Liu, S.-H.-J., Lan, Y.-J., & Ho, C.-Y.-Y. (2014). Exploring the Relationship between Self-Regulated Vocabulary Learning and Web-Based Collaboration. *Educational Technology & Society*, *17* (4), 404–419.

Exploring the Relationship between Self-Regulated Vocabulary Learning and Web-Based Collaboration

Sarah Hsueh-Jui Liu[1], Yu-Ju Lan[2*] and Cloudia Ya-Yu Ho[1]

[1]Department of Applied English, Kainan University, Taiwan // [2]Department of Applied Chinese Language and Culture, National Taiwan Normal University, Taiwan // sarah.hjliu@gmail.com // yujulan@gmail.com // cloudiaho@hotmail.com

[*]Corresponding author

(Submitted November 1, 2013; Revised May 13, 2014; Accepted May 24, 2014)

ABSTRACT

Collaborative learning has placed an emphasis on co-constructing knowledge by sharing and negotiating meaning for problem-solving activities, and this cannot be accomplished without governing the self-regulatory processes of students. This study employed a Web-based tool, Google Docs, to determine the effects of Web-based collaboration on vocabulary improvements among learners of English as a foreign language (EFL). The work performed in this study represents a further step toward identifying the factors that influence self-regulated vocabulary strategy use and perceptions of Web-based collaboration (SRvsWBC). In total, 210 undergraduate students participated in this study and undertook the designed tasks, such as vocabulary pre-/posttests and a self-report questionnaire survey of SRvsWBC. The findings of the study suggest that collaboration using a Web-based tool affects knowledge development, and provide insights into the integrated spectrum of self-regulation, L2/FL learning, and Web-based technology that will be useful for pedagogy.

Keywords

Web-based collaboration, English as a foreign language (EFL), Vocabulary strategy use, Self-regulated learning (SRL)

Introduction

Accessing the Internet has become the most popular means by which college students communicate with one another on a daily basis, such as via email (Lee, Cheung, & Chen, 2005). Such Web 2.0 social tools have been considered to support the meaningful and collaborative learning (Gao, 2013; Tsai & Tsai, 2013) that underlies a social cognitive view of self-regulated learning (SRL). These tools reportedly motivate students to become independent learners who are able to direct and take control of their own learning and to evaluate their learning goals in order to acquire knowledge and skills (Pintrich, Smith, Garcia, & McKeachie, 1993; Zimmerman, 1990). There has been a substantial amount of research into SRL in an attempt to examine the importance of an individual's internal (e.g., interests and motivation) and external (e.g., interaction between interlocutors) characteristics in both face-to-face settings and technology-based environments (e.g., Cho & Jonassen, 2009; Cho & Kim, 2013; Schmidt, Boraie, & Kassabgy, 1996). It has been stated that those who are seeking language-use opportunities outside the classroom in technology-based settings "have been found to be more likely to take responsibilities for self-directing and self-managing their language learning and use technologies to regulate their language learning experience" (Lai, 2013, p. 103). Understanding the internal constructs in relation to contextual factors (e.g., learning mathematics) is essential, but there has been little research in this area (Hsin, Lin, & Yeh, 2005).

Building on previous work, this study aimed to provide a better understanding of whether the use of Web-based collaboration tool influences the vocabulary improvements of learners and whether the subscales of underlying variables are identifiable and interrelated. This study neither analyzed the negotiated interaction of the participants where they were using a Web-based tool (Google Docs in this case) nor assessed the effectiveness of the learning activities undertaken by the participants; instead, the aim was to measure the impact of collaboration on the vocabulary improvements of the participants in a Web-based environment. This study further aimed to identify the relationship between the constructs under investigation.

Literature review

Self-regulated second-language or vocabulary learning

SRL refers to individuals who "are metacognitively, motivationally, and behaviorally active participants in their own learning process" (Zimmerman, 1989, p. 329). This posits that SRL involves "not only cognitive but also motivational and affective factors, as well as social contextual factors" (Pintrich, 2004, p. 386). Broadening the scope of SRL in educational psychology to encompass second or foreign language (L2/FL) learning, learners can be said to actively employ strategic tactics to control their emotions (e.g., being anxious when conversing with native speakers of the L2) and to overcome unknown vocabulary or linguistic deficits in order to facilitate effective communication (Oxford, 2011).

Affective constructs, including motivation and attitudes toward L2 learning, have been empirically examined in relation to the use of L2 learning strategies (e.g., Schmidt, Boraie, & Kassabgy, 1996). It is believed that students with higher levels of motivation display higher quality learning strategies and outcomes. This is consistent with language strategy use being found to be inextricably intertwined with the motivation or self-perceived ability to determine the degree of outcomes. L2 learners with greater motivation are likely to employ more types of strategies, such as communication-oriented strategies, and to do this more frequently (Oxford & Nyikos, 1989). Instrumentally motivated students who were inclined to learn an L2 for practical reasons were found to prefer using strategies in connection with a first language and other languages more frequently, whereas integrative motivated students tended to learn the language just out of interest (Levine, Reves, & Leaver, 1996).

