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TRACING PEER FEEDBACK TO REVISION PROCESS IN A WIKI SUPPORTED COLLABORATIVE WRITING

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Abstract

This study investigates how can peer comments lead to actual revision process in a wiki supported collaborative writing environment among primary five and six students from a Chinese primary school in Hong Kong where English is taught as a second language (L2). Students from three upper primary classes totaling 119 students from age ten to twelve and their three English subject teachers went through three months of English language writing using a wiki. Quantitative and qualitative data were analyzed from activities recorded in a wiki system, including posted edits and comments and students' group writings. The wiki page history revealed information on types of revisions that occurred, allowing a trace of how different peer feedbacks lead to actual revisions, resulting in better group writing. Findings from the study may shed light on how wikis can help provide necessary support and how peer-feedback can affect students' writing process with wikis.

Keywords

Wikis, collaborative writing, L2 writing, primary school, revision, peer feedback

Introduction

With the advancement of educational technology there has been a strong emphasis on the integration of Web 2.0 technology in language teaching and learning (Education Bureau, 2007; Richardson, 2009). 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 in using technologies for L2 writing. Generally, the literature seems to point to web-based collaborative learning as potentially promising technology in language learning as well as in writing (Goodwin-Jones, 2003). Many studies have started to appear on the application of Web 2.0 in education involving collaborative tools called wikis. They examine 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 (e.g. (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 young L2 learners needs further investigation. This study intends to fill in this research gap.

In this study, a mixed method approach was used to explore the possible benefits of peer commenting and editing on a wiki platform to students and their teachers in local Hong Kong upper primary English language classes. The findings may help illuminate how effective peer commenting may influence revision process during collaborative writing using a wiki technology.

Literature Review

Much research has examined revision in student writing both in English taught as a first language (L1) (Faigley & Witte, 1981; Fitzgerald & Markham, 1987) and L2 writing (Berg, 1999; Min, 2006; Paulus, 1999; Tsui & Ng, 2000; Yang, Badger, & Yu, 2006). These studies examined whether incorporated revisions in the final text are of content or form changes and looked at how peer-feedback and teacher-feedback influenced students' revision process. Content changes involve global level changes on idea, content and organization while form changes consist of copy-editing operations including spelling, grammar, and punctuation. By examining how inexperienced writers revise differently from expert writers, Faigley and Witte (1981) developed a revision taxonomy which has been widely used in revision analysis. Fitzgerald and Markham (1987) have adapted the taxonomy in their study investigating how direct instruction with the revision process affects knowledge of revising and leads to further revision efforts with primary school students. Majority of revisions made by American university students whose English is a second language (ESL) were found to be surface level revisions but the revisions resulted from peer and teacher feedback tend to be meaning-level changes (Paulus, 1999). However, Yang (2006) found that with Chinese ESL university students teacher feedback brought about surface-changes and highlighted how students involve in self-correction when they doubt or have reservations about peer feedback since teacher feedback is believed to be correct and will not lead to further self-initiated correction. Similarly, Hong Kong secondary school L2 learners were found to favour teacher comments which were incorporated more compared to peer comments but peer feedback enhanced a sense of audience, raised their awareness of their own strength and weaknesses, encouraged collaborative learning and fostered ownership of text (Tsui & Ng, 2000). Other studies (Berg, 1999; Min, 2006) examined how trained peer responses, in contrast to non-trained peer responses, affect revision types and quality of writing. In these studies meaning-type revisions occurred with higher rate among trained students than untrained students implying that training students with certain response skills to writing is essential for effective peer response.

Studies have appeared on the effect of technologies on revision process through use of track changes in computers (Liu & Sadler, 2003), on-line peer tutoring (R. H. Jones, Garralda, Li, & Lock, 2006), wiki based collaborative writing (J. Jones, 2008; Kessler, 2009; Mak & Coniam, 2008). Liu and Sadler (2003) found that university students working in technology-enhanced group work using MOO and Microsoft Word editing tend to have larger number of comments with larger percentage in revision-oriented comments leading to more overall number of revisions compared with students in traditional group discussing face-to face during peer commenting and using pen and paper for revising. A local study compared on-line use of ICQ and face-to-face peer-tutoring for L2 writers and found that students felt at ease when communicating through their familiar domain of online chat, rather than a formal atmosphere of a face-to-face situation, where tutors tended to direct the course of discussion focusing more on grammar, vocabulary, and style (R. H. Jones, et al., 2006). Jones (2008) investigated revision patterns of revision histories in Wikipedia articles and found that contrary to Faigley and Witte's (1981) findings with inexperienced and expert writers, the articles that were not nominated for its highest quality had more content revisions and fewer surface revisions. Studies have found that students tend to attend more to the content revisions than grammar revisions using a wiki collaborative writing platform for non-native speaker of pre-service English teachers from Mexican university (Kessler, 2009) and with Hong Kong ESL secondary students (Mak & Coniam, 2008). Mak and Coniam (2008) observed that the collaborative nature of wikis helped students enhance the quality of their collaboration by expanding, amending, reorganizing and correcting during the editing process and highlighted the usefulness of wikis' tracking function as pedagogically valuable in revealing the evolution of students writing over time.

Objectives of the study

Although some studies with technologies have shed a positive light in the area of revision, very few studies have been conducted with primary school children using technologies such as wikis to compose and revise text. Wikis may help to scaffold students' collaborative writing through a platform of sharing, peer-commenting, and co-constructing (Richardson, 2009). To address the research gaps, the following research question was proposed: How does the use of wiki's features such as posting comments and edits help L2 writers during collaborative writing in an upper primary English language classroom? Three sub-questions helped to guide data collection: What kinds of comments are being posted? What kinds of revisions are being done on the wiki platform? How do the posted comments lead to actual revisions to improve students' writing?

