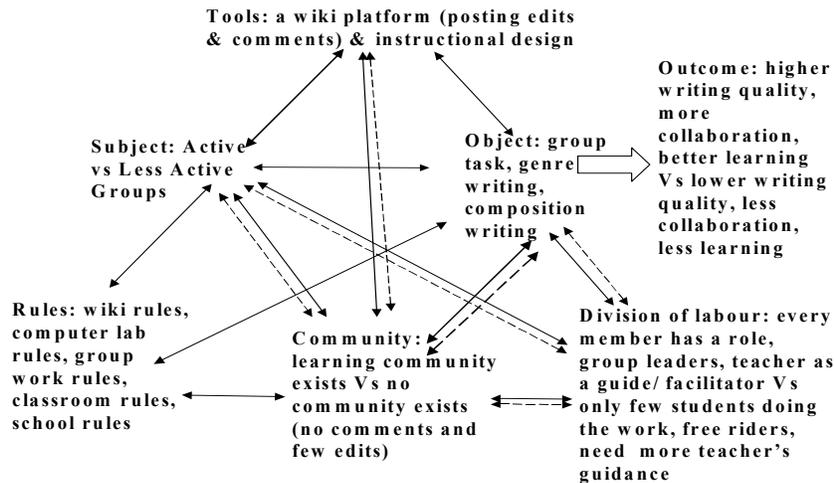### 5.4. *Comparison Using Activity Theory*

Fig.2: Comparison of Active and Less Active Groups Based on Activity Theory (Engestrom, 1987)

From the activity theory perspective, all six elements of the activity system: tools, subject, task objective, community, division of labour and rules need to be in place for any successful learning outcomes to occur. This was seen in the active groups (Group A, B, C & D), where a wiki platform promoted collaboration through its affordances provided by posting edits and comments during the course of group writing to co-construct a general description of their own chosen topic. Rules for wikis and group work

set up by the teacher for students to follow, existence of learning communities with the members willing to share and support each other, and roles that each group member are willing to take up, all facilitate the collaborative activity leading to a productive outcome. Any one of these elements may break down, such as with the less active groups (Group F & H), who posted nil comments or only few edits indicating low collaboration level. This may mean that there is no learning community among the group members, and that members are not actively carrying out their roles. A common scenario is that a few members are doing all the work, and the rest are free riders. This signals that teachers may need to provide more guidance to these groups to help create a learning community by assigning roles or encouraging sharing among the members. Once one of the six elements ceases to operate, the other elements may start to break down, creating internal contradictions or tension (Engestrom, 2001) between the elements. This chain reaction may also include the complete abandonment of the tool and the total cessation of peer-to-peer comments, as in the case of group F and H. Fig. 2 shows a detailed comparison of the active and the less active groups within their activity systems, and the dotted lines indicate the tension between the elements.

6. Conclusion and Teaching Implications

The study found that a class of primary five students in a Hong Kong Chinese primary school were positive in their perceptions of using a wiki. The students enjoyed using the wiki and commented how it helped them to work better as a team and write better, encouraged peer-to-peer interaction, and facilitated online group work. Both the students and their teacher perceived the exchange of comments through a wiki platform as beneficial to their collaboration and construction of their group writing. Among the eight groups observed in this primary five class, those active groups that spent more time working on their group work tended to produce better quality writing.

A detailed analysis of the types of revisions in the wiki's tracking system indicates that the content of ideas, for example, the adding; reorganizing; replacing; and elaborating of ideas was being revised rather than forms, such as syntax; spelling; punctuation; and formatting. This may be due not only to PBworks' affordances in providing writers with spell checks to lessen their cognitive loads, but also to the ease with which the internet allows a host of ideas and information to be made available, freeing writers to focus on analyzing and evaluating the content to extract main points for their own writing. Other reasons considered are that students feel at ease with communicating through technology, which tends to produce more content and process discussions (Jones, et al., 2006), and that peer feedback activates self-corrections (Yang, et al., 2006). Among this class of primary five students, those groups revising idea changes more than forms seemed to produce higher quality writing. Although the wiki technology affordances may provide the opportunity for writers to focus on content, it will not happen automatically, and a teacher's role becomes ever more important in directing students to the right skills. Wiki's tracking system gives in-depth information about the types of edits the students are

making and helps teachers assess their collaboration and development of their group writing process, a task that maybe difficult to monitor in traditional group work. This can help teachers decide on the kind of support to be given, and provide feedback when necessary during the course of writing and not at the end when the product is finished.

The general findings from the active groups and the less active groups were compared using the theoretical framework of the activity theory. The active groups' involvement in comments and edits in the wiki's tracking system indicates that all six elements of activity systems are necessary and important for a group to collaborate actively in a writing project. On the other hand, a low frequency of comments and edits posted on the wiki platform indicates a warning signal that collaboration is not working. The activity theory points to the elements of community of learning and division of labour that may need to be re-examined. For example, teachers need to assist group members in sharing and helping each other to create a learning community, or to assign roles so that each member has a role to play. All six elements of the activity system: tools, subject, task objective, community, division of labour, and rules need to be in place for an effective implementation of a computer supported collaborative learning environment.