In the context of L2 vocabulary learning, because word knowledge plays an important role in receptive and productive skills in association with effective communication (Liu, Lan, & Jenkins, in press; Nyikos & Fan, 2007), insufficient vocabulary knowledge will cause learners to experience communication breakdowns when confronted with unknown words or expressions. Tseng, Dörnyei, and Schmitt (2006) proposed an integrative model of SRL and vocabulary strategy use based on the conceptual framework of SRL. Instead of focusing at a micro level of specific vocabulary strategy use, such as paying attention to the prefix and suffix of a word, their model emphasizes that a learner's innate self-regulatory capacity enables him- or herself to choose appropriate strategies to activate a macro level of learning. Such general aspects involve an individual's commitment control (to achieve learning goals), metacognition control (to manage concentration on learning), satiation control (to eliminate boredom), and emotional and environmental control. The relations between vocabulary strategy use and motivation are also evident from vocabulary interventional studies. Mizumoto and Takeuchi (2009) found that the motivation of students could be enhanced by explicitly teaching them vocabulary strategies inside the classroom, such as reviewing learned vocabulary (metacognition strategies) and making a mental picture (cognitive strategies).

SRL and web-based technology for language learning

Web-based technology can support SRL in L2 learning, since it "can shift control to the learner, through promoting learner agency, autonomy, and engagement" (McLoughlin & Lee, 2010, p. 28). Such Web-based tools for L2 learning contexts underlie the sociocultural theory (cf. Lantolf & Thorne, 2007; Vygotsky, 1978) that assumes that cognitive developmental processes take place through collaborative interaction between interlocutors in a social milieu, whereby learners are engaged in co-constructing their knowledge in the target language (Swain & Lapkin, 2000). Various research studies have investigated the multifaceted dimensions of how use of technology improves L2 learning. While some studies have examined meaningful interactions between experienced and novice interlocutors (e.g., Sotillo, 2005; Yilmaz & Granena, 2010), others have focused on how such technology allows students to work collaboratively in order to enhance learning experiences (e.g., Chang, 2005; Gao, 2013; Kessler, Bikowski, & Boggs, 2012; Lai & Gu, 2011).

Cheng and Chau (2013) examined the relationship between the SRL ability of students and their e-portfolio achievements, and found that use of cognitive and self-regulated strategies was positively related to learning outcomes. Their scoring of e-portfolios revealed that higher achievers employed more cognitive processing strategies, such as elaboration, organization, and critical thinking, and metacognitive self-regulation and collaborative peer-learning strategies. Chang (2005) examined the relations between SRL strategies and how learners perceive their

motivation for Web-based instruction. The results of that study indicate that learners can improve their learning motivation and confidence by incorporating SRL strategies and Web-based instruction.

Regarding the use of a Web-based medium for the out-of-classroom support of student learning, Lee et al. (2005) attempted to measure students' acceptance of such a learning medium within a motivational framework in terms of two main factors: extrinsic (perceived usefulness and ease of use) and intrinsic (perceived enjoyment). The findings show that apart from perceived ease of use, both extrinsic motivation and intrinsic motivation are significantly related to the attitudes of students and their intention to use a Web-based learning medium. As hypothesized, motivational subscales, such as extrinsic and intrinsic, are considered to be associated with how students perceive the use of technology.

Use of web-based technology for language learning

Web-based technology provides opportunities for authentic learning and meaningful communication (Kabilan, Ahmad, & Abidin, 2010). For example, Warschauer (1996) investigated the difference in participation by learners between electronic and face-to-face discussion in L2/FL learning. The results of his study reveal that learners exhibited more equal opportunities when expressing their thoughts in the electronic modality than in the face-to-face modality. Learners not only produced more complex lexical and syntactic structures, but also had a more positive attitude toward discussing issues electronically. Kessler et al. (2012) assessed collaborative writing by learners that focused on linguistic features (e.g., verb tenses and meaning), strategic processing (e.g., planning), and the perception of the collaboration when using the Google Docs Web-based tool. Their results suggest that this Web-based tool allowed students to exhibit their abilities in using collaborative scaffolding in relation to the forms and meanings of words, employing multiple strategies in writing, such as editing and revising, as well as feeling positive toward working in such an environment.

