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One wiki, two groups: Dynamic interactions across ESL collaborative writing tasks

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ABSTRACT

With the growing importance of Web 2.0 tools for communication and collaboration, small group writing using one such tool—the wiki—has been increasingly implemented in second language classes. A few researchers have examined group interactions during wiki-based collaborative writing, but little research has explored changes in interaction patterns that occur when students perform multiple wiki writing tasks. This study investigates two ESL groups' interactions during two collaborative writing tasks that used a Wikispaces site in an English for Academic Purposes (EAP) course at an American university. We examined the dynamics of peer interaction across writing tasks for each group by inspecting (1) language functions performed during task negotiation, (2) writing change functions performed during text co-construction, (3) scaffolding strategies, and (4) changes in patterns of interaction across tasks. Data included wiki modules, interviews, and reflection papers. Our analyses show that two ESL groups working on identical tasks in the same wiki space enacted strikingly different patterns of interaction and that those patterns changed within each group across two tasks. We discuss these dynamics with reference to the fluidity of scaffolding occurring within small groups. This study fills a gap in computer-mediated collaborative writing research and also sheds new light on networked writing pedagogy.
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1. Introduction

Interaction within a small group writing task environment has captured the attention of second language (L2) teachers and researchers over the past decades (Donato, 1994, 2004; Storch, 2002, 2004; Swain & Lapkin, 1998). Collaborative writing as an instructional activity that encourages interaction during the writing process has been increasingly implemented in L2 classes. Swain (1995, 2000) posits that the need to produce written output encourages students to process language deeply, to reflect on language use, and to collaborate in the solution of linguistic problems. In the process of co-authoring, students contribute to decision making in various aspects of writing (Storch, 2005) and take into account not only grammar and lexis but also discourse (DiCamilla & Anton, 1997; Storch, 2002; Swain & Lapkin, 1998). Collaborative writing tasks also provide L2 students with more opportunities to review and apply the content knowledge they have learned (Hirvela, 1999).

Research on face-to-face collaborative writing (e.g., Storch, 2002; Watanabe, 2008) shows how interaction patterns influence students' writing performance and their learning outcomes. Storch (2002) conducted a collaborative writing project with ESL college students and examined patterns of interaction in pair writing in terms of *equality* (i.e., the degree of

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contribution to writing and the extent of control over the direction of writing) and *mutuality* (i.e., the degree of engagement with each other's contribution). She identified four interaction patterns: *collaborative*, *dominant/dominant*, *dominant/passive*, and *expert/novice*, and reported that the pairs displaying a collaborative stance (i.e., *collaborative* and *expert/novice*) showed evidence of more uptake indicating more transfer of knowledge in subsequent individual work than the pairs exhibiting the remaining two patterns (i.e., *dominant/dominant* and *dominant/passive*). Watanabe (2008) demonstrated the important role of interaction, in contrast to language proficiency, in students' writing performance. Both higher- and lower-proficiency peers can provide opportunities for learning if they display a collaborative stance, sharing reciprocal ideas and making equal writing contributions.

Due to the increasing accessibility of Web 2.0 technologies, online collaborative writing has become more common in L2 teaching and research. In particular, with wikis' multiple functions, e.g., "Discussion," "Comment," and "History,"[1] which afford opportunities for collaborative writing, students' interaction during collaborative wiki tasks has become an emerging research topic. One line of inquiry has examined students' wiki writing and revising behaviors. Mak and Coniam (2008) identified four types of *writing change functions* that small groups of secondary ESL students were engaged in when jointly producing a school brochure: adding ideas, expanding ideas, reorganizing ideas, and correcting errors. In a study on German-as-a-foreign-language college students' collaborative writing in pairs, Kost (2011) found both meaning changes (e.g., additions, deletions, and substitutions) and form changes (e.g., edits on spelling, punctuation, and nominal endings). More recently, Li (2013) examined the collaborative writing process of a small group of Chinese EFL students and identified five types of writing change functions: addition, deletion, rephrasing, reordering, and correction. This study illustrated group members' mutual engagement in the collaborative wiki writing process, by analyzing each type of writing change functions in terms of two subtypes: *self* writing change functions (i.e., writing changes made to the texts composed by the member himself/herself) and *other* writing change functions (i.e., writing changes made to the texts composed by other group members).

Another research strand has focused on patterns of interaction in collaborative wiki writing. Drawing on the archived wiki History records, Bradley, Linström, and Rystedt (2010) detected three distinct patterns of interaction when pairs of students co-constructed writing in an ESP course: *a lack of visible interaction*, where only one individual posted a full piece of text; *cooperation*, where individuals worked in a parallel fashion; and *collaboration*, where individuals engaged with each other's ideas and jointly wrote the essay. In a German-as-a-foreign-language context, Arnold, Ducate, and Kost (2012) identified more collaboration patterns when students made formal revisions, but more cooperation patterns when they made content changes. Following Storch's (2002) account of interaction patterns with respect to "equality" and "mutuality," Li and Zhu (2013) examined wiki Discussion records supplemented with wiki Page and History records, and derived three distinct patterns of interaction in EFL group wiki writing: *collectively contributing/mutually supportive*, *authoritative/responsive*, and *dominant/withdrawn*. Just as in the face-to-face setting, Li and Zhu (2013) indicated that wiki-mediated interaction influenced students' writing performance and learning experience: The groups exhibiting the first two patterns reported in the interviews more learning opportunities than the group demonstrating the third pattern.

Despite such research on students' interactions using wikis, "there is still a lack of clarity of the nature of wiki collaboration" (Storch, 2011, p. 285), in particular, on how students negotiate writing tasks and jointly produce wiki texts. We attribute such gap partly to the lack of systematic coding frameworks for analyzing wiki interactions. Previous research (e.g., Arnold et al., 2012; Bradley et al., 2010; Mak & Coniam, 2008) has been limited to students' text construction behaviors (i.e., how wiki texts are jointly constructed), and existing coding schemes have not been unified. To provide a comprehensive picture of the collaborative writing process, we need to examine how students first negotiate writing tasks and then construct wiki texts together. Wikis' affordances for collaboration through the three distinctive features (i.e., Discussion, Comment, and History) have rarely been examined in previous research, and tracking students' use of them allows us to examine the writing process more adequately, including joint task negotiation, joint text construction, and continual revision. Furthermore, little research on collaborative writing, in either face-to-face or computer-mediated settings, has explored changing patterns of peer interaction across writing tasks. The present study fills these research gaps by investigating the dynamics of interaction when small groups of ESL students perform two collaborative wiki writing tasks using Wikispaces in a university EAP course.

We take a sociocultural theory perspective to explore the small groups' wiki writing interaction. Sociocultural theory describes how human cognitive development is a socially mediated process in which language, as a mediating tool, plays an essential role (Donato, 1994; Lantolf, 2000; Vygotsky, 1978). Language allows people to plan, coordinate, and reflect on their actions (Wells, 1999). In pair or group work, language allows learners to co-construct knowledge and solve problems during interaction (Antón & DiCamilla, 1998; Swain, 2000; van Lier, 2002; Villamil & de Guerrero, 1996). Learners negotiate meaning and social relationships as they speak, with linguistic tools becoming essential components of the systems in which problem solving and cognitive development occur (van Lier, 2002). In peer response activities, scholars have examined participants' approaches to critiquing peer writing by analyzing the language functions of their utterances, namely the purposes in which language is used to communicate, such as suggesting, eliciting, justifying, and questioning (e.g., Lockhart

[1] Wiki "Discussion" allows students to communicate and negotiate page contents and revisions via asynchronous messaging; "Edit" enables students to freely change or revise texts, images, or hyperlinks; "History" reveals all the changes the page has gone through with color-coded deleted and inserted texts; and "Comment," a newly established feature in the editor toolbar, allows students to raise questions about specific texts and provide comments by posting in pop-up boxes.

& Ng, 1995; Stanley, 1992; Zhu, 2001). Likewise, in collaborative wiki writing activity, students perform varied language functions to negotiate wiki tasks (Li, 2014).

Moreover, the sociocultural construct of scaffolding is crucial to our account of ESL wiki interaction and collaboration. Scaffolding is "a kind of process that enables a child or novice to solve a problem, carry out a task, or achieve a goal which would be beyond his unassisted efforts" (Wood, Bruner, & Ross, 1976, p. 90). We extend previous work by drawing on the scaffolding strategies reported in previous studies (de Guerrero & Villamil, 2000; Lidz, 1991; Wood et al., 1976) on verbal interaction between novices and experts, and examining how students scaffold each other via wiki-mediated interaction in L2 collaborative writing.

In this study, we address the following four research questions:

(1) How do students in small groups negotiate writing tasks and engage with each other's ideas via wikis?
(2) How do students in small groups co-construct written texts via wikis?
(3) How do students scaffold each other during wiki-based small group writing?
(4) What patterns of interaction occur for each group across two wiki writing tasks?

The inquiry of these questions is expected to shed light on the dynamics of peer interaction across writing tasks. In accordance with these questions, we also aim to build a systematic coding framework to examine the comprehensive process of collaborative wiki writing.