Methodology

This study used mixed method design using the strength of both quantitative and qualitative approach (Creswell, 2008) to investigate how peer comments lead to actual revision and improve their writing performances in a collaborative writing using a wiki technology.

Participants

Students from two primary five and one primary six classes totaling 119 students, aged from ten to twelve years (mean age 11.6, 59 boys and 60 girls), and their three English subject teachers were selected by purposeful sampling. 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 from ten to twelve 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.

Intervention Programme

The students and their teachers participated in an intervention programme for approximately three months, only during their English writing lessons. The intervention programme was designed with the integration of a wiki tool called PBworks (<http://pbworks.com/academic.wiki>) in their existing English language curriculum (HKCECES, 2008) in collaborative writing. To scaffold them in their writing, students were asked to co-construct their writing on PBworks pages created for each group, and exchange constructive feedback and comments through its platform guided by teacher provided wiki rules. The students worked collaboratively in mixed ability and gender groups of four to produce two non-fiction texts on topics of their choice and illustrate their work with photos and graphics. 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 programme was refined based on a pilot study (Woo, Chu, Ho, & Li, in press). The teachers helped scaffold students' writing by providing a genre framework and timely feedback which included teaching skills such as critically evaluating and extracting appropriate information from the internet, and encouraging students to paraphrase and summarize main ideas. For ethical reasons, the intervention programme was offered to other classes and their English teachers on a voluntary base. However, this study focused only on three classes.

Data Collection and Analysis

Qualitative and quantitative data were collected and examined through a triangulation method using multiple sources of evidence, including evaluation of students' group writing, students' comments posted on wiki platform and editing information recorded in the wiki's history page.

Students' group writings were evaluated using the analytic method adapted from Tompkins' (2004, 2010) scoring rubrics for assessing young writers, which has also been used to assess Hong Kong primary five students composition writing (Lo & Hyland, 2007). Group writings were analyzed in three areas of content and organization, language, and visual graphics and photos. Each area was divided into further subscales except for the last scale on visual graphics and photos, which was included since as part of their writing instructions, students were encouraged to insert graphics and photos from Internet. To reflect the aspects of genre in their writing, item 4 in organization; 'Appropriate use of genre and its conventions' and item 5 in language; 'Use of imagery, simile or metaphor' have been added to the list. Each item was then given scores according to, excellent-5, good-4, average-3, below average-2, poor-1, and components not used-0. There were total of 13 items, with full score being 65. See Appendix A for details.

Comments posted on the wiki platform were analyzed based on Liu and Sadler's (2003) categories of comments used to examine the types of comments made through technology-enhanced peer discussion. Peer comments were divided into two areas of global: feedback related to idea development, audience and purpose, and organization of writing, and local: comments related to copy-editing, such as wording, grammar, and punctuation. They are further divided into four types of comments: evaluation that comments on features of writing, clarification that probe for explanations and justifications, suggestion that points out the direction for changes, and alteration that provides specific changes. These comments were categorized into those that are likely to lead to revision, revision oriented and those that do not, non-revision oriented. Two other categories were added, comments on management level that aimed at managing group work or wiki technology and any other comments that did not fit the above categories or were irrelevant to the writing topics. Refer to Appendix B for rubrics.

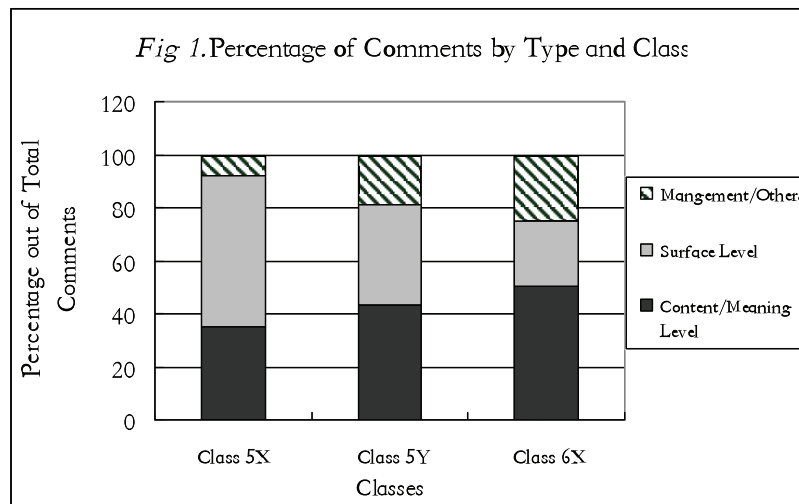
Editing information generated by different groups as recorded in a wiki's history page was sorted by types of revision based on adapted version of Faigley and Witte's (1981) revision taxonomy. The taxonomy has two broad categories of content or meaning changes with subcategories of macrostructure and microstructure changes and surface changes with its subcategories of meaning-preserving and formal changes. Formal changes consists of changes in spelling, grammar, abbreviations, punctuation, and format, while meaning-preserving changes consists of changes as in additions, deletions, substitutions, rearrangements (permutations), expansions (distributions), and consolidations. Both macrostructure and microstructure changes are further categorized into the same sub-categories of meaning-preserving changes. Refer to Appendix C for rubrics.

To assure the inter-rater reliability of the coding methods, 25% of data from group writing evaluation, peer comments and revisions were double rated and their correlation computed. The correlation coefficient of main items from group writing evaluation; analytical score grand total, content and organization, language and visual graphic and photos averaged .942 (range .969 to .892, $p < .001$). For main items of comments analysis, content and meaning level, surface level and management and other non-related comments, the correlation coefficient averaged .980 (range .993 to .962, $p < .001$). For main items of revision analysis, content and meaning changes, surface changes and total overall revision, the correlation coefficient averaged .933 (range .914 to .955 $p < .001$). These correlation coefficients indicate a very high degree of inter-rater reliability. Quantitative data were analyzed using SPSS (Window version 17.0) to examine correlation of variables and paired sample t-test for significant differences among the variables. The data were checked for normality, linearity and homoscedasticity and none of the major assumptions were violated.