One of important factors influencing language learning is how learners perceive Web-based collaboration that may improve their learning in the target language. Davis (1989) suggested that perceived usefulness and ease of use are the two factors underlying the degree to which users believe that using technology will enhance their performance. Both of these factors relate to an individual's cognitive responses to using technology, which will in turn influence the user's emotional states (Holden & Rada, 2011). Such feelings and opinions regarding the perception of technology use outside the classroom have been investigated empirically, with the results showing that learners generally have positive attitudes toward technology use and acceptance (Lai, Wang, & Lei, 2012; Lee et al. 2005). As hypothesized in the present study, the L2 vocabulary strategy use by learners to enhance English learning is associated with their acceptance and perception of Web-based collaboration.

The participants in this study worked together as group members on Google Docs either at the same time or at different times. However, since collaborative work involves individuals working in a group (Stahl, Koschmann, & Suthers, 2006), completing problem-solving tasks or working collaboratively can be problematic (Chisholm, 1990). For example, some individuals in a particular group might not feel comfortable giving their opinions or commenting on the work of others due to a lack of confidence in their English ability, whereas other individuals may be more willing to work with others for various reasons, such as in order to complete the tasks to help them get a good grade. How individuals perceive collaborative learning is reflected in their behaviors, and these were used in the present study to identify them as active or passive collaborators. Together with the theoretical concepts relevant to SRL and technology use, this study attempted to answer the following questions: (1) is there a significant relationship between the scores in pre- and posttests, (2) is there a significant difference in the vocabulary improvements between active and passive collaborators, and (3) what factors influence self-regulated vocabulary strategy use and the perception of Web-based collaboration (SRvsWBC)?

Method

Participants

In total, 210 first- and second-year university students from 6 intact English classes at a private university in northern Taiwan were recruited for this research. The final number of included participants was 180 due to 16 students being

absent during the administration of the questionnaire survey and 14 students completing less than half of the questionnaire. The number of female participants (N = 114) was nearly double that of male participants (N = 66), please see Table 1. The students voluntarily participated in this study, and their age ranged between 19 and 26 years old. They were studying in various fields and shared similar backgrounds, speaking Chinese or Taiwanese as a first language and learning English as a core subject and as an FL ever since when they had been elementary-school students.

The demographic information of the participants shown in Table 1 indicates that almost all of the students (97%) were aged between 19 and 21 years, with only 3% being aged between 22 and 26 years. Furthermore, more than half of the students were in their first year of studies, whilst approximately 40% of them were second-year students. Majors in Tourism and Hospitality comprised the largest proportion of students (37%), whereas the majors in Logistics and Shipping Management comprised the smallest proportion (11%).

Table 1. Descriptive statistics of the demographic information

Gender	Male	66	(37%)
	Female	114	(63%)
	Total	180	(100%)
Age	19-21 years	138	(97%)
	22-26 years	5	(3%)
	Total	143	(100%)
	37 missing cases		
Year of study	First year	102	(57%)
	Second year	78	(43%)
	Total	180	(100%)
Major subject	Tourism and Transportation	23	(13%)
	Logistics and Shipping Management	19	(11%)
	Tourism and Hospitality	67	(37%)
	Leisure and Recreation Management	25	(14%)
	Air Transportation	46	(25%)
	Total	180	(100%)
Length of time spent learning English	7-8 years	78	(55%)
	9+ years	64	(45%)
	Total	142	(100%)
	38 missing cases		
Length of time spent in English-speaking countries	None	148	(92%)
	1–6 months	11	(7%)
	< 1 year	2	(1%)
	Total	161	(100%)
	19 missing cases		

Regarding the length of time spent learning English, the homogeneous group of students started to learn English as a school core subject when they were in sixth grade at elementary school. This meant that approximately half of the students had been learning English for more than 7 years. A mere 1% of students had visited an English-speaking country, such as the United Kingdom or the United States.

Instruments and materials

Vocabulary test

The English vocabulary test used to measure the participants' vocabulary knowledge comprised a total of 40 items divided into 5 sections. Sections A and C, respectively comprising five and eight questions, involved matching tests between English words with similar meanings, such as "exercise" being akin to "work out." Section B, comprising five questions, provided five target lexical items with five gaps in a short reading passage. Similar to Section C, Section D (12 questions) involved matching English words with their meaning in Chinese. In the last section, ten target items underlined in a text were tested in ten multiple-choice questions. The designed content of the pre- and posttests was mainly based on the participants' textbook.

Self-report questionnaire survey

The paper-and-pencil-administered questionnaire survey of SRvsWBC, translated from English into Chinese, consisted of two sections. The first section contained question items designed to obtain learners' demographic information, such as their majors, gender, and age. The second section comprised 3 parts with a total of 52 items scored on a 5-point Likert scale, ranging from "strongly disagree" (score of 1) to "strongly agree" (score of 5). Part 1 measured the motivational beliefs of learners based on Zimmerman (1989), Pintrich and de Groot (1990), and Gardner (1985); the total of 20 items were divided into the following 3 subscales: (1) self-efficacy (6 items), dealing with one's perception and beliefs for learning, such as "compared with others, I think I'm a good student"; (2) motivation (10 items), focusing on reasons for engagement in academic tasks, such as "I like doing English tasks"; and (3) test anxiety (four items), such as "I have an uneasy, upset feeling before taking a test."