2. Methods

This study draws from a larger project investigating wiki-based collaborative writing, in which a multiple-case study approach (Stake, 2006; Yin, 2009) was utilized. Below we provide relevant information about the larger wiki project.

2.1. The setting, the wiki site, and writing tasks

The study was conducted in a credit-bearing EAP course offered to twenty-nine international graduate students at a public research university in the southeastern U.S. in the Spring of 2013. These students took EAP courses and were simultaneously enrolled in discipline-specific courses. This EAP course aimed to develop students' academic English skills, with an emphasis on producing papers and presentations in different academic genres. One major required assignment was a team research project, which involved out-of-class wiki-based collaborative writing. The first author set up the Wikispaces site (see Fig. 1) early in the semester. As the course instructor did not want her students to see writings from other small groups at the writing stage, we created private small group tabs under wiki "Projects" for the students to co-write within small groups. As Fig. 1 shows, students joined the Wikispaces site using pseudonyms, entered their respective writing group tabs under "Research Proposal"/"Annotated Bibliography," and co-worked on the two writing tasks using wiki Edit, Discussion, Comment, and History. After the due date for each task, the course instructor graded each small group's wiki writing products. The students' performance in the two wiki tasks accounted for 15% of their final score.

Specifically, students chose from two topics for their wiki writing tasks: (1) a "McDonaldization" idea (regarding globalization) involving companies other than McDonald's; and (2) immigration in the Unites States.[2] In Task 1 (Research Proposal), group members first discussed the specific research topic on the Wikispaces site and then jointly wrote a research proposal, including research background, research questions, methods, and significance, under their group tab through the module of Projects. In Task 2 (Annotated Bibliography), on the same research topic as Task 1, the groups selected nine or 12 sources (three sources per person) and wrote annotated bibliographies of these sources under their group tab through Projects (see Fig. 1). For each source students were required to include complete citations, the purpose of the work, a summary of the content, and its relevance to the research topic. In both tasks, the students were encouraged to make use of the wiki Edit, Discussion, Comment, and History to compose their group writing, to check and contribute frequently, and to revise their joint wiki writing in content, style, and format.

2.2. Participants and group formation

The students were divided into small groups of three or four, because such groups have been found to collaborate most successfully (Fernández Dobao, 2012; Morgan, Allen, Moore, Atkinson, & Snow, 1987). The groups were formed based on (1) students' free choice of partners; (2) language proficiency; and (3) students' L1/cultural background. After the students formed groups voluntarily, the course instructor made minor adjustments in order to mix language proficiency levels and L1/cultural backgrounds, hoping to provide students more opportunities to scaffold each other and engage in more meaningful negotiation in the L2 (Iwashita, 2001; Polio & Gass, 1998; Storch, 2013). Students were required to select a group leader after their groups were formed with the hope that students would self-monitor their group work in the absence of teacher intervention.

[2] Both Group I and Group II selected the first research topic of globalization.

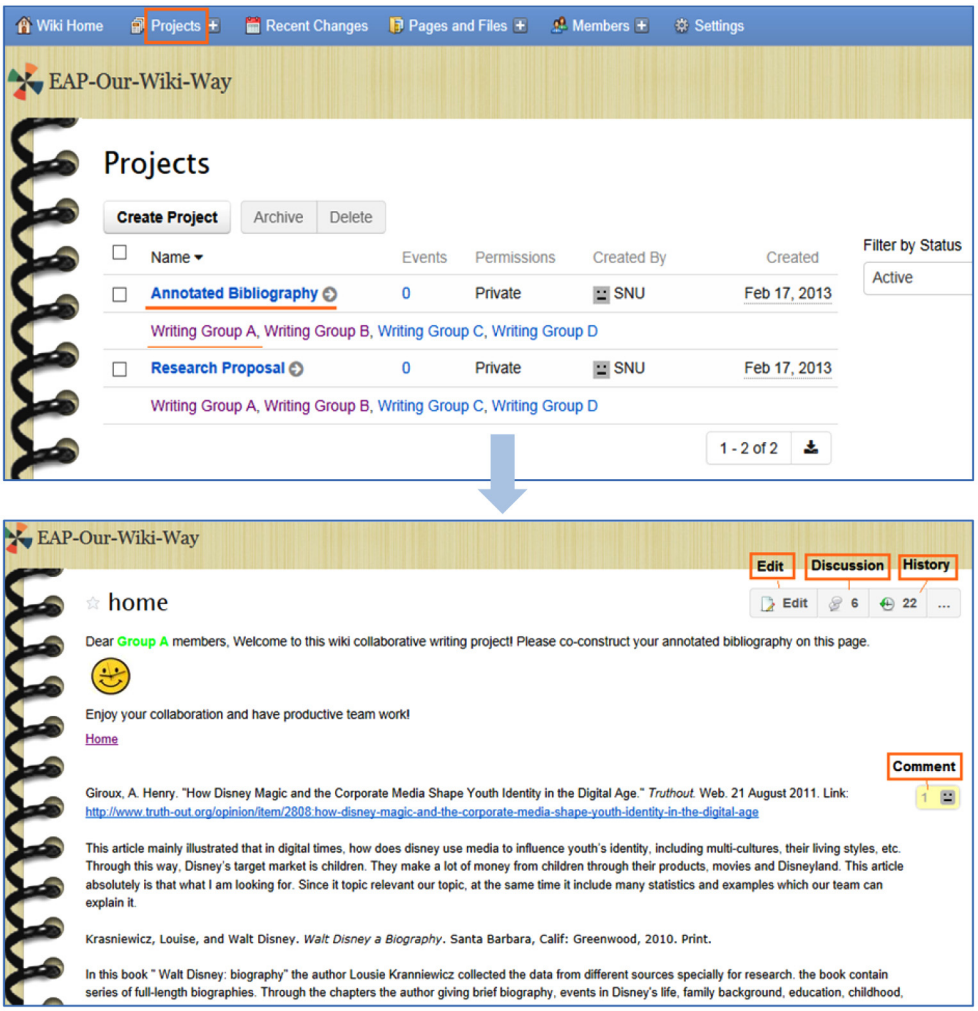


Fig. 1. Screenshot of Sample "Projects" in Wikispaces.

In order to explore the dynamic nature of wiki interaction across tasks, we examined two cases that exemplified distinctive and dynamic patterns of interactions over the two wiki writing tasks. The two groups (called Group I and Group II in this article) were similar in composition (both with two Chinese students and a third student from a different cultural background). Although working on the same writing tasks, the two groups displayed different patterns of interaction during collaborative writing, and these patterns remained dynamic across the two tasks for both groups. The profile of the participants for this study, derived from the pre-task questionnaire (see Appendix A), is displayed in Table 1.

Group I consisted of two Chinese males, Dong and Feng, and one Saudi Arabian male, Abdul, all majoring in Finance. Feng, selected as the group leader, perceived his English language proficiency as intermediate-high, whereas the other two members perceived their proficiency level as intermediate. Both Dong and Feng were comfortable using computers for study, entertainment, and social networking, while Abdul had a neutral opinion toward computer use. All three members had a positive or very positive attitude about group work. Like Group I, Group II was composed of three male students majoring in Finance: Chuan and Gao from China, and Vitaly from Russia. Chuan was selected as the group leader. He perceived his language proficiency as intermediate, in contrast to the intermediate-high level self-reported by his two partners. Chuan also felt neutral about computer use while his partners felt comfortable or very comfortable. All the members of Group II reported a positive attitude to teamwork prior to the wiki project.

2.3. Data collection

The wiki project lasted nine weeks. In Weeks 1 and 2 of the project, students were introduced to the wiki study, and then signed an informed consent form. This was followed by group formation and a pre-task questionnaire survey. The students worked on their research proposal in Week 3 and their annotated bibliography in Weeks 4 and 5. Students' discussion and writing processes were automatically recorded in wiki Discussion, Comment, and History modules under small group tabs

Table 1
Profile of the participants.

	Pseudoname	Gender	Nation	Study area	English proficiency	Computer use	Attitude to teamwork
Group I	Dong	M	China	Finance	Intermediate	Comfortable	Positive
	*Feng	M	China	Finance	Intermediate–high	Comfortable	Positive
	Abdul	M	Saudi Arabia	Finance	Intermediate	Neutral	Very positive
Group II	Gao	M	China	Finance	Intermediate–high	Comfortable	Positive
	*Chuan	M	China	Finance	Intermediate	Neutral	Positive
	Vitaly	M	Russia	Finance	Intermediate–high	Very comfortable	Positive

Note: Participants with * were group leaders selected by the peers. English proficiency level listed in the table was from participants' own perception revealed in the pre-task questionnaire. This EAP course regulates that the students enrolled should have at least an intermediate-level, as reflected in the language requirement: TOEFL iBT 65-78/IELTS 5.5-6.0.

Table 2
Analysis of wiki-based interactions: equality & mutuality.