Findings and Discussion

Types of Comments Posted on Wiki Platform

With an exception of one primary five class (5X), both classes 5Y and 6X had significantly higher percentage of content and meaning level than surface level comments as shown in Fig. 1. This was also supported by Liu and Sandler (2003) with university students.



As shown in Table 1, to address the research question one, the results were recorded in percentage of occurrence out of the total categories except for total categorized comments and posted comments, which are shown in frequency of occurrence by topics and classes. More categories of comments were recorded compared to actual comments posted since a comment may consist of few categories. For example, “Good! The picture is beautiful. But you can add more word to say your feeling!” was recorded as both surface non-revision oriented and content and meaning revision oriented.

More percentage of revision oriented comments were found in both content and meaning level and surface level for all classes except for 5X, in which case there were more non-revision oriented comments in their content and meaning level comments. This is a good sign noting that more meaningful comments are being posted despite the fact that teachers may not have had time to give specific instruction and emphasize the quality of peer feedback especially in primary five classes. Paired sample t-test showed significant differences as shown in Table 1 where * indicates significance at $p < .05$ and ** significant at $p < .001$.

For primary five classes, there were much more comments posted during the second topic and this could be due to students becoming familiar with their wiki and realizing the benefit of communication with peers, thus more increase in management and other non related comments.

Table 1. Types of categorized comments by topics

Types of Comments	Percentage out of Total Categorized Comments % (SD)								
	5X			5Y			6X		
	Topic I N=10	Topic II N=10	Total N=20	Topic I N=10	Topic II N=10	Total N=20	Topic I N=10	Topic II N=10	Total N=20
Content/Meaning Level Overall	37.99 (18.61)	32.29 (15.68)	35.14* (17.0)	45.5 (23.74)	41.12 (22.72)	43.29 (22.73)	57.39 (11.83)	43.46 (19.15)	50.43* (17.06)
➤ Revision oriented	13.87 (14.26)	3.77 (5.85)	8.82* (11.80)	31 (22.88)	18.2 (14.52)	25.58 (19.77)	49.31 (10.56)	39.39 (19.92)	44.35** (16.33)
➤ Non-Revision oriented	24.12 (16.42)	28.52 (15.46)	26.32* (15.68)	14.49 (18.21)	22.92 (14.58)	18.7 (16.63)	8.08 (4.79)	4.07 (4.25)	6.08** (4.86)
Surface Level Overall	59.96 (18.85)	53.96 (21.76)	56.96* (20.05)	46.76 (28.84)	29.31 (24.49)	38.03 (27.54)	17.30 (11.67)	31.6 (21.85)	24.45* (18.56)
➤ Revision oriented	38.29 (21.98)	34.68 (28.28)	36.49 (24.72)	34.36 (18.78)	17.61 (19.12)	25.98* (20.35)	15.31 (9.16)	30.25 (22.03)	22.78** (18.12)
➤ Non-Revision oriented	21.67 (13.42)	19.28 (17.29)	20.47 (15.11)	12.4 (16.08)	11.7 (16.29)	12.05* (15.76)	1.99 (3.10)	1.35 (2.87)	1.67** (2.92)
Management/Other non related comments	2.05 (4.73)	13.75 (15.41)	7.9 (12.61)	7.79 (15.62)	29.58 (22.04)	18.68 (21.69)	25.31 (16.39)	24.94 (17.18)	25.12 (16.34)
	Frequency of occurrence								
Total Categorized Comments	118	183	301	100	182	282	766	283	1049
Posted Comments	90	154	244	77	172	249	714	273	987

- Content/Meaning Level Overall % + Surface Level Overall % + Management/Other non related Comments % = Total Categorized Comments (100 %)
- *significant at $p < .05$ and ** significant at $p < .001$.

5Y had more content and meaning level comments than surface level comments except in the first topic where the difference between two levels of comments was very slight. There seems to be more revision oriented comments in both surface level and content and meaning level. In contrast, 5X had more surface level comments compared to content and meaning level comments for both the topics. There tend to be more revision oriented comments on surface level while non-revision oriented comments to be dominant in content and meaning level. Although there were quite a difference in the number of comments posted during the second topic for both classes, proportion of the percentage of these categories remain rather consistent between two topics except for management and other non related comments which increased during the second topics and this could be due to different type of genre. The second topic required students to write a poster in how to keep healthy, thus involving more instructional management and formatting. It could be also due to students becoming familiar with comment posting and realization of the benefit of open forum between classes, which is seen by an increase in other non-related playful comments. Table 2 shows excerpts illustrating students' excitement in communicating through this platform. All the italics in the excerpts indicate the commenter, group name, time, and date.

Table 2. Excerpts of posted comments from 5Y

Posted comments (5YII Marie)	Types of comments
Vincent (Marie) /11:26 am/Feb 1, 2010 Vinci, can u see me?	Other non related
Vinci (Marie) /11:27 am/Feb 1, 2010 Yes, ok	Other non related
Vinci (Marie) /11:27 am/Feb 1, 2010 HI I am Apri . l	Other non related
Vincent (Marie) /11:28 am/Feb 1, 2010 Vinci!	Other non related
Vincent (Marie) /11:30 am/Feb 1, 2010 We should concentrate on our work! Do not play toooooooooooooooooohappy!!!!!!!!!!!!!!!!!!!!!!!!!!!!	Management
Jeffrey (Little Monster) /11:31 am/Feb 1, 2010 GOOD!!!!!!!!!!!!HARDWORKING!!!!!!!!!!!!	Content non-revision oriented-evaluation
Vincent (Marie) /11:31 am/Feb 1, 2010 VINCI VINCI VINCI VINCI VINCI VINCI!	Other non related