Part 2 assessed how learners employ vocabulary strategies in L2 using 14 items designed based on the taxonomies of Schmitt (2000) and Oxford (1990), and involved the following 4 factors: (1) determination (3 items), referring to discovering the meaning of a new word, such as "paying attention to the structures of new words"; (2) social strategies (3 items), relating to tactics involving interacting with others, such as asking for help from a teacher or peers; (3) memory (5 items), regarding mnemonics methods using grouping or imagery, such as "listing words that are related to each other"; and (4) metacognition strategies (3 items), involving a series of conscious actions including planning, monitoring, and evaluating an individual's learning, such as "reviewing new words."

Part 3 comprised 18 items on the perception of Web-based collaboration based on the work of Davis (1989), and was divided into 2 subscales: (1) perceived usefulness, comprising 11 items such as "using the Web-based tool increases my English vocabulary ability"; and (2) ease of use, comprising 7 items such as "I find Google Docs easy to use." Each subscale consisted of four questions.

Learning materials

Five reading texts taken from the participants' textbooks and online reading materials (e.g., English Club) for use as vocabulary learning materials were designed for the participants to practice and work collaboratively on Google Docs. Each text contained fewer than 500 words and included some questions to be answered after the text had been read. For example, in one of the five articles regarding the impact of fast food on people's health, the questions related to reading comprehension included "what impression do people have about fast food according to this article" and "please list a number of new vocabulary words that appear in this article and how you will remember them."

Figures 1 and 2 provide examples of synchronicity and asynchronicity to illustrate how the collaborators worked on Google Docs. Figure 1 shows an example of a learning activity performed asynchronously by a group of students on Google Docs, whereas Figure 2 provides an example of two collaborators working synchronously. Changes or attempted changes marked in different colors, which indicates activities performed by different members, are recorded in a history list in the right-hand column, with the colors allocated to the students selected randomly by the system. For example, Figure 1 shows that clicking the student in blue makes her answer to the comprehension question appear (in blue) in the central area.

Figure 1. An example of group members collaborating asynchronously on a learning activity

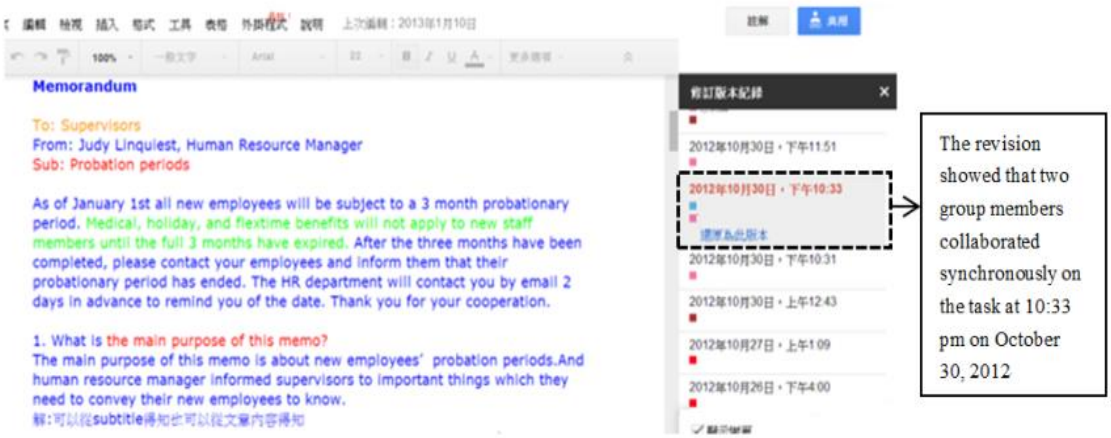

Figure 2. An example of group members collaborating synchronously on a learning activity

Google docs

The current project provided participants with access to the learning materials via Google Docs, which were designed to supplement the compulsory English class in which the students and the researcher met for 2 hours a week in a face-to-face classroom setting. Google Docs provides many free tools similar to those included in the Microsoft Office software package (e.g., Word, Excel, and PowerPoint) that allow multiple users to create/edit documents or share files and collaborate with others. In this research the participants collaborated synchronously or asynchronously on given tasks using the Word processing tool.