Constructs	Language functions	Writing change functions	Scaffolding strategies
Equality	Analysis: Types of language functions and frequency counts per person Data sources: Wiki Discussion/Comment	Analysis: Types of writing change functions and frequency counts per person Data source: Wiki History	
Mutuality	Analysis: *Initiating* versus *Responding* language functions Data sources: Wiki Discussion/Comment	Analysis: *Self* versus *Other* writing change functions Data source: Wiki History	Analysis: Scaffolding strategies Data sources: Wiki discourse & interview/reflection paper

on the Wikispaces site. In Week 6, the first author administered a post-task questionnaire survey and conducted semi-structured individual interviews with purposefully sampled students in the teacher's office. In Week 7, students wrote reflection papers about group dynamics and individual contributions. After students completed an individual research and writing project in Week 8 drawing on the skill they had acquired in the wiki collaborative writing, the first author conducted follow-up interviews and member checks in Week 9.

Records of the two groups' wiki activities during the Research Proposal and Annotated Bibliography tasks constituted our main data sources. The wiki Discussion/Comment posts provided evidence about how students negotiated writing tasks and engaged with one another's ideas in the small groups. Wiki History records provided a picture of how group members co-constructed texts after discussing the writing tasks. In addition to wiki records, we reviewed the data from interviews and reflection papers to inform our understanding of scaffolding strategies. Note that all three members of Groups I and II participated in post-task interviews, but only one from each group participated in the follow-up interview mainly because other students were not available as they planned for their trip back to their home countries. We also collected the reflection papers from two members of Group I[3] and the three members of Group II.

2.4. Data analysis

We investigated the dynamics of peer interaction regarding two focal groups when they performed two wiki writing tasks. We drew on Storch's (2002) research that examined patterns of peer interaction referring to "equality" and "mutuality" (Damon & Phelps, 1989); we retained the definition of equality and expanded the definition of mutuality to include negotiation on tasks and involvement in texts. Equality is the level of contribution to group writing and degree of control over the direction of writing; mutuality is the degree of engagement with each other's contributions, namely the extent of reciprocal response in negotiating tasks and involvement with others' texts in producing joint writing. Table 2 summarizes our approach to analyzing group interaction in terms of equality and mutuality in the computer-mediated writing environment, taking a comprehensive view of *language functions*, *writing change functions*, and *scaffolding strategies*. Specifically, we evaluated equality by examining language function types and frequency counts, as well as writing change function types and frequency counts. We evaluated mutuality by analyzing each group's *initiating* (i.e., proposing new ideas) vs. *responding* (i.e., reacting to others' ideas) language functions as well as *self* vs. *other* writing change functions, and by examining scaffolding episodes occurring in collaborative wiki writing.

We answer Research Question 1 (about group members' task negotiation and engagement with each other's writing ideas) by analyzing *language functions* revealed in wiki Discussion and Comments records. We answer Research Question 2 (about text co-construction of the joint writing) by analyzing writing change functions revealed in wiki History records, and Research Question 3 (about scaffolding occurrences) by examining scaffolding strategies reflected in wiki discourses (mainly wiki Discussion), interviews and reflection papers. These analyses allow us to draw conclusions about the overall patterns of interaction for Group I and Group II through a grounded approach (Glaser & Strauss, 1967; Strauss & Corbin, 1998) in which

[3] Abdul in Group I did not submit his reflection paper.

Table 3
Taxonomy of language functions.

Language functions	Definitions & examples
Acknowledging	Recognizing or praising others' ideas, comments, helpfulness, and capabilities. E.g., *Nice job!*
Agreeing	Expressing agreement with others' viewpoints. E.g., *I agree with you.*
Disagreeing	Expressing disagreement with others' viewpoints. E.g.,—*We should focus on one company because we should narrow the topic. Focus on Apple.* —*Apple could be just an example and I think it will be too narrow.*
Elaborating	Extending and elaborating on self or others' ideas about writing. E.g., *There're some more subtopic I come up with:[. . .]*
Eliciting	Inviting or eliciting opinions, comments, etc. from group partners. E.g., *How you think about that?*
Greeting	Greeting group members. E.g., *Hi, guys.*
Justifying	Defending one's own ideas/comments by giving reasons. E.g., *(we can choose Coca-Cola as our target.) Cause it owns wide-range consumers and its successful development experience has made it standing over 100 years.*
Questioning	Asking questions that one is not clear about. E.g., *What is the difference of wiki comparing to Google doc?*
Requesting	Making direct requirements or requests. E.g., *Please respond and add something.*
Stating	Stating one's ideas and the ideas groups have discussed earlier; posting writing contents or sharing information. E.g., *As I knew, Starbucks has cooperated with three local companies in China.*
Suggesting	Offering suggestions/recommendations about writing contents, structure, format etc. E.g., *We can just discuss benefits for outsourcing, what the reason for it is. . .something like that.*
Two main categories	
Initiating	Proposing new ideas or initiating group interaction. E.g., *Please respond and add something.*
Responding	Reacting to others' ideas. E.g., *The idea is good, but we need more challenges.*

Note: The examples were directly drawn from the wiki project, and language errors were not removed. Each instance of the above language functions can fall into the category of either initiating or responding.

we analyze the triangulated data in an iterative and holistic manner and make comparisons of the data across the two groups. We further compare the interaction patterns of the two groups on Task 1 and Task 2, exploring the dynamic nature of peer interactions across writing tasks as addressed in Research Question 4.

Below we further discuss the data analysis techniques we developed to assess language functions, writing change functions, and scaffolding strategies.

2.4.1. Analysis of language functions

As noted above, previous literature on peer response (e.g., Lockhart & Ng, 1995; Stanley, 1992; Zhu, 2001) analyzed language functions to explore peer interactions. In the area of wiki-based collaborative writing, language functions refer to the mediating functions of the language used in wiki communication discourse during the process of task negotiation, serving both cognitive functions and social functions (Li & Zhu, 2013). In Li and Zhu (2013), all the wiki Discussion posts were analyzed in terms of idea units, which were coded with respect to language functions, such as agreement, suggestion, and apology. In the present wiki project, rather than imposing existing categories on the available data, we read and reread wiki Discussion and Comment records, induced salient categories of meaning, and developed relationships between categories until we derived the taxonomy of language functions displayed in Table 3. Each category of language functions is defined and illustrated with a representative example from the project. When analyzing the data, we distinguished the instances of language functions in terms of initiating and responding, so as to explore group members' mutual engagement in the writing process. An outside researcher coded these wiki data, as did the first author. The inter-rater agreement was 87.4% and disagreements were resolved through discussion. We also calculated the frequency count per person for each type of language functions.

2.4.2. Analysis of writing change functions

Writing change functions were first proposed by Mak and Coniam (2008) when they examined the ways in which students co-produced texts in a wiki. They identified such categories as adding, expanding, reorganizing, and correcting. In another collaborative wiki writing study, Li (2013) identified five types of writing change functions (i.e., addition, deletion, rephrasing, reordering, and correction), and each writing revision was also distinguished in terms of *self*- and *other*-writing change functions. Based on Li (2013), we analyzed the small groups' wiki History threads in relation to Task 1 and Task 2 in the present study, and developed a taxonomy of writing change functions displayed in Table 4. Definition of each type of writing change functions was provided, and each type was illustrated with a representative example from the wiki project. The first author and an outside researcher independently coded 25% of the History records from Task 1 and Task 2. The inter-coder agreement was 89.4%, and disagreements were resolved by discussion. Then the first author coded the remaining data

Table 4
Taxonomy of writing change functions.

Writing change functions	Definitions & examples
Adding	**Contributing new contents or adding information to existing contents at different levels, in different forms.** E.g., BUSINESS: In the United States, tourism is big business. In fact, it's the number one service that we export. In 2010, we welcomed nearly 60 million international visitors to America, and they helped to boost our economy to the tune of $134 billion. **http://www.whitehouse.gov/blog/2012/01/19/president-obama-promotes-tourism-disney-world** (*the link added*)
Deleting	**Removing texts or existing information.** E.g., ~~Through this report, we can obtain a clear understanding of the question that how Disney runs its business.~~(*the sentence deleted*)
Rephrasing	**Expressing existing ideas in an alternative way**. E.g., [. . .] we need to analysis his perspective in religion, political view [. . .] [. . .] we can through this article to examine that how dose Disney's culture influence people's ideology. (*the sentence rephrased*)
Reordering	**Reorganizing ideas or moving around contents.** E.g., Banister, Judith. "Manufacturing Earnings and Compensation in China." Monthly Labor Review 128.8 (2005): 22–40. Print. The article, from an academic journal, written for a general audience, evaluates the quality and usability of statistics on manufacturing earnings and labor compensation in China. [. . .] Also, it uses numerous data and especially cites the source of the annual data on labor compensation used in the article, which always makes an article more scientific and more reliable. (*This annotation moved to a former section according to the alphabetic order of authors.*)
Correcting	**Correcting or attempting to correct mistakes in grammar, mechanics, and spelling.** E.g., This annual report is useful for our research work because it provides some numbers and ~~statistics~~**statistic** data which can be used as evaluation of benefits that Apple company gets from work outsourcing. (*the spelling corrected*)
Two main categories	
Self	**Writing changes made to the texts composed by the member himself/herself.** E.g., *Chuan*: This article describes information and statistics in Chinese company Foxconn profits. *Chuan*: This article describes the information ~~and statistics in~~*about* Chinese company Foxconn ~~profits~~*that assemble Apple products in China*.
Other	**Writing changes made to the texts composed by other group members.** E.g., *Dong*: The detailed topic is the business of Coca-Cola in China and Saudi Arabia. *Abdul*: The detailed topic is the business of Coca-Cola in China and ~~Saudi Arabia~~*Middle East countries*.