Contrary to primary five, 6X's comments decreased during the second topic and this may be due to the difference in genre. First topic being general description involving Internet search to collect information, needed brainstorming ideas and second topic being narrative with a story framework provided involved less discussion. For 6X, there seem to be more content and meaning level comments than surface level comments especially in the first topic where the difference between the two levels of comments is distinct. There seems to be more revision oriented comments in both the surface level and the content and meaning level, which shows that this class of 6X students is engaging in quite a meaningful peer feedback that are of revision oriented quality. Although there are quite some differences in number of comments posted during the second topic, again the proportion of percentage of these categories remain rather consistent between two topics. Although management and other non related comments were recorded more compared to primary five, they were more on task and brainstorming ideas as in examples below. Primary six students had experienced using a wiki during the previous year in a pilot study (Woo, et al., in press) and it was noted that they have sustained their engagement with the technology even after the effect of novelty (Hawthorn effect) has worn off. This group of students exchanged their ideas through comments before they actually started to write on the wiki platform.

Table 3. Excerpts of posted comments from 6X

Posted comments (6XIDMCR&B)	Types of comments
Charis Ann (MC in R&B) /12:15 pm/Jan 20, 2010 So... what's the topic	Management
Mandy (MC in R&B) /12:16 pm/Jan 20, 2010 ?	Other non related
Charis Ann (MC in R&B) /12:16 pm/Jan 20, 2010 i need topic so i can write	Management
Rachel (MC in R&B) /12:16 pm/Jan 20, 2010 i don't think it's a gd idea to write air pollution because our class writing is air pollution	Content non-revision oriented-evaluation
Bessie (MC in R&B) /12:16 pm/Jan 20, 2010 no, i don't agree!! We can't write a lot if we write land pollution!!	Content non-revision oriented-evaluation
Charis Ann (MC in R&B) /12:16 pm/Jan 20, 2010 plz topic	Management
Rachel (MC in R&B) /12:17 pm/Jan 20, 2010 i don't think it's a gd idea to write air pollution because our class writing is	Content non-revision oriented-

air pollution already
 Bessie (MC in R&B)/12:17 pm/Jan 20, 2010
 But I think there will be a lot of groups will write ap

evaluation

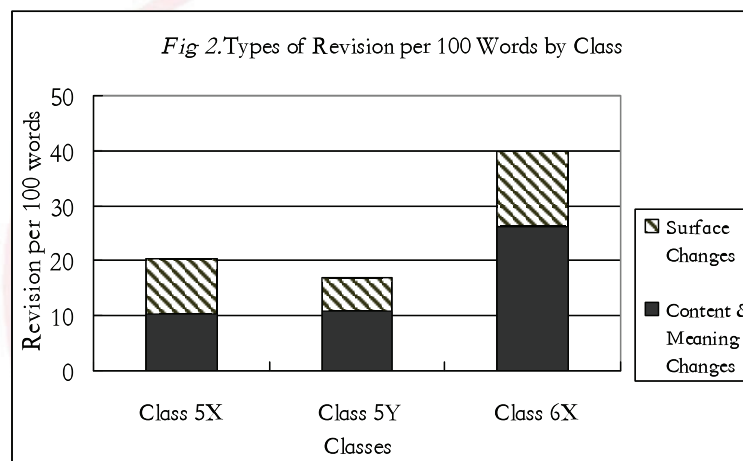
Content non-revision oriented-
 evaluation

Charis Ann (MC in R&B)/12:17 pm/Jan 20, 2010
 TOPIC!!!!!!!!!!!!!!

Management

Types of Revisions Posted on Wiki Platform

As in Fig.2, generally in all three classes, more than half of total categorized revisions per 100 words that each class made were of content and meaning changes in nature which is a good sign that meaningful editing is taking place on content level rather than mainly on surface level as supported by other studies with wikis (Kessler, 2009; Mak & Coniam, 2008). This was significant for primary six at $p < .001$ level. As in Table 3, to answer the research question two, the results were recorded in amount of revisions per 100 words except for number of posted edits and comments, which are shown in frequency of occurrence.



There were significantly more macrostructure level changes than microstructure level changes on the content and meaning level changes, while on the surface level changes there seem to be more formal changes rather than the meaning-preserving changes as shown in Table 4 with paired sample t test * indicating significance at $p < .05$ and ** significant at $p < .001$. In each three classes, there was more number of comments posted than posted edits since not all comments were revision oriented that would lead to actual revision.

Examining the data in detail by topics confirms that for most topics except for 5X's second topic, close to half of the revisions and more than half in case of primary six were content and meaning changes than surface changes as shown in Table 4. There were more editing posted depending on types of genre as in the first topic for primary five and the second topic for primary six. Primary five's second topic was to write a poster, which required less editing but needed more discussion on formatting and its presentation while primary six was on narrative with a story framework provided thus involving less discussion. Following excerpt from primary six data addresses research question three as it sheds light on how the content and meaning level revision oriented comments can lead to revision on content and meaning level changes.