Procedure

There were two workshop sessions conducted for the participating classes at a computer laboratory in the university (see Figure 3). The first session, held in the first week of the semester, was run as a tutorial. Each class of participants was divided into small groups, each comprising four or five students, and a new Gmail account was created for each of them to allow them to access Google Docs. The purpose of the first workshop was essentially to help the participating students to familiarize themselves with the tool functions on Google Docs, such as uploading a file, creating and sharing a document, and collaborating with others. The second session, conducted in the middle of the semester, served two purposes: (1) to check whether the collaborators had encountered any technical obstacles when using the Web-based tool and (2) to check whether the collaborators were having any problems using the tools provided on Google Docs. Each session lasted 50 minutes.

In the first workshop session the students also completed a vocabulary pretest. Following this, small groups of students started practicing vocabulary learning by reading texts on Google Docs when they were at home or on campus. They were allowed to provide their answers to the questions and to comment on the answers provided by others, and they were reminded to use English as much as possible when answering the questions. They were encouraged to collaborate with their group members when answering the post-reading questions (as discussed in the section above) by using the vocabulary strategies taught in the face-to-face setting of the classroom. Note that the participants were taught vocabulary strategies in that face-to-face setting, including mnemonic or memory methods. The types of strategies taught in class were entirely dependent on the contents of their textbook. Five reading texts in total were used for the vocabulary learning on Google Docs. A new text was uploaded approximately every 3 weeks. This protocol resulted in three articles being available in the system before the second workshop took place in week 9, so that students could provide feedback about using the system. In the last week the students took the vocabulary posttest and completed the SRvsWBC questionnaire.

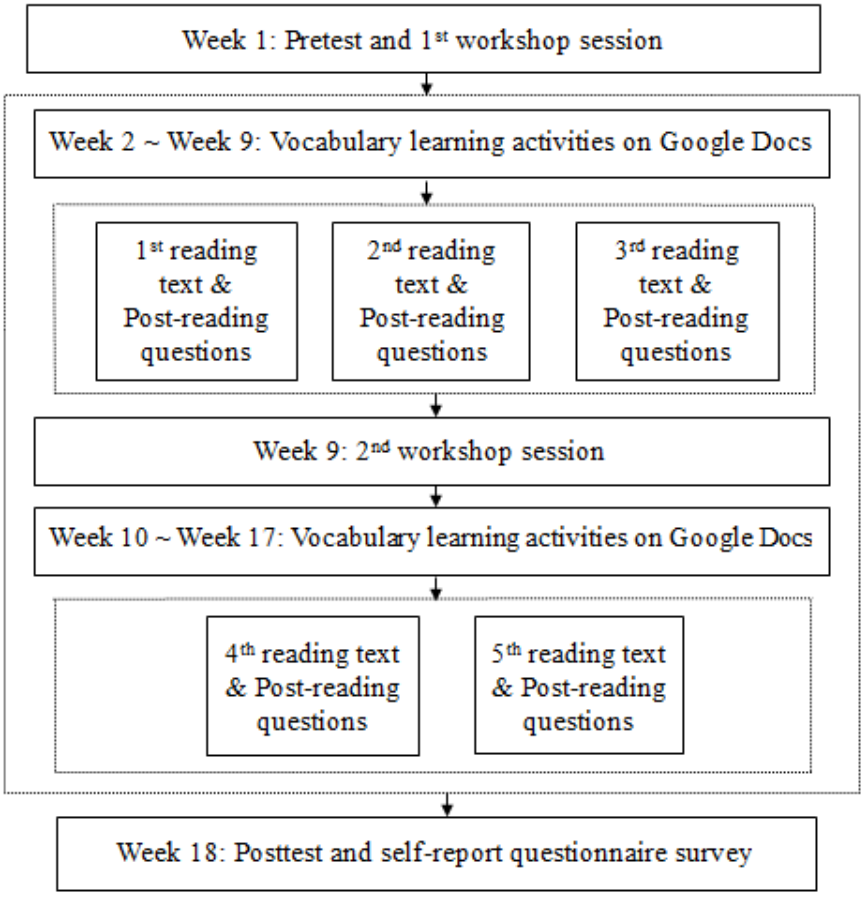

Figure 3. Procedure of data collection

Data analysis

A paired-samples *t*-test using SPSS version 17 was performed to examine the effect of the Web-based collaboration tool on the vocabulary improvements. In addition, two types of collaboration were identified according to the individual contributions to a given task: passive and active collaboration. The learning activity entitled "Fast Food" was randomly selected for the analysis of these two types of collaboration. The criteria of this classification were based on the collaborative effort made by the participants, such as expressing personal prior experience (as see the details in Table 3). All attempts made by the participants were coded independently by the two researchers of this study; the results showed that the interrater agreement was 86% in the data analysis.

Factor analysis and Pearson's product-moment correlation were computed to determine the subscales of the latent constructs, e.g., vocabulary strategy use, and to identify the relationships between the underlying constructs. The purpose of the correlation analysis was to determine whether the variables being investigated were positively related, negatively related, or not related.