Adapted from Li (2013).
Note: The examples were directly drawn from the data of the wiki project, and language errors were not removed.

following the same steps. Finally, we calculated frequency counts for each group member as to each category of writing change functions.

2.4.3. Analysis of scaffolding strategies

Successful scaffolded interaction embodies good collaboration, so we examined scaffolding occurrences/non-occurrences in the wiki discourse. In this study, scaffolding was operationally defined as assistance from group members that facilitated the completion of joint wiki writing tasks. Wiki "Discussion" and "Comment" records were coded in terms of episodes, i.e., units of discourse during which the participants discussed writing problems and task procedures (de Guerrero & Villamil, 2000). Only the data relevant to scaffolding or unacted scaffolding episodes were coded. We drew on scaffolding strategies established in previous literature (Lidz, 1991; Rommetveit, 1985; Villamil & de Guerrero, 1996; Wood et al., 1976), and constructed a coding scheme for scaffolding represented in Table 5. We also examined excerpts from interview transcripts and reflection papers in which students commented on scaffolding occurrences in the wiki writing process, and these excerpts enriched our analysis of scaffolding strategies.

3. Results

We examined small groups' interactions by analyzing how group members negotiated writing tasks in terms of language functions (Research Question 1); how they jointly composed writing in terms of writing change functions (Research Question 2); and how/whether they scaffolded each other during wiki joint writing process employing scaffolding strategies (Research Question 3). Based on these analyses, we derived distinctive patterns of interaction in each task for each group, as addressed in Research Question 4.

In the following sections, we present a detailed picture of the two groups' wiki interactions from the above-mentioned aspects. As both groups discussed the research topics and relevant sources before they actually composed the two wiki papers, we examined all the wiki Discussion/Comment[4] records under each small group tab as a whole and examined the

[4] The students mostly discussed writing tasks using wiki Discussion and Comment modules, as required in the project. However, a brief discussion occurred on the wiki Page during Task 2. Our analysis of language functions, focusing on the pre-writing stage, was confined to the wiki Discussion and Comment data in this study.

Table 5
Coding scheme for scaffolding strategies.

Scaffolding strategies	Definitions & examples
Affective involvement (Lidz, 1991)	**Expressing warmth to group members, and giving group members sense of caring in the project**. E.g., XX, thank you for your sharing such a wonderful information! *(When Student A successfully completed the section of "Background," Student B praised his nice work.)*
Contingent responsivity (Lidz, 1991)	**Interpreting group partner's behavior and responding appropriately.** E.g., Hey . . .I found a useful link for you. *(Student D suggested to Student E an appropriate source to annotate when Student E struggled with a source regarding "counter-argument.")*
Direction maintenance (Wood et al., 1976)	**Maintaining pursuit of the goal for the group work.** E.g.,—unfortunately I don't have background about Disney. However, if you prefer this topic, It's Okay. —[. . .] we will meet tomorrow and I can show you the details of our topic. *(Student C tried to offer help to Student A so as to maintain the common task goal of researching Disney.)*
Instructing (de Guerrero & Villamil, 2000)	**Giving mini-lessons in an authoritative tone.** E.g., It should be a kind of overview of our research but not a paragraph with concepts of writing a research paper. *(Student D tried to correct Student E's wrong writing direction after reading Student E's irrelevant posts regarding "Series of questions.")*
Intersubjectivity (Rommetveit, 1985)	**Group members participate in a common task and have a shared understanding of the situation and are in tune with one another.** E.g.,—I recommend we choose the topic of immigration in the United States and its influence on American Culture [. . .] —The idea is good, but we need some more challenges. . . . Globalization is a hot topic nowadays. . .So how about we make our research on Globalization, and we can choose Coca-Cola as our target. [.] What's your opinion, guys? —Fine, I agree. —fantastic, I agree with you. *(Student G initiated the group discussion by suggesting the topic of immigration, and Student H politely responded to Student G by recommending a more challenging topic: "globalization of Coco-Cola." This idea was endorsed by both Student I and Student G.)*
Recruiting interest (Wood et al., 1976)	**Arousing group members' interest in the task.** E.g.,—we were child, we know how Disney attract us and get us involved from our own experience, and the content related to Disney must be very interesting. Just think about these topics and see how many points pops out in your mind, you will agree with me! *(Student A showed little knowledge and interest in the research topic of Disney, and Student C tried to arouse Student A's interest.)*

Note: The scaffolding strategies and excerpts listed in this table apply to the entire data of the larger wiki project. Therefore, some scaffolding strategies presented here were not discussed in this study. Also, language errors were not removed.

language functions according to the taxonomy of language functions involving both wiki tasks. We also examined the writing change functions that the two groups performed in each wiki task and explored how the members jointly produced wiki writing for the two different tasks. Then we investigated the scaffolding strategies deployed while the small groups engaged in each writing task. We discuss the results for each group below, beginning with specific features, followed by overall patterns.

3.1. Group I: Specific features of interaction

The members of Group I collectively contributed to the discussion of task orientation and writing content using diverse language functions, and the group had balanced participation in text construction in Task 1. In Task 2, however, Abdul participated significantly less, and Dong and Feng's mutual engagement also decreased.

3.1.1. Language functions

The language functions Group I performed involving both wiki writing tasks are displayed in Table 6. The three members made joint contributions to task discussion, with Dong performing nine instances of language functions, Feng 10 and Abdul 5. The language functions included 15 initiating acts and 9 responding acts. Both Dong and Feng made several suggestions and successfully elicited their group partners' responses. Moreover, the group members constructed positive social relations through greeting, agreeing, and acknowledging.

The following excerpts illustrate the group members' engagement in task negotiation through multiple language functions.

Excerpt 1: Wiki Discussion (2/24/2013)

1. **Dong**: Hi, guys (**Greeting**), our proposal will be divided into topic, resources, method and problems (**Suggesting**). How you think about that? (**Eliciting**)

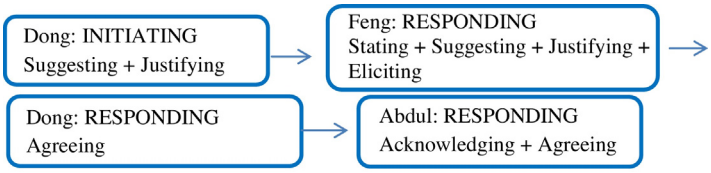
Table 6
Language functions involving two tasks performed by Group I.

Language functions		Dong	Feng	Abdul	Subtotal
Initiating	Eliciting	2	1	0	3
	Greeting	1	0	0	1
	Justifying	1	1	1	3
	Requesting	0	1	0	1
	Stating	1	1	1	3
	Suggesting	3	1	0	4
	Subtotal	8	5	2	15
Responding	Acknowledging	0	1	1	2
	Agreeing	1	1	1	3
	Elaborating	0	2	1	3
	Suggesting	0	1	0	1
	Subtotal	1	5	3	9
Total		9	10	5	24

2. **Feng**: Sure (**Agreeing**) and rhetorical stance should be presented, and explain the significance of the research. we need a timeline for investigating the topic, possible sources for investigation. (**Elaborating**)

In Excerpt 1, Dong and Feng jointly brainstormed the rhetorical structure using language functions involving both initiating and responding moves in the wiki Discussion. Excerpt 2 presents another example.

Excerpt 2: Wiki Discussion (2/10/13)



1. **Dong**: I recommend we choose the topic of immigration in the United States and its influence on American Culture, (**Suggesting**) because its the topic that we have already familiar with and can find the subtopic and resources quickly and easily. (**Justifying**)
2. **Feng**: The idea is good, but we need some more challenges. . . . (**Suggesting**) Globalization is a hot topic nowadays, Lots of people in China wear NIKE, eat KFC, drink Coca, make calls by Iphone, drive BMW, shopping in Walmart, but none of these are Chinese company (**Stating**). So how about we make our research on Globalization, and we can choose Coca-Cola as our target (**Suggesting**). Cause it owns wide-range consumers and its successful development experience has made it standing over 100 years (**Justifying**). What's your opinion, guys (**Eliciting**)?
3. **Dong**: Fine, I agree (**Agreeing**)
4. **Abdul**: fantastic (**Acknowledging**), I agree with you (**Agreeing**)

Dong initiated the group discussion by suggesting the topic of immigration and reasoning that this topic would be easy to handle. Feng politely responded to Dong by suggesting what he believed to be a more challenging topic: the globalization of Coco-Cola. After justifying his choice, Feng invited his partners' response. Both Dong and Abdul endorsed his idea through agreeing/acknowledging acts. In this way the three members reached consensus before proceeding with writing.