Table 4. Types of categorized revisions by topics

Types of Revisions per 100 words (SD)									
Types of Revisions	5X			5Y			6X		
	Topic I N=10	Topic II N=10	Total N=20	Topic I N=10	Topic II N=10	Total N=20	Topic I N=10	Topic II N=10	Total N=20
Content/Meaning Changes Overall	9.18 (6.08)	11.22 (4.94)	10.20 (8.79)	6.02 (4.80)	15.86 (18.30)	10.94 (13.96)	31.54 (14.16)	20.72 (10.05)	26.13** (13.18)
➤ Macrostructure	7.85 (5.56)	8.36 (1.77)	8.11** (5.44)	4.72 (3.82)	12.94 (5.52)	8.83* (13.0)	23.19 (12.47)	12.25 (5.35)	17.72* (10.9)
➤ Microstructure	1.32 (1.44)	2.86 (2.42)	2.09** (2.1)	1.30 (1.26)	2.92 (1.95)	2.11* (1.8)	8.35 (5.69)	8.47 (5.94)	8.41* (5.66)
Surface Changes Overall	7.8 (7.76)	12.55 (9.52)	10.20 (5.49)	3.92 (4.38)	8.18 (7.97)	6.05 (6.63)	15.24 (6.86)	12.15 (8.43)	13.69** (7.65)
➤ Meaning Preserving	1.44 (1.99)	.96 (1.29)	1.20** (1.65)	.80 (.97)	2.0 92.99)	1.40* (2.25)	2.29 (2.07)	2.67 (2.83)	2.48** (2.42)
➤ Formal	6.42 (5.95)	11.58 (9.44)	9.0** (8.12)	3.12 (3.48)	6.18 (5.86)	4.65* (4.94)	12.94 (6.08)	9.48 (6.82)	11.21** (6.54)
Total Categorized Revisions	17.04 (12.75)	23.77 (9.52)	20.41 (11.48)	9.94 (2.72)	24.04 (23.28)	16.99 (18.55)	46.78 (19.26)	32.87 (14.49)	39.82 (1.81)
Frequency of Occurrence									
Posted Edits	108	98	206	83	104	187	314	327	641
Posted Comments	90	154	244	77	172	249	714	273	987
➤ Content/Meaning Changes Overall per 100 words + Surface Changes Overall per 100 words= Total Categorized Revisions per 100 words									
➤ *significant at p< .05 and ** significant at p< .001.									

Table 5. Excerpts of posted comments & edits from 6X

Posted comments (6XIALittleWriters)	Types of comments
Tiffany (The Little Writers)/12:26 pm/Jan 21, 2010	
Water pollution Sometimes, you will see much rubbish in the sea .Why?? Because of us. We shouldn't throw rubbish in the sea. In order to decrease discharge oil in the sea, we need to take fever ship, boat or ferry...And we shouldn't take land from the sea because the animals will not have enough places to live.	Content revision oriented alteration
Posted edits (6XIALittleWriters)	Types of revisions (frequency)
Thu Jan 21, 2010 (12:30:54pm) to Thu Jan 21, 2010 (7:28:32pm)	
Boating Solution: Throw garbage away from the sea Take public trasport instead of ferry Results: Animals become lifeless. Sea water willbecome dirty. If people drink the dirty water,they will get sick. The ocean will turn as black as night. Air Pollution Causes: Too many people smoke People use a lot of paper Stop pollution:	Macrostructure substitution (2) Macrostructure addition (4) Microstructure substitution Macrostructure deletion

Air pollution is getting serious,

Results:

The temperature will rise because of global warming.

The fumes of cars cause acid rain.

Acid rain can damage not only plants and animals, but also ourselves

For a better life, come and protect the environment ! Pass the message above to your family!

Designer: T.L.W. Government Readers: Primary students

Microstructure addition

Microstructure consolidation

Correlation between Comments and Revisions

Table 5 shows a positive correlation between posted comments and different types of revisions recorded. Both for primary five and six, there were significant positive correlation between the number of comments posted and the total categorized revisions per 100 words indicating that more the students tend to post comments, more different types of revision were recorded per 100 words (5X: $r = .449$ 5Y: $r = .459$, 6X: $r = .561$ $p < .05$).

Table 6. Pearson Correlation Coefficient between number of posted comments and types of revisions by class

Types of Revisions	Class	Content/Editing Changes Overall	Pearson Correlation Coefficient between Number of Posted Comments and Types of Revisions by Class (p value)					Total Categorized Revisions
			Macrostructure	Microstructure	Surface Changes Overall	Meaning Preserving	Formal	
Posted	5X	.054 (.820)	-.08 (.737)	.350 (.130)	.552 (.012)*	.044 (.855)	.589 (.006)*	.449 (.047)*
Comments	5Y	.425 (.062)	.419 (.066)	.267 (.255)	.388 (.091)	.520 (.019)*	.284 (.255)	.459 (.042)*
	6X	.384 (.095)	.225 (.344)	.463 (.040)*	.663 (.001)*	.267 (.256)	.678 (.001)*	.561 (.010)*

➤ Figures with * indicate significance at $p < .05$.

The number of comments posted had positive correlation with all types of categorized revisions for both primary five and six except macrostructure changes for 5X, which had slight negative correlation but not significant. Those with significant correlation were microstructure ($r = .463$), surface changes ($r = .663$) with formal changes ($r = .678$) for primary six $p < .05$. Primary five varied with significance shown in surface changes ($r = .552$) with formal changes ($r = .589$) for 5X and with meaning-preserving changes ($r = .520$) for 5Y $p < .05$. Formal changes involving spelling, punctuation, grammar were most common revisions seen among Hong Kong students' revision process as shown in the following excerpts from posted comments by primary six students.

Table 7. Excerpts of posted comments & edits from 6X

Posted Comments (6XIIISJJ)	Types of comments
Ivy (SJJJ)/2:41 pm/Feb 2, 2010 "Dad, I want to move to a new flat!!! Ummm... villa is the only flat which fit me!" said Ashley. "This sentence is strange."	Content revision oriented-evaluation
Stephanie (SJJJ)/2:42 pm/Feb 2, 2010 live---lived wants--wanted	Surface revision oriented-alteration
Ivy (SJJJ)/2:42 pm/Feb 2, 2010 I think we can change it into "villa is the only type of house which is my favourite!"	Content revision oriented-alteration

[Janice \(SJJ\)/2:48 pm/Feb 2, 2010](#)

And at that moment,Ashley's brother came back with mum. I think that "and" is unnecessary

Surface revision oriented-alteration

[Janice \(SJJ\)/2:51 pm/Feb 2, 2010](#)

Don't you feel delight?!"said Ashley. It should be "delighted"!!