Results

English vocabulary improvements

A paired-samples *t*-test was conducted to measure the impact of the Web-based collaboration tool on learners' vocabulary scores between the pre- and posttests (see Table 2). The mean score in the English vocabulary test increased significantly from the pretest (Mean = 23.22, SD = 7.44) to the posttest [Mean = 29.41, SD = 7.55, *t*(137)

= –12.04, $p < .000$; mean difference between the pre- and posttests = –6.20]. Furthermore, the eta-squared statistic (.35) indicated a large effect size (or strength of association) based on comparison with reported guideline values (.01 = small effect, .06 = moderate effect, .14 = large effect; Cohen 1988, cited in Pallant, 2005, p. 201).

Table 2. Results of paired-samples *t*-tests for pre- and posttests

	N	Mean	SD	*t*	*p* (two-tailed)	eta squared
Pretest	138	23.22	7.44	–12.04	.000	.35
Posttest	138	29.41	7.55			

The increased scores in the posttest suggest that the participants improved their vocabulary knowledge by learning collaboratively in the Web-based environment over the 18-week study period. These results indicate a significant relationship between the vocabulary scores in the pre- and posttests.

We also examined how the participants collaborated with others within their own group. Active collaborators were those who contributed by providing their answers to questions and discussing questions with others or by commenting on the answers provided by others (see Table 3).

Table 3. Criteria of active collaborators

Criteria	Examples of students' statements
1. Expressing personal prior experience	"I think the fast food is very convenience to buy it but don't eat too much. They are not good for your health, because you don't know what make it look delicious. If you can, you should cook a meal by yourself. It will better for your health." (S29)
2. Being engaging in discussions	"Yes, I think so." (S27)
3. Commenting on others' answers	"I don't think there is any advantages of fast food, the only advantage is very convenient to buy whenever you feel hungry. When the first time I saw the processes of making fast food, I told to myself never ate fast food any more. High fat and high sugar will lead us to death." (S24)
4. Providing personal opinions or suggestions	

Note. "S" indicates "Student no."

One of questions asked of the students for the "Fast Food" topic was "What are the advantages or disadvantages of fast food?" Although the statement made by Student no. 29 (S29) contained grammatically incorrect sentences and inappropriate expressions, such as "…is very convenience to buy…," the statement provided his personal opinions and suggestions, such as "…because you don't know what make it look delicious" indicating that the ingredients of fast food might not be healthy to eat. He suggested that people should prepare meals themselves so as to ensure that they eat healthy food. S27 commented on what S29 had stated by saying, "yes, I think so too," though it was not clearly indicated which part of the statement made by S29 she was agreeing with. However, S24 provided a more complete answer than that of S29, in that while S29 said that fast food was convenient to buy, S24 explained why this was the case: that it was convenient to buy when one is hungry. S24 also expressed her personal experience and emotions when she saw how people make the fast food, and this made her determined not to eat fast food again.

In contrast to active collaboration, passive collaboration refers to not providing any answers to the questions as well as only viewing the work of others, without making any contributions to the collaborative work. For example, S28 and S25 (who were in the same group) only viewed the responses without providing any answers.

According to the two types of collaboration discussed above, a further statistical analysis was conducted with the aim of identifying differences in the vocabulary pre- and posttests between passive (Group A) and active (Group B) collaborators. This revealed that there were more passive collaborators (N = 84) than active collaborators (N = 64 or 60). Once again, this data analysis was based on one of five randomly selected learning tasks.

Table 4. Results of paired-samples *t*-tests for pre- and posttests between groups

	Group A			Group B			*t*	*p* (two-tailed)	eta squared
	N	Mean	SD	*N*	Mean	SD			
Pretest	84	23.40	7.33	64	22.52	7.21	.72	.47	.003
Posttest	84	22.52	7.58	60	27.65	7.79	2.43	.01	.04

Table 4 lists the results of a paired-samples *t*-test conducted to measure the impact of collaborative learning on the vocabulary improvements of the participants. The table indicates that there was no significant group difference ($p > .05$) in the pretest, whereas there was a significant difference in the posttest between Group A (Mean = 22.52, *SD* = 7.58) and Group B [Mean = 27.65, SD = 7.79, $t(142) = 2.43$, $p < .01$]. The eta-squared value (.04) indicates the presence of a small-to-moderate effect size.

The above results suggest that there was a significant difference in vocabulary improvements between the pre- and posttests ($p < .000$). Moreover, there was a significant association in the posttest between the passive and active collaborators ($p < .01$).