3.1.2. Writing change functions

After negotiating about their research topic and writing direction, the three members co-constructed group writing with respect to the Research Proposal and Annotated Bibliography, using their own group wiki space. We discuss below the writing change functions that Group I performed in each task, which were tracked through the group wiki History.

As Table 7 displays, in Task 1 (Research Proposal), the group members made a total of nine writing change functions, including six instances of adding and three instances of rephrasing. Dong performed five changes, and Feng and Abdul both two. They changed the texts that they had composed themselves (six instances) and also edited others' contributions (three instances). In Task 2 (Annotated Bibliography), participation was different. Among the total of 17 writing change acts, Dong contributed seven, Feng nine, and Abdul only one. Abdul's participation did not meet the task requirement of three annotations per person. He revealed in the post-task interview that he was occupied with the preparation for "a very important test." Members of Group I performed diverse types of writing change functions, i.e., adding, rephrasing, deleting, and correcting, but they made revisions predominantly on their own texts (15 out of 17). The degree of mutuality and equality of their interaction was thus reduced in Task 2.

Table 7
Writing change functions in two tasks performed by Group I.

		Dong	Feng	Abdul	Total
Task 1: Research proposal					
Adding	Self	3	2	0	6
	Other	0	0	1	
Rephrasing	Self	1	0	0	3
	Other	1	0	1	
Total		5	2	2	9
Task 2: Annotated bibliography					
Adding	Self	4	7	1	12
	Other	0	0	0	
Rephrasing	Self	1	1	0	2
	Other	0	0	0	
Deleting	Self	0	1	0	1
	Other	0	0	0	
Correcting	Self	0	0	0	2
	Other	2	0	0	
Total		7	9	1	17

3.1.3. Scaffolding strategies

Due to the interpersonal nature of scaffolding, we discuss scaffolding strategies taking each small group as a unit rather than distinguishing scaffolding strategies adopted by each individual member. We identified the members' scaffolding as it occurred, predominantly in Task 1. The three members working together as a collective built writing ideas and negotiated writing tasks at the pre-writing stage. *Collective scaffolding* characterized Group I's wiki interaction, in which they made collective efforts to propose writing orientation and provide guides through problem solving for one another (Donato, 1994). The scaffolding strategy of *intersubjectivity* (Rommetveit, 1985) was evident when they negotiated writing contents. As shown in Excerpt 2, in the pre-writing stage Dong suggested selecting immigration as the research topic due to their familiarity with immigration. Feng politely suggested what he believed a more challenging topic, i.e., globalization of Coco Cola, then justified the topic and invited his group partners to respond, closely followed by his partners' agreement. As a result, the group members achieved shared understanding and joint commitment to the task. Of note, while cognitive conflict (Tocalli-Beller & Swain, 2005) may occur during collaborative activity, negotiation of divergent opinions allows group members to construct new understanding and attain a new consensus. Feng, the assigned leader, explained "using 'coordinative' way to communicate" rather than "pushing" others (Reflection paper of Feng, 4/5/13). He also stated that "I informed group partners we need to move on, what next we need to do. If I forgot something, my members informed me, as well" (Interview with Feng, 3/8/13). This excerpt illustrates group members' efforts to offer reciprocal assistance and reach mutually agreed-upon understanding (Tudge, 1992). However, the scaffolding strategy was not obvious when the members of Group I performed Task 2, with Abdul's reduced participation and Dong and Feng's less engagement in each other's writing contribution.

3.2. Group II: Specific features of interaction

The members of Group II performed the two wiki writing tasks in a different fashion. They had little positive engagement with each other's writing contributions in Task 1, but offered contingent scaffolding to group partners in Task 2. In contrast to the decreasing degree of mutuality exhibited by Group I, Group II displayed clear evidence of an increasing degree of mutuality during the course of collaborative wiki writing.

3.2.1. Language functions

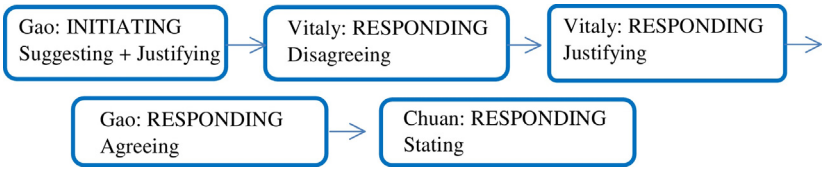
Table 8 shows the language functions that Group II performed. We identified 26 instances of language functions, consisting of 17 initiating acts and 9 responding acts (including merely 2 positive responses). The language functions most often performed by this group were stating (6), requesting (5) and suggesting (3). Both Gao and Vitaly offered a few suggestions, requests, or questions, most of which were not responded to by other group members. For instance, on one occasion Vitaly requested "I put some ideas, please respond and add something" (wiki Discussion, 2/10/13), but his partners did not respond. In contrast to Group I, in which group members elaborated on multiple occasions, only one instance of elaborating was found in Group II. When Gao was not sure of the key word "Outsourcing" for their research study, for instance, he made a post in the wiki Discussion and asked for responses. Neither of his group partners made an immediate reaction, and consequently Gao found a definition of "outsourcing" in Wikipedia and went on to elaborate on his own statement.

Excerpt 3 below shows this group's difficulty in reaching consensus during task negotiation.

Excerpt 3: Wiki Discussion (2/10/13)

Table 8
Language functions involving two tasks performed by Group II.

Language functions		Gao	Chuan	Vitaly	Subtotal
Initiating	Eliciting	1	0	1	2
	Greeting	1	0	0	1
	Justifying	1	0	1	2
	Questioning	1	0	1	2
	Requesting	3	0	2	5
	Stating	3	0	1	4
	Suggesting	0	0	1	1
	Subtotal	10	0	7	17
Responding	Agreeing	1	0	0	1
	Disagreeing	0	0	2	2
	Elaborating	1	0	0	1
	Greeting	0	0	1	1
	Stating	0	1	1	2
	Suggesting	1	0	1	2
	Subtotal	3	1	5	9
Total		13	1	12	26



Gao: We should focus on one company because we should narrow the topic. Focus on Apple (**Suggesting, justifying**).
Vitaly: Apple could be just an example and I think it will be too narrow (**Disagreeing**).
Vitaly: . . .if we take Apple we can talk only about USA and China. Whether it's enough for us or not, I don't know. Our big topic is globalization so we need to develop it to show that it is spread all over the world. Do you know that we have Korean "Hyundai", German "BMW" and "Volkswagen" factories in Russia? We do and it's also one of the examples of globalization (**Justifying**).
Gao: OK. Our topic include Apple, Hyundai, BMW and Volkswagen. We will talk about all of these brands get benefits from globalization outsourcing (**Agreeing**).
Chuan: The professor wants us to narrow our topic. She advises us use one company Apple in Russia and China (**Stating**).

In Excerpt 3, group members discussed the research topic for their group project. When Gao suggested narrowing the topic down to Apple's outsourcing strategy, Vitaly disagreed by arguing that discussion of multiple companies in diverse countries better supported the broad topic of globalization. Gao later agreed with Vitaly's idea, but Chuan's subsequent statement that their instructor advised "Apple in Russia and China" implied his disagreement. There was no further reciprocal discussion of the topic at the pre-writing stage. Surprisingly, Chuan, the group leader, was seldom involved with the group communication via wikis (having merely one instance as shown in Table 8).

3.2.2. Writing change functions

Wiki History records showed that the members of Group II conducted multiple types of writing change functions during wiki writing processes, illustrated in Table 9.

In Task 1, the group members produced a total of 14 writing change acts, displaying more types than Group I, namely adding (7), rephrasing (1), reordering (3), and deleting (3). In particular, Gao made the most contributions to group writing (7 and 24 instances of writing change functions in each of the two tasks). Despite the individual contributions to group writing, the group members did not exhibit the co-ownership and demonstrated few coordinated efforts. In Task 1, the majority of the writing changes (13 out of 14) were made to writers' own texts and only one instance was directed at others' texts. For example, in the early stage of writing, Vitaly posted "Our methods" as one of the rhetorical moves that he thought their group writing should include. No one contributed to the methods section as the task's due date approached, so he deleted "Our methods." Compared with their performance in Task 1, the group members showed a higher degree of reciprocal response in Task 2. Five instances of other writing change functions were identified. For example, Chuan not only rephrased and added to his own texts, but also engaged with his group partner's texts by correcting his partner Vitaly's spelling mistakes, e.g., "demonstate" (demonstrate) and "failicities" (facilities).

Table 9
Writing change functions in two tasks performed by Group II.