7. Limitations of the Study

The intervention programme in this study may not be long enough for participants to fully acquire and internalize the skills needed to produce a significant effect in the improvement of the quality of their writing. These skills include both wiki technology and information literacy skills such as information searching on the internet, scanning, skimming and critically reviewing information, and note taking skills involved in project-based learning. Since using a wiki technology was a new experience for both the teacher and the students in this study, a "Hawthorn effect" in terms of novelty may have affected their enthusiasm and overall outcomes. This was a small-scale case study involving one class with one subject teacher and the subjective perspective associated with the questionnaires cannot be generalized beyond this study. A lack of data and information on why some groups have high or low collaboration, points to the need for further research on in-depth analysis of collaborative process within the groups.

References

Angrist, J., & Lavy, V. (2002). New evidence on classroom computers and pupil learning. *Economic Journal, 112*, 735-765.

Bower, M. (2008). Affordance analysis-mathching learning tasks with learning technologies. *Educational Media International, 45*(1), 3-15.

Chu, S. K. W. (2008). TWiki for knowledge building and management. *Online Information Review, 32*(6), 745-758.

Chu, S. K. W. (2009). Inquiry project-based learning with a partnership of three types of teachers and the school librarian. *Journal of The American Society for Information Science and Technology, 60*(8), 1671-1686.

Crook, C. (1994). *Computers and the collaborative experience of learning*. London: Routledge.

Education Bureau (2007). *Consultation document on the third strategy on information technology in education: Right technology at the right time for right task*. Hong Kong: Government of HKSAR.

Education Bureau (2008). Territory-wide System Assessment 2007 (Primary Schools) Quick Guide Retrieved Feb 26, 2009, from http://www.systemassessment.edu.hk/pri/eng/index_eng.htm

Engestrom, Y. (1987). Learning by expanding. http://communication.ucsd.edu/MCA/Paper/Engestrom/expanding/toc.htm

Engestrom, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work, 14*(1), 133-156.

Engstrom, M. E., & Jewett, D. (2005). Collaborative learning the Wiki way. *TechTrends, 49*(6), 12.

Goldberg, A., Russell, M., & Cook, A. (2003). The Effect of Computers on Student Writing: A Meta-Analysis of Studies from 1992 to 2002. *The Journal of Technology, Learning, and Assessment, 2*(1).

Goodwin-Jones, B. (2003). Blogs and wikis: Environments for on-line collaboration. *Language Learning & Technology, 7*(2), 12.

Hazari, S., North, A., & Moreland, D. (2009). Investigating Pedagogical Value of Wiki Technology. *Journal of Information Systems Education, 20*(2), 187.

HKCECES (2008). *Specific Guidelines for English Language Primary 4-5 Levels*.

Hyland, K. (2003). *Second language writing*. Cambridge: Cambridge University Press.

Jones, R. H., Garralda, A., Li, C. S. D., & Lock, G. (2006). Interactional dynamics in on-line and face-to face peer-tutoring sessions for second language writers. *Journal of Second Language Writing, 15*, 1-23.

Lantolf, J. P. (2000). Intorducing sociocultural theory. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 1-26). Oxford, U.K.: Oxford University Press.

Leont'ev, A. N. (1978). *Activity, consciousness, and personality*. Englewood Cliffs, N.J.: Prentice-Hall.

Lipponen, L., Hakkarainen, K., & Paavola, S. (2004). Practices and Orientations of CSCL. In J.-W. Strijbos, P. A. Kirschner & R. Martens (Eds.), *What we know about CSCL and implementing it in higher education* (pp. 31-50). Boston, Mass.: Kluwer Academic Punlishers.

Lo, J., & Hyland, F. (2007). Enhancing students' engagement and motivation in writing: The case of primary students in Hong Kong. *Journal of Second Language Writing, 16*, 219-237.

Mak, B., & Coniam, D. (2008). Using wikis to enhance and develop writing skills among secondary school students in Hong Kong. *System, 36*, 437-455.

Nicol, D., Littlejohn, A., & Grierson, H. (2005). The importance of structuring information and resources within shared workspaces during collaborative design learning. *Open Learning, 20*(1), 31-49.

Parker, K. R., & & Chao, J. T. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects, 3*, 57-72.

Raman, M., Ryan, T., & Olfman, L. (2005). Designing knowledge management systems for teaching and learning with wiki technology. *Journal of Information Systems Education, 16*(3), 311-320.

Richardson, W. (2009). *Blogs, wikis, podcasts, and other powerful web tools for classrooms* (2nd ed. ed.). Thousand Oaks, Calif.: Corwin Press.

Saville-Troike, M. (2006). *Introducing second language acquisition*. Cambridge : New York: Cambridge University Press.

Scardamalia, M., & Bereiter, C. (2006). Knowledge Building: Theory, Pedagogy, and Technology. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 97-115). New York: Cambridge University Press.

Strijbos, J. W., Martens, R. L., & Jochems, W. M. G. (2004). Designing for interaction: Six steps to designing computer-supported group-based learning. *Computers & Education, 42*(4), 403-424.

Yang, M., Badger, R., & Yu, Z. (2006). A comparative study of peer and teacher feedback in a Chinese EFL writing class. *Journal of Second Language Writing, 15*, 179-200.