Factor analysis for identifying the underlying constructs

To identify the constructs of SRvsWBC, an exploratory factor analysis was performed to explore the interrelationship among a set of subscales in each construct. The maximum likelihood and promax were employed when using the extraction and rotation methods. In accordance with Pallant (2005) and Field (2009), the criteria for determining the suitability of extracting factors were (1) correlation coefficients of at least .4, (2) Kaiser-Meyer-Olkin (KMO) values exceeding .5, (3) the scree plot indicating the factors to be extracted, (4) Barlett's Test of Sphericity reaching a significance level of .000, and (5) eigenvalues exceeding Kaiser's criterion of 1.

In the construct of motivational beliefs, the results suggest four subscales or factors, including intrinsic and extrinsic motivations, test anxiety, and self-efficacy (see Table 5). However, the two items on the subscale of self-efficacy (Q4, "I believe that I can keep up with what the teacher teaches"; and Q18, "compared with others, I think I have good study skills") were eliminated since they did not contribute to any factors. Table 5 indicates that the factor loadings ranged between .52 and .97. The results suggest that the items clustered in Factor 1 represented intrinsic motivation, with eight items involving goals and beliefs that any given learning activity was interesting and essential, such as "I like to take challenging English tasks." Factor 2 represented test anxiety, comprising four items such as "I tend to think about how poorly I am doing." Factors 3 and 4 represented self-efficacy (four items) and extrinsic motivation (two items), respectively. These four factors explained 62.75% of the total variance in this construct. The value for the KMO Measure of Sampling Adequacy was .827, Bartlett's Test of Sphericity produced $x^2(171) = 1314.08$ and $p < .000$, and Cronbach's α coefficients exceeded .70, which indicates sound reliability.

All responses in the motivational beliefs were rated on a 5-point Likert scale, ranging from "strongly disagree" (score of 1) to "strongly agree" (score of 5). Table 5 indicates that the participants made positive statements regarding intrinsic motivation, self-efficacy, and extrinsic motivation; in particular, self-efficacy had the highest mean score with 4.23, which indicated that those who had higher self-efficacy for learning were more likely to think they would get a better grade or to think they knew more about the subject than others did. In contrast, participants responded less positively regarding test anxiety; the mean score was 2.97, which suggested that the participants tended to agree that they experienced only mild test anxiety.

Table 5. Summary of results of exploratory factor analysis for the questionnaire survey of motivational beliefs ($N = 146$)

Item statement	Factor			
	INT	TES	SEL	EXT
Q9. I like to take challenging English tasks	.86			
Q11. I like brainstorming for English practice tasks	.83			
Q20. I complete English tasks by myself	.71			
Q12. I like explaining to others about what I know	.61			
Q10. I like doing English tasks	.59			
Q3. I am confident in English learning	.54			
Q19. I accomplish tasks without looking at the answers first	.53			
Q17. I like learning new things from a learning task	.52			
Q13. I tend to think about how poorly I am doing		.91		
Q14. I worry about tests before taking one		.81		
Q15. I think about the questions that I cannot answer		.75		
Q16. I have an uneasy, upset feeling before taking a test		.63		

Q5. Compared with others, I think I'm a good student			.91	
Q6. I can do well in the classroom			.84	
Q1. I know a great deal about this subject			.58	
Q2. I'll get a good grade			.58	
Q8. Better English skills will help me to get a better job				.97
Q7. People will respect me if I have an excellent English ability				.61
Eigenvalue	6.00	2.92	1.72	1.29
Percentage of total variance	31.58	15.35	9.04	6.78
Cumulative variance (%)				62.75
Cronbach's α	.86	.86	.82	.71
Mean	3.30	2.97	4.23	3.50
SD	4.78	3.25	2.43	1.41

Note. Abbreviations: INT = intrinsic motivation, TES = test anxiety, SEL = self-efficacy, EXT = extrinsic motivation.

Table 6. Summary of results of exploratory factor analysis for vocabulary learning strategies (N = 140)

Item statement	Factor 1: MEM	Factor 2: MET	Factor 3: DET	Factor 4: SOC
Q14. Connecting words to one's experience	.86			
Q6. Using semantic maps to help remember new words	.80			
Q12. Using keyword methods to remember words	.68			
Q7. Listing words that are related to each other	.49			
Q13. Studying the spelling of a word	.44			
Q9. Reviewing new words		.94		
Q11. Previewing what is to be learned		.68		
Q10. Testing oneself with new words		.60		
Q1. Paying attention to the structures of new words			.85	
Q3. Grouping words according to the parts of speech			.63	
Q2. Breaking a word into small parts that I can remember			.46	
Q5. Asking for help from a teacher				.94
Q4. Asking for help from peers				.60
Eigenvalue	5.83	1.65	1.30	1.11
Percentage of total variance	36.42	10.30	8.13	6.97
Cumulative variance (%)				61.81
Cronbach's α	.82	.80	.74	.68
Mean	3.21	3.55	3.50	2.99
SD	3.19	1.74	1.87	1.57

Note. Abbreviations: MEM = memory, MET = metacognition, DET = determination, SOC = social.