		Gao	Chuan	Vitaly	Total
Task 1: Research proposal					
Adding	Self	3	2	2	7
	Other	0	0	0	
Rephrasing	Self	0	1	0	1
	Other	0	0	0	
Reordering	Self	2	0	0	3
	Other	1	0	0	
Deleting	Self	1	1	1	3
	Other	0	0	0	
Total		7	4	3	14
Task 2: Annotated bibliography					
Adding	Self	10	2	4	18
	Other	0	1	1	
Rephrasing	Self	5	0	1	6
	Other	0	0	0	
Reordering	Self	1	1	1	3
	Other	0	0	0	
Deleting	Self	5	1	1	7
	Other	0	0	0	
Correcting	Self	3	0	0	6
	Other	0	3	0	
Total		24	8	8	40

3.2.3. Scaffolding strategies

Noticeable changes in Group II's scaffolding strategies were observed across the two tasks. The interaction in Task 1 was characterized by a *lack of intersubjectivity* and *instructing unresponded to*. In Task 2, however, their interaction involved more positive *instructing* and *contingent responsivity*. As compared to Group I, a lack of intersubjectivity was salient in Group II's interaction in Task 1. As noted above in Excerpt 3, a few instances of divergent thinking occurred, but divergent thoughts did not lead to shared understanding. To take another example, with a belief that his initial posting would be "good for other members to relate to the topics" (post-task interview with Gao, 3/8/13), Gao wrote a long paragraph on the topic of Apple's outsourcing in the wiki page. Despite his expectation that his post would benefit the group partners' follow-up work so that group members could reach consensus on the writing direction, Gao's contribution was not acknowledged by his group partners.

Interestingly, Vitaly employed instructing (Villamil & de Guerrero, 1996) in both Task 1 and Task 2, but his partners reacted to the instructing acts differently in the two tasks. Excerpt 4 below illustrates Vitaly's response after he read Chuan's irrelevant posts about "Series of questions," which mainly addressed a general problem of writing an academic paper but did not address their specific research topic in Task 1.

Excerpt 4: Wiki History (Vitaly, 2/24/13)

> Don't you remember that last time we already defined the series of questions. (What is the contra argument, what is the argument and etc.). Even in the assignment it's written: I identify a series of questions that will inform your research. It should be a kind of overview of our research but not a paragraph with concepts of writing a research paper.

Here Vitaly tried to regulate the task by calling attention to a trouble source, that is, irrelevant texts posted by Chuan. He attempted to instruct his group partner by marking discrepancies between what had been produced and the perceived task goal. However, this scaffolding strategy received no uptake—the identified trouble source was not repaired and irrelevant texts were not removed by his partners. However, Vitaly's instructing in Task 2 was well received by other group members. He instructed his partners by leaving a note "don't forget to post in alphabetical order," and his suggestion was accepted immediately by both Gao and Chuan. In addition, contingent responsivity was also evident in the interaction between Vitaly and Chuan in Task 2. When Chuan struggled in finding a source on the "counter-argument" that had been assigned to him, Vitaly suggested to Chuan a pertinent source by sharing its link in the group wiki page. Chuan responded to Vitaly's assistance and subsequently wrote an annotation for that source.

3.3. Overall dynamic patterns of interaction for Group I and Group II

Our analyses of multiple data sources as discussed in the preceding sections indicated that Group I and Group II, working on identical tasks in the identical wiki space, enacted different patterns of interaction throughout the writing process. Table 10 displays the dynamic patterns of interaction across tasks for Group I and Group II.

In Task 1, Group I exhibited a *collective* pattern, involving constructive interactions and collective scaffolding. Group members displayed active individual accountability in task completion (high equality) and mutual engagement in text construction (high mutuality), which was reflected in group members' balanced wiki participation, positive responding language functions, and other writing change functions. Collective scaffolding among all the three participants was a distinctive feature in this group's

Table 10
Dynamic patterns of interaction across tasks for Group I and Group II.

		Patters of interaction
Group I	Task 1	**Collective** Three members make balanced contribution to group writing; as a collective, they negotiate writing tasks and control writing directions. They are willing to engage with one another's text contributions, and collective scaffolding occurs.
	Task 2	**Active/Withdrawn** Two members actively participate in their own divided writing task, but the third member has a reduced degree of participation and even withdraws from the task.
Group II	Task 1	**Dominant/Defensive** Two members take control of the task in different ways. The third member, although the assigned leader, contributes the least to group writing, but nonetheless defends his writing contribution and leadership. Group members are unwilling or unable to engage with one another's contributions and few instances of reciprocal interaction occur.
	Task 2	**Collaborative** Each member takes a collaborative stance and interacts with the other member in the writing task. They actively participate in their own divided writing task. They show willingness to engage with each other's ideas and text contributions.

interaction. There was no one expert (no member asserted individual expertise), but three members collectively acted as experts, drew on their resources and scaffolded each other's efforts in the writing task. As Dong recalled in the interview: "When we have some good ideas, we just go on the wikis and consult others' ideas [. . .] I also invited others to respond" (Interview with Dong, 3/9/2013). In this way the interactions among participants were positive and productive.

In Task 2, however, group members' collective efforts became minimal, shown in Abdul's reduced contribution of annotations and Dong and Feng's reduced engagement in each other's text construction. The interaction pattern switched to *active/withdrawn*. Dong and Feng took responsibility for the construction of individual three annotations, but were involved with few instances of other writing change functions. Abdul did not do a fair share of the group work, ending up with merely one annotation. Lack of intersubjectivity characterized the group interaction in Task 2. For instance, when he noticed the missing annotations from Abul, Feng left a comment—"Can you find one more source to add?"—on the wiki Page, but Abdul did not make response. Thus, equality and mutuality decreased in this task.

Group II displayed a *dominant/defensive* pattern of interaction in Task 1 that involved unbalanced individual contributions (low equality) and few reciprocal responses to one another's writing efforts (low mutuality), reflected in unbalanced instances of language functions from three members and quite a few instances of unresponded language functions as well as self writing change functions. Vitaly and Gao took control of the task in different ways: Vitaly played an explicit authoritative role in the process of task negotiation, as revealed in the instructing-related posts in wiki discourse, while Gao exerted influence on written texts implicitly, with a large degree of writing contribution and the initiation of writing contents. Chuan, the assigned leader, contributed the least to the research proposal, shown in his few instances of language functions during task negotiation. In the post-task interview, Chuan claimed that he was responsible for "What we should do first, what we should do next and separate the tasks, what you should do, what they should do, make every steps clear for everyone. [. . .] I gave my recommendation face-to-face" (Interview with Chuan, 3/8/2013). In general, the three members showed a low degree of equality and low degree of mutuality in Task 1.

Members of Group II took a collaborative stance, however, with a higher degree of equality and mutuality in Task 2. They each showed individual accountability in completing three annotations and reciprocal engagement with each other's annotations (reflected in positive responding language functions and increasing instances of other writing change functions). Collaborative interaction occurred between Vitaly and Chun, and also between Vitaly and Gao. Members of Group II did not simply work in parallel fashion, completing the equal labor assigned to each of them. Scaffolding strategies (e.g., enacted instructing and contingent responsivity) were evident when they performed Task 2.

Note that we distinguish between *collective* and *collaborative* patterns. The collective pattern was demonstrated by Group I in Task 1, exhibiting a feature that has been described as *collective scaffolding* (Donato, 1994): The three group members (Dong, Feng, and Abdul) jointly negotiated writing tasks while assuming simultaneous roles as individual novices and collective experts, throughout the wiki task. The collaborative pattern refers to the interaction occurring between two members, as demonstrated by Group II in Task 2 (separate interactions between Vitaly and Chuan, and between Vitaly and Gao), with no evidence of the three members together as a collective negotiating the same writing problems. But this group nonetheless successfully completed Task 2 with three members' active participation.

4. Discussion

Our study presents two distinctive ways in which ESL students interacted in two collaborative writing tasks on the Wikispaces site. We drew on sociocultural theory to explore peer interactions in wiki-based collaborative writing, by examining language functions, writing change functions, and scaffolding strategies. The language functions identified in the wiki discourse showed how students used the target language as a mediating tool to interact with group partners while performing writing tasks and negotiating social relationships. The investigation of writing change functions revealed an ongoing joint writing process at both writing and revising stages. Our examination of scaffolding strategies enriched our understanding of group dynamics.

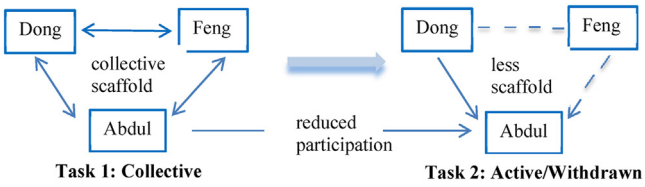


Fig. 2. Dynamics of Interaction for Group I.

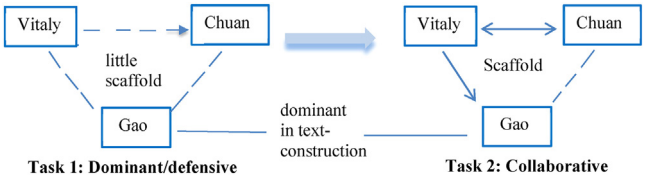


Fig. 3. Dynamics of Interaction for Group II.