Surface revision oriented-alteration

Posted Edits (6XIISJJ)

Types of revisions

[Tue Feb 2, 2010 \(2:42:56pm\)](#) to [Tue Feb 2, 2010 \(2:44:09pm\)](#)

Moving To ANew Flat

Formal grammar

parents live in Causeway Bay. One day,when Ashley came home from school,she told her father that she wants to move to a new flat.

'Dad,Iwant to move to a new flat!!!Ummm...villa is the only flat which fit me!' said Ashley.

Microstructure substitution

'Move?why?Is the building going to be rebuilt?'Ashley's father was surprised.

'Definitely not!'replied Ashley.

[Tue Feb 2, 2010 \(2:44:09pm\)](#) to [Tue Feb 2, 2010 \(2:45:14pm\)](#)

Moving To ANew Flat

Microstructure additions

Ashley and her parents lived in Causeway Bay.

the onlyhouse which is my favour!' said Ashley.

Formal spelling

'Move?why?Is the building going to be rebuilt?'Ashley's father was surprised.

'Definitely not!'replied Ashley.

Table 8 shows correlation between subscales of both categorized comments and revisions.

A clear indicator with primary five is a negative correlation between the surface level comments at non-revision oriented in nature with content and meaning changes at macrostructure changes which were significant for 5X ($r = -.455$ & $r = -.520$, $p < .05$). This assures that less surface level comments at non-revision oriented in nature the more revision changes at content and meaning of macrostructure changes in nature. However, a puzzling phenomenon occurred with primary six where these two categories have significantly positive correlation, content and meaning changes at macrostructure changes ($r = .501$ & $r = .541$, $p < .05$). This means that even when surface level at non-revision oriented comments were produced there were increase in content and meaning revisions at macrostructure in nature. Primary six also had significant correlation between this surface level at non-revision oriented nature with surface change especially with formal changes ($r = .616$ & $r = .576$, $p < .05$).

Table 8. Pearson Correlation Coefficient between comments and revisions by class

Categorized Comments/Revisions	Pearson Correlation Coefficient between Categorized Comments and Revisions by Class (p value)						
	Class	Content/Meaning Changes Overall	Macrostructure	Microstructure	Surface Changes Overall	Meaning Preserving	Formal
Surface Level:	5X	-.455 (.044)*	-.520 (.019)*		-.012 (.959)		-.003 (.991)
Non-Revision oriented	5Y	-.271 (.248)	-.253 (.288)		-.067 (.978)		.074 (.756)
Management/Other non related comments	6X	.501 (.024)*	.541 (.021)*		.616 (.004)*		.576 (.008)*
	5X			.475 (.034)*		.242 (.304)	
	5Y			.664 (.001)*		.372 (.106)	
	6X			.145 (.542)		.602 (.005)*	

➤ Figures with * indicate significance at $p < .05$.

Following excerpts from primary six student show how surface level non-revision oriented comments lead to revision on content and meaning changes at macrostructure and surface changes at formal changes. An interesting observation was a flurry of activities that occurred after a teacher posted comment. This maybe due to encouraging remarks that may not necessary be revision oriented or students realizing that they are being monitored. Either case a teacher feedback spurred a wide range of revision followed by several formatting which were omitted due to limited space.

Table 9. Excerpts of posted comments & edits from 6X

Posted comments (6XIIFCSuperfantasticfour)	Types of comments
<p><i>Miss Lee/10:50 am/Jan 21, 2010</i> good research! I like the pictures, but you have to cite the sources of the pics as well.</p>	<p>Surface non revision oriented-evaluation Surface revision oriented-alteration</p>
Posted edits (6XIIFCSuperfantasticfour)	Types of revision (frequency)
<p><i>Thu Jan 21, 2010 (10:43:41pm) to Thu Jan 21, 2010 (10:55:28pm)</i> Our Dirty Earth Super Fantastic Four are going to design a poster for all secondary schools students in Hong Kong. Every Day WATER POLLUTION are harming us And the Earth...We need to protect our Earth and ourselves!Let's think about what we can do for the environment!! CleanWater,Sea Better!!! Water Pollution in Hong Kong Causes: produce sewage and chemical. They are discharged to the rivers and pollute the water. ... 3. People throwrubbish to the rivers. They pollute the water. for building. Solutions: andsewage in the rivers. Problems: 1. There are a lot of germs in the polluted water. If people drink this water,it will cause different kinds of illnesses. be endangered. 3. We can't swim in the sea anymore because the water is dirty. If we swim in the dirty and polluted water, we will hurt our skin. (http://www.airheadsscuba.com/kayesite1/wtrpoll.html) (http://www.flickr.com/photos/marells/2215563719/)</p>	<p>Formal punctuation Microstructure addition-4 Microstructure substitution-2 Formal grammar-2 Meaning preserving substitution Microstructure deletion</p>
<p><i>Thu Jan 21, 2010 (10:55:28pm) to Thu Jan 21, 2010 (11:00:03pm)</i></p>	

Water Pollution in Hong Kong

Causes:

the water.

2. Tankers sometimes have accidents. At that time, plenty of oil leaks out of the tankers. The animals that live in the water become lifeless.

3. People throw rubbish to the rivers. They pollute the water.

.....

Solutions:

1. Don't throw the rubbish and sewage into the rivers. Problems:

1. There are a lot of germs in the polluted water. If people drink this water, it will cause different kinds of illnesses.