We found that the two groups demonstrated unique approaches to joint wiki writing, and variation occurred while each group worked on the two writing tasks. Group I demonstrated a collective approach to the writing of a research proposal (Task 1), but their interaction pattern switched to active/withdrawn due to Abdul's absence when they worked on the annotated bibliography (Task 2). Conversely, Group II started with a dominant/defensive pattern in Task 1, but developed a collaborative stance in Task 2. We have thus documented how small groups' interaction patterns can change across different writing tasks. Unlike previous studies (e.g., Li & Zhu, 2013; Storch, 2002, 2004) that discussed relatively stable patterns of interaction that groups/pairs exhibited, the present study reveals the changing patterns of interaction and the fluidity of scaffolding in L2 small group writing that can occur across multiple writing tasks.

In Figs. 2 and 3 we represent the dynamics of peer interaction for the two groups when they perform two wiki tasks. We interpret small group interactions from the lens of sociocultural theory, particularly drawing on the construct of scaffolding. For Group I, in Task 1, the three members (Dong, Feng, and Abdul) built on each other's ideas and constructed joint scaffolding in task negotiation and text co-construction (indicated by straight lines with two arrows in Fig. 2). But the pattern changed in Task 2 with the reduced participation from Abdul and less scaffolding among group members (indicated by a dotted line in Fig. 2). Dong and Feng contributed their own three annotations with little engagement with each other's texts. Feng once solicited Abdul's more contribution, but Abdul did not respond, and actually withdrew in the middle of the task. In addition, Dong made a few changes to the only annotation that Abdul composed.

In Task 1 the members of Group 2 did not engage with each other's contributions, except for Vitaly's attempt at instructing, and little scaffolding was enacted. Group 2 members developed a different pattern in Task 2, however. They engaged in fluid scaffolding by creating separate collaborative interactions between Vitally and Chuan, and between Vitaly and Gao. The dynamics of interaction in Group 2 is summarized in Fig. 3. When the group worked on the research proposal, Vitaly took an emergent leadership role when he observed that "this project was not taken seriously." He continued to explain why he took responsibility of a leader: "A group leader has to manage the entire project, because he is the manager of it. I expected the same thing from our leader, but it was worthless" (Post-task interview with Vitaly, 3/8/13). His partner Chuan, who was given the role as assigned leader, was resistant to being led and helped (represented as a dotted line with an arrow in Fig. 3).

As shown in Group 2's interaction, one person adopting a leadership role, as a mediational means, can influence the collaborative writing process (Yang, 2014). Unlike Yang's observation about the positive effect of taking leadership, the authoritative air that Vitaly assumed in Task 1 did not facilitate joint writing, and potential scaffolding was not activated. We partly attribute this group dynamics to the conflict between emerging leadership stemming from identifying the lack of knowledge and skill of the assigned leader and the defensive stance of that leader. However, Vitaly's change in attitude and tone in Task 2 seemed to facilitate group interaction, as he exhibited a friendly and collaborative manner when making suggestions, which was accepted by his group partners. This was followed in turn by the assigned leader Chuan's efforts to improve the texts that Vitaly had constructed.

This study deepens our understanding of the complex roles of tasks in group interactions. On one hand, this study has shown that the nature of tasks has effects on students' wiki writing interaction. In both wiki tasks, we detected some instances of correcting functions during text co-construction but few instances of group members' elaborated negotiation of language points, in terms of Language-Related Episodes (LREs) where learners talk about or question their own or others' language use (Swain & Lapkin, 1998), which has been reported in prior wiki writing studies (e.g., Kessler, 2009; Li & Zhu, 2013). Instead, we discovered multiple instances of wiki discussion on content topics and genre structures. We explain this finding in part through the common features of the two wiki tasks: When unfamiliar academic writing tasks focus on the

application of emerging genre knowledge, language receives much less attention. The different nature of wiki tasks also mediated group dynamics. For instance, members of Group 2 were unable to engage with one another's contributions in Task 1 that entailed interdependence of different individual efforts, but they co-worked smoothly in Task 2, which could be completed independently by different individuals. For Group 1, changing configurations of participation (due to Abdul's absence) interacted with the task structure to influence the group interaction. As the task of the annotated bibliography required a clear division of labor, the nature of this task somewhat affected the mutuality of Group 1, mirrored by Dong and Feng's reduced engagement in each other's texts. Thus, different tasks afford different group dynamics and can be completed in different relational configurations, variously suiting individual and circumstantial preferences for certain patterns of interaction to occur.

On the other hand, this study supports the claim that learning tasks are merely blueprints (Coughlin & Duff, 1994; Storch, 2004; Zhu & Mitchelle, 2012), and that groups can perform the same joint writing tasks quite differently than what one might expect. In this study, Task 1 (Research Proposal) required group members to construct texts jointly and make joint decisions throughout the writing process, whereas Task 2 (Annotated Bibliography), even though it involved a common writing product, required a combination of each member's individual work. We assumed that students might demonstrate a more collaborative stance in Task 1 than in Task 2, but we found the opposite for Group II, which collaborated more on Task 2. As Donato (2000) posited, "Tasks do not manipulate learners to act in certain ways, because participants invest their own goals, actions, cultural background and beliefs into tasks and thus transform them" (p. 44). Other factors such as the recognition of individual responsibility, participants' goals, agency, and emotions, and the use of technology may also be relevant to students' interaction and collaborative learning.

5. Conclusion

Our study illustrates the dynamic nature of small group interactions across collaborative wiki writing tasks. We contribute to the computer-mediated collaborative writing literature in several ways. The study documents how small groups take diverse approaches to both task negotiation and text co-construction when working on two academic writing tasks using wikis. Theoretically, drawing on the construct of language mediation and (collective) scaffolding to interpret students' wiki interaction, our study shows how sociocultural theory can guide research on computer-mediated collaborative learning, capturing dynamic interactions and the fluidity of scaffolding.

Our study also contributes methodologically to the field of collaborative writing. We have deployed the concepts of equality and mutuality in analyzing peer interactions and have demonstrated how they can illuminate the online collaborative writing context. Specifically, we extended the definitions of equality and mutuality to apply to the online collaborative writing tasks, and developed a systematic way to evaluate equality and mutuality with respect to language functions, writing change functions, and scaffolding strategies, the three connected elements essential for online joint writing. We also constructed an innovative coding framework by refining multiple coding schemes for analyzing computer-based discussion, text co-construction behaviors, and scaffolding episodes.

No prior research has analyzed the online collaborative writing process in such a comprehensive manner. For instance, Li and Zhu (2013) only indicated the application of language functions to peer interactions in collaborative wiki writing, without providing a taxonomy of language functions. Writing change functions have been discussed in a few studies of wiki collaborative writing (e.g., Li, 2013; Mak & Coniam, 2008), but these studies lack a unified coding scheme for writing change functions with clear illustrations for each component. Furthermore, scaffolding strategies have rarely been scrutinized in the online collaborative writing literature. We still need to test and validate our coding framework, but we envision that this unified framework will serve as a valuable resource for the analysis of online collaborative writing process in future studies of group dynamics in the online writing environment.

Pedagogically, the wiki was a very useful collaboration tool for small group writing, but our study clearly shows that the collaborative nature of the technology does not automatically lead to participants taking a collaborative approach. We believe that multiple factors, such as the participants' life trajectories, the instructional context, members' communicative strategies, personal circumstances, and the affordances of the technology mediate students' participation in computer-based collaborative writing projects. Instructors need to give careful thought to group formation and leader selection when designing collaborative writing tasks. Instructors are encouraged to form groups of students from different L1/cultural backgrounds with an aim to creating more opportunities of task and language negotiations, and to help students develop intercultural communication skills. As to the selection of group leaders, students' language proficiency levels and learning abilities need to be considered. Instructors can also foster collaborative writing processes by guiding students to reflect on group dynamics and taking into consideration both individual contributions and joint efforts in the assessment of writing products.

With the increasing development of new technologies, online collaborative writing will become a common activity in a variety of L2 contexts. Researchers and educators must attend both to the affordances of these technologies and to the various individual and group factors that influence how the technologies are used and how students interact and learn in the online writing context. Future studies could use the coding framework established in this study and further explore the dynamic nature of peer interaction in online collaborative writing using other collaboration tools (e.g., Google docs, PBworks, and MixedInk). Future research could examine multiple mediating factors that help explain dynamics of peer interaction in online writing environments, such as tasks, goals, agency, emotion, language proficiency, and technology use. Also, to better understand the important role of peer scaffolding in computer-mediated writing, the influence of interaction patterns on group

writing products, as well as on individual's learning could constitute an important research direction. Furthermore, cross-cultural communication among students from mixed demographic backgrounds in online collaborative writing environments deserves further investigation. Such future work on online collaborative writing will shed new light on how the transformational roles of new technologies, interacted with group dynamics, afford L2 writing performance and writing development.

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Appendix A. Pre-task Questionnaire Survey

Participant ID:_____ Date:_____

The following questionnaire is designed for my dissertation study on wiki-based collaborative writing in the EAP class. I would like to invite you to answer the following questions concerning your background information and your learning experiences. Please provide your information as truly as possible. All the data collected will be highly confidential and will be used for this research only. Thank you very much for your kind help!

1. Gender: ☐ Male ☐ Female Age: _____
2. Home country:_____
3. Academic program/field of study/major: _____.
4. How many years have you studied English? _____.
   What are your goals of learning English?_____ .
5. Your experiences of learning English is ☐ very positive; ☐positive; ☐neutral; ☐ negative; ☐ very negative.
6. Your English proficiency is ☐low; ☐intermediate-low; ☐intermediate; ☐ intermediate-high; ☐ high.
7. How often do you use the computer? _____ hours per day.
   You use the computer for ☐ study; ☐ fun; ☐ social networking (Please choose all that apply.)
8. Are you comfortable using computer programs? ☐ very comfortable; ☐ comfortable; ☐ neutral;☐uncomfortable;☐very uncomfortable.
9. Your experience in using wikis:
   Have you worked on a group project using wikis before? If yes, briefly comment on the wiki project(s). _____ .
10. Your experience in using other Web 2.0 tools (e.g., blogs, twitter, google docs, facebook)_____.
11. Your classroom work style:
    Your attitude toward individual work is ☐very positive;☐ positive; ☐ neutral; ☐ negative; ☐ very negative.
    Your attitude toward small group work is ☐ very positive; ☐ positive; ☐neutral; ☐ negative;☐very negative.
12. Are you familiar with your group partners in this wiki project?
    _____.
    For the partner(s) you have met before, how long have you known this person?
    _____.

References

Antón, M., & DiCamilla, F. (1998). Socio-cognitive functions of L1 collaborative interaction in the L2 classroom. *The Canadian Modern Language Review, 54*, 314–342.

Arnold, N., Ducate, L., & Kost, C. (2012). Collaboration or cooperation? Analyzing group dynamics and revision processes in wikis. *CALICO Journal, 29*, 431–448.

Bradley, L., Linström, B., & Rystedt, H. (2010). Rationalities of collaboration for language learning in a wiki. *ReCALL, 22*, 247–265.

Coughlin, P., & Duff, P. A. (1994). Same task, different activities: Analysis of a SLA task from an activity theory perspective. In J. P. Lantolf & G. Appel (Eds.), *Vygotskian approaches to second language research* (pp. 173–191). Norwood, NJ: Ablex.

Damon, W., & Phelps, E. (1989). Critical distinctions among three approaches to peer education. *International Journal of Educational Research, 13*, 9–19.

de Guerrero, M. C. M., & Villamil, O. S. (2000). Activating the ZPD: Mutual scaffolding in L2 peer revision. *The Modern Language Journal, 84*, 51–68.

DiCamilla, F. J., & Anton, M. (1997). Repetition in the collaborative discourse of L2 learners: A Vygotskian perspective. *Canadian Modern Language Review, 53*, 609–633.

Donato, R. (1994). Collective scaffolding in second language learning. In J. P. Lantolf & G. Appel (Eds.), *Vygotskian approaches to second language research* (pp. 33–56). Norwood, NJ: Ablex.

Donato, R. (2000). Sociocultural contributions to understanding the foreign and second language classroom. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 27–50). Oxford, England: Oxford University Press.

Donato, R. (2004). Aspects of collaboration in pedagogical discourse. *Annual Review of Applied Linguistics, 24*, 284–302.

Fernández Dobao, A. (2012). Collaborative writing tasks in the L2 classroom: Comparing group, pair, and individual work. *Journal of Second Language Writing, 21*, 40–58.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Aldine.

Hirvela, A. (1999). Collaborative writing instruction and communities of readers and writers. *TESOL Journal, 8*(2), 7–12.

Iwashita, N. (2001). The effect of learner proficiency on interactional moves and modified output in nonnative–nonnative interaction in Japanese as a foreign language. *System, 29*, 267–287.

Kessler, G. (2009). Student-initiated attention to form in wiki-based collaborative writing. *Language Learning & Technology, 13*(1), 79–95.

Kost, C. (2011). Investigating writing strategies and revision behavior in collaborative wiki projects. *CALICO Journal, 28*, 606–620.

Lantolf, J. P. (2000). Second language learning as a mediated process. *Language Teaching, 33*, 79–96.

Li, M. (2013). Individual novices and collective experts: Collective scaffolding in wiki-based small group writing. *System, 41*, 752–769.

Li, M., & Zhu, W. (2013). Patterns of computer-mediated interaction in small writing groups using wikis. *Computer Assisted Language Learning, 26*, 61–82.

Li, M. (2014). *Small group interactions in wiki-based collaborative writing in the EAP context*. (Doctoral dissertation). Retrieved from University of South Florida Scholar Commons. http://scholarcommons.usf.edu/etd/5254..

Lidz, C. S. (1991). *Practitioner's guide to dynamic assessment*. New York: Guilford Press.

Lockhart, C., & Ng, P. (1995). Analyzing talk in ESL peer response groups: Stances, functions, and content. *Language Learning, 45*, 605–655.

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

Morgan, M., Allen, N., Moore, T., Atkinson, D., & Snow, C. (1987). Collaborative writing in the classroom. *Bulletin of the Association for Business and Communication, 50*(3), 20–26.

Polio, C., & Gass, S. M. (1998). The role of interaction in native speaker comprehension of non-native speaker speech. *The Modern Language Journal, 82*, 308–319.

Rommetveit, R. (1985). Language acquisition as increasing linguistic structuring of experience and symbolic behavior control. In J. Wertsch (Ed.), *Culture, communication and cognition: Vygotskyan perspectives* (pp. 183–204). Cambridge: Cambridge University Press.

Stake, R. E. (2006). *Multiple case study analysis*. New York: The Guilford Press.

Stanley, J. (1992). Coaching student writers to be effective peer evaluators. *Journal of Second Language Writing, 1*, 217–233.

Storch, N. (2002). Patterns of interaction in ESL pair work. *Language Learning, 52*(1), 119–158.

Storch, N. (2004). Using activity theory to explain differences in patterns of dyadic interactions in an ESL class. *Canadian Modern Language Review, 60*, 457–480.

Storch, N. (2005). Collaborative writing: Product, process, and students' reflections. *Journal of Second Language Writing, 14*, 153–173.

Storch, N. (2011). Collaborative writing in L2 contexts: Processes, outcomes, and future directions. *Annual Review of Applied Linguistics, 31*, 275–288.

Storch, N. (2013). *Collaborative writing in L2 classrooms*. Bristol, UK: Multilingual Matters.

Strauss, A. L., & Corbin, J. M. (1998). *Basics of qualitative research* (2nd ed.). Newbury Park, CA: Sage.

Swain, M. (1995). Three functions of output in second language learning. In G. Cook & B. Seidlhofer (Eds.), *Principle and practice in applied linguistics: Studies in honor of H. G. Widdowson* (pp. 125–144). Oxford: Oxford University Press.

Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 97–114). Oxford: Oxford University Press.

Swain, M., & Lapkin, S. (1998). Interaction and second language learning: Two adolescent French immersion students working together. *The Modern Language Journal, 82*, 320–337.

Tocalli-Beller, A., & Swain, M. (2005). Reformulation: The cognitive conflict and L2 learning it generates. *International Journal of Applied Linguistics, 15*, 5–28.

Tudge, J. R. H. (1992). Processes and consequences of peer collaborations: A Vygotskian analysis. *Child Development, 63*, 1364–1379.

van Lier, L. (2002). An ecological-semiotic perspective on language and linguistics. In C. Kramsch (Ed.), *Language acquisition and language socialization: Ecological perspectives* (pp. 140–164). London: Continuum.

Villamil, O. S., & de Guerrero, M. C. M. (1996). Peer revision in the L2 classroom: Socio-cognitive activities, mediating strategies, and aspects of social behavior. *Journal of Second Language Writing, 5*, 51–75.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Watanabe, Y. (2008). Peer-peer interaction between L2 learners of different proficiency levels: Their interactions and reflections. *Canadian Modern Language Review, 64*, 605–635.

Wells, G. (1999). *Dialogic inquiry: Towards a sociocultural practice and theory of education*. Cambridge: Cambridge University Press.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry, 17*, 89–100.

Yang, L. (2014). Examining the mediational means in collaborative writing: Case studies of undergraduate ESL students in business courses. *Journal of Second Language Writing, 23*, 74–89.

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

Zhu, W. (2001). Interaction and feedback in mixed peer response groups. *Journal of Second Language Writing, 10*, 251–276.

Zhu, W., & Mitchelle, D. A. (2012). Participation in peer response as activity: An examination of peer response stance from an activity theory perspective. *TESOL Quarterly, 46*, 362–386.

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