2. The animals that live in the water become lifeless. They will be less and less.

3. We can't swim in the sea anymore because the water is dirty. If we swim in the polluted water, we will hurt our skin.

.....

(<http://home.gwu.edu/~annacre/pollution.htm>)

(<http://www.flickr.com/photos/mareilles/2215563719/>)

Macrostructure rearrangement-4

Microstructure substitution

Microstructure consolidation

Thus even non revision oriented comments at surface level can elicit variety of revisions. In contrast to revision done after when the text is finished, the activities on the wiki platform revealed a complex collaborative process involved during the composition and not just review of a completed text. This maybe also be related to an unexpected significantly positive correlation of management and other non-related comments with content and meaning changes at microstructure for primary five (5X: $r = .475$, 5Y: $r = .664$, $p < .05$) and surface changes at meaning preserving changes for primary six ($r = .453$ & $r = .602$, $p < .05$). As shown in excerpts from 6X and 5Y's posted comments, posting management and other non related comments seem to play some role in establishing communication in team-building and other affective domain promoting social interaction. This may point to further research on how online communication can help enhance affective domain, a prerequisite in collaborative group learning (Kutnick, Ota, & Berdondini, 2008).

Outcome of the Writing Performances

To address research question three, all four group writing by different topics from 2 normal group writing written before the introduction of wiki technology and 2 wiki group writing collected after three months of wiki intervention were analyzed. As recorded in Table 7, for all three classes, wiki group writing mean scores improved compared with the normal group writing except for 5Y's visual graphics and photos which recorded a slight but non significant decline. Significance level from paired sample t test is shown on the most right hand column with * indicating significance at $p < .05$ and ** significant at $p < .001$.

Table 10. Group Writing Evaluation of Normal and Wiki Group Writing by Class

Items Evaluated	Class	Group Writing Evaluation by Class (p value)		
		NGW	WGW	P value of Significance
Analytical Scores Grand Total	5X	35.01 (5.13)	37.55 (6.13)	.181
	5Y	34.03 (6.45)	37.0 (7.52)	.060
	6X	34.0 (5.5)**	41.25 (4.55)**	.000
➤ Content/Organization	5X	20.63 (3.86)	21.1 (4.85)	.732
	5Y	18.81 (3.98)	21 (5.7)	.078
	6X	20.8 (3.29)*	24.45 (3.02)*	.001
➤ Language	5X	12.53 (1.95)	13.3 (1.92)	.236
	5Y	12.32 (2.56)	13.35 (1.27)	.055

➤ Visual Graphics	6X	11.8 (2.07)**	14.15 (1.76)**	.000
	5X	1.86 (1.07)*	3.15 (1.42)*	.001
	5Y	2.9 (.64)	2.65 (1.35)	.437
	6X	1.5 (1.0)*	2.65 (1.69)*	.022
<hr/>				
➤ NGW=normal group writing, WGW= wiki group writing				
➤ significant at $p < .05$ and ** significant at $p < .001$.				

For primary five, paired sample t-test did not yield any significance except for visual graphics and photos in 5X. This maybe due to small sample sizes of 20 pieces of group writing in each class. Thus 5X and 5Y were combined (N=40) which resulted in statistically significant improvement for items on total analytical scores, from 34.52 (SD=5.78) to 37.28 (SD=6.77), language, from 12.42 (SD=2.25) to 13.33 (SD=1.61), and visual graphics and photos, from 2.38 (SD=1.02) to 2.9 (SD=1.39) $p < .05$. On the other hand for primary six, all the figures showed significant improvement with wiki group writing.

One cautionary note is that students' writing performances tend to increase with time and it alone will not indicate the success of revision process. Further research on association between the subscales of both categorized comments and revisions may help find the effect of revision process on writing performances.

Conclusion & Implications

In this study, out of three upper primary classes involved in the wiki collaborative writing, two classes recorded more content and meaning level comments than that of surface level comments and these comments tend to be revision oriented in nature. Similarly, in all three classes there tends to be more content and meaning level changes than surface changes with the types of revisions students engaged in. There tends to be more macrostructure changes than microstructure changes in content and meaning changes while for surface level changes, there were more formal changes involving spelling, punctuations, grammar and formatting. Although number of comments and revisions varied depending on topics and genre of the writing, generally the distribution of percentage of types of categories remained consistent between two writing tasks for both comments and revisions except for one primary five class which had a slight variation.

Correlation analysis showed that in all classes more the students tend to post comments, more types of revisions were recorded per 100 words. Significant positive correlation was also seen with microstructure and surface changes of meaning preserving and formal changes. Although there were more content and meaning revision than surface changes recorded, there were strong indications that the students continued to correct grammar, spelling and punctuations at the surface formal level as well. Closer examination with qualitative data showed that even surface level non revision oriented comments may spur revision process. Although group writing evaluation alone cannot determine the outcome of the revision process, a significant improvement with wiki group writing compared with students' normal group writing before the introduction of a wiki has been noted.

Due to small sample size, strong statistical support and generalization beyond these classes were difficult and further research with larger sample size may provide more complete picture. However, unexpected positive association of management and other non related comments with few types of revision have point to further research on how certain comments can promote team collaboration possibly through an affective domain.

As other researchers have shown on trained peer response (Berg, 1999; Min, 2006), explicit teaching instructions encouraging peer comments of revision oriented in nature both at content and surface level help enhance effective peer feedback for meaningful revision to take place. At the same time providing timely and constructive teacher feedback tends to spur various revision activities which has also been supported by other studies (Paulus, 1999; Tsui & Ng, 2000).

Tracing peer comments and revisions on the wiki platform revealed a complex collaborative process involved during the actual composition of writing and not just during the reviewing process of an already completed text. Wiki's history pages and its tracking function provide a window of information on how students co-construct and co-revise during their composing process and helps teachers assess the development of their group writing process, a task that may be difficult to monitor in traditional group writing. This can help teachers decide on the kind of support to be given, and provide immediate feedback when necessary to support the writers during the course of writing and not at the end when the product is finished.

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Appendix A: Analytic scale in evaluating group writing. Adapted from Tompkins, G. E. (2004). *Teaching writing: balancing process and product* (4th ed.). Upper Saddle River, N.J.: Pearson/Merrill/Prentice Hall.

A. Content & Organization	
1.	Original and creative ideas
2.	Well developed and elaborated ideas with details
3.	Consideration of audience and purpose(s)
4.	Appropriate use of paragraphs to organize ideas
5.	Logical presentation of ideas
6.	Appropriate use of connectives to give cohesion to the text
7.	Appropriate use of genre and its conventions
C. Language	
1.	Good choice of vocabulary
2.	Variety of phrase and sentence patterns
3.	Appropriate use of language (grammar: tense agreement, articles, pronouns, prepositions, etc.)
4.	Correct spelling and punctuation
5.	Use of imagery, simile or metaphor
D. Visual Graphics & Photos	
E. Grand-Total	

Excellent-5 Good-4 Average-3 Below Average-2 Poor-1 Not used-0 13 items x 5 =65 (full score)

Appendix B: Types of comments. Adapted from Liu, J., & Sadler, R. W. (2003). The effect and affect of peer review in electronic versus traditional modes on L2 writing. *Journal of English for Academic Purposes*, 2, 193-227.

Level	Content/Meaning Level: comments aimed at global area with regards to development, audience and purpose, and organization of writing.	Surface Level: - comments aimed at local area with regards to copy editing, rewording, grammar and punctuation.	Management Level: Comments that are related to management of wiki technology or operational level.	Other Comments: Any other comments that are unrelated to writing and not fit into above categories.
Nature	Revision Oriented: will likely lead to revision	Revision Oriented: will likely lead to revision	Non-Revision Oriented: will not likely lead to revision	
Type				
1.	Evaluation: comments on either good or bad features of writing.			
2.	Clarification: probes for explanations and justifications			
3.	Suggestion: point out the direction for change.			
4.	Alteration: provide specific changes			

Appendix C: Types of revisions. Adapted from Faigley, L., & Witte, S. (1981). *Analyzing Revision. College Composition and Communication*, 32(4), 400-414.

Level of changes	<i>Meaning Changes</i> : Involve adding of new content or the deletion of existing content.		<i>Surface Changes</i> : Changes that do not bring new information to a text remove old information.
Sub-categories	<i>Macrostructure Change</i> : Major change that would alter the <u>summary</u> of a text. Alter the overall direction and gist of the text. Will affect the global meaning of the text and influence the summary and interpretation of the content.	<i>Microstructure Changes</i> : Meaning changes that would not affect the overall summary, <u>gist</u> , or direction of the text. Simple adjustment or elaborations of existing text and would not affect the overall interpretation of the text. May involve the use of cohesive ties, causing sentence sequences to be understood as consistent and parallel connected discourse.	<i>Formal Changes</i> : C involving conventional copy-editing operations
1. Additions	If the ideas are added or elaborated that will change the summary of the text.	If the ideas are elaborated with additional ideas but not big enough to change the summary of the text.	Spelling: Any corrections in spelling Grammar (tense, number & modality): verb t agreements, singular plural changes, mood e.g. will, be, can, should etc. Punctuation: change capitalization, periods, commas, etc. Abbreviation: replace forms of abbreviations numbering & bullet Format: any spacing between lines, word letters, punctuation Any visits indicated wiki as formatting to place.
2. Deletions	When ideas are deleted and change the overall summary of text.	When word or phrases are deleted and change the meaning of the concept or idea but not big enough to change the summary of the text.	When word or phrases are added without changing the meaning of the concept or the idea.
3. Substitutions	If existing ideas are replaced by different ones and change the overall summary of the text.	When word or phrases are deleted and change the meaning of the concept or idea but not big enough to change the summary of the text.	When word or phrases are deleted without changing the meaning of the concept or idea.
4. Rearrangements	If existing words or phrases are reordered, reorganized, re-sequenced, deleted but appear again in other parts and change the meaning of the original ideas enough to change the summary of the text.	If existing words or phrases are reordered, re-sequenced, deleted but appear again in other parts and change the meaning of the original ideas but not enough to change the summary of the text.	If existing words or phrases are replaced by different ones without changing the meaning of the ideas.
5. Expansions	Distributional changes occur where what has been compressed into a single unit now falls into more than one unit. The change will affect the summary of the text.	If existing words or phrases are reordered, re-sequenced, deleted but appear again in other parts and change the meaning of the original ideas but not enough to change the summary of the text.	If existing words or phrases are reordered, reorganized, re-sequenced, deleted but appear again in other parts without changing the meaning of the original ideas.
6. Consolidations	Opposite of expansion where two more units are consolidated into one unit. Examples are sentence-combining and when some summarization are occurring and changes the direction or overall gist of the text.	Distributional changes occur where what has been compressed into a single unit now falls into more than one unit and changes the meaning of the ideas but not enough to change the summary of the text. Examples are when ideas are being elaborated with additional ideas.	Distributional changes occur where what has been compressed into a single unit now falls into more than one unit. If the same ideas are elaborated then treat it as expansion of existing ideas without changing the meaning of the original ideas.
	Opposite of expansion where two more units are consolidated into one unit. Examples are sentence-combining and changes the direction or overall gist of the text.	Opposite of expansion where two more units are consolidated into one unit. Examples are ideas but not enough to change the meaning of the text. Examples are sentence-combining but will not affect the original summary of the text.	Opposite of expansion where two more units are consolidated into one unit. Examples are sentence-combining without changing the meaning of the text.