Table 6 indicates that the analysis of vocabulary strategy use yielded the following four factors: (1) memory, comprising five items such as "connecting words to one's experience" and "using semantic maps to help remember new words"; (2) metacognition, comprising three items such as "reviewing words that are related to each other," "previewing what is to be learned," and "testing oneself with new words"; (3) determination, comprising the three items of "paying attention to the structures of new words," "grouping words according to the parts of speech," and "breaking a word into small parts that I can remember"; and (4) social, comprising the two items of "asking for help from a teacher" and "asking for help from peers." Factors 1, 2, 3, and 4 explained 36.42%, 10.30%, 8.13%, and 6.97% of the total variance, respectively. The value of the KMO Measure of Sampling Adequacy was .85, and Bartlett's Test of Sphericity produced $x^2(120) = 865.79$ and $p < .000$. All values of Cronbach's α apart from that for Factor 4 (social strategy) exceeded the recommended value of .70.

One item, a social factor (Q8, "Study and practice meaning in a group"), was discarded because its coefficient value was less than .40. Table 6 indicates that the four factor loadings ranged between .44 and .94. In terms of the vocabulary strategies that were most frequently employed, the metacognition and determination factors had similar mean scores of 3.55 and 3.50, which means that the participants preferred using metacognition and determination strategies when learning vocabulary words. However, the social factor had the lowest mean of 2.99, which means the students tended not to ask for help from their teachers or peers when they were experiencing difficulty in learning lexical words in English.

Table 7 presents the results for the perception of the Web-based collaboration survey. This survey identified two factors: (1) usefulness, comprising nine items such as "Google Docs helps me accomplish my English tasks"; and (2) ease of use, comprising six items such as "it is easy to remember how to use Google Docs." Factors 1 and 2 explained 59.46% and 7.50% of the total variance, respectively. The value of the KMO Measure of Sampling Adequacy was .95, Bartlett's Test of Sphericity produced $x^2(120) = 1763.41$ and $p < .000$, and all values of Cronbach's α exceeded .90, indicating good internal consistency.

Table 7. Summary of results of exploratory factor analysis ($N = 145$)

Item statement	Factor 1: USE	Factor 2: EAS
Q7. Google Docs helps me accomplish my English tasks	.85	
Q17. Learning activities improve my English ability	.83	
Q10. Using the Web-based tool increases my English vocabulary ability	.80	
Q4. Learning activities are helpful for learning vocabulary words	.79	
Q18. Learning tasks are helpful for increasing vocabulary knowledge	.78	
Q6. Learning tasks increase my interest in learning English	.76	
Q16. Learning tasks increase my reading ability	.76	
Q11. Google Docs is an effective learning environment	.73	
Q1. Google Docs is an effective tool for learning English	.70	
Q3. Google Docs is easy to use		.95
Q9. I became familiar with the system by learning how to use it		.90
Q15. It is easy to remember how to use Google Docs		.67
Q2. I like to use this system for learning English		.49
Q13. I find it easy to use the system after I was first taught how to		.49
Q8. When using Google Docs, I don't consult anyone else		.43
Eigenvalue	9.51	1.20
Percentage of total variance	59.46	7.50
Cumulative variance (%)		66.96
Cronbach's α	.95	.90
Mean	3.55	4.00
SD	5.62	4.41

Note. Abbreviations: USE = usefulness, EAS = ease of use.

Two items in the usefulness factor (Q5, "Without the system, it is difficult to perform my job"; and Q12, "I will use the system for other subjects") and one item in the ease-of-use factor (Q14, "I often make errors when using the system") were eliminated for the following reasons: Q5 and Q12 did not cluster into a single factor, and Q14 had a coefficient less than .4. The first-factor loading had a smaller coefficient range of between .70 and .85, whilst the second-factor loading had a wider coefficient range of between .43 and .95. The mean scores for the usefulness and ease-of-use factors were 3.55 and 4.00, respectively, which indicates that the students had a positive attitude toward using the Web-based tool.

The above results show that three constructs are associated with SRvsWBC: (1) motivational beliefs, comprising intrinsic motivation, extrinsic motivation, self-belief, and test anxiety; (2) vocabulary strategy use, comprising memory, metacognition, determination, and social strategies; and (3) perception of Web-based collaboration, comprising usefulness and ease of use. These constructs as factors that influence SRvsWBC were co-related, as described below.

Interrelations of the constructs

The interrelationships among the subscales of motivational beliefs, vocabulary strategy use, and perception of Web-based collaboration were examined using Pearson's product-moment correlation. A preliminary analysis indicated that there was no violation of the assumptions of normality, linearity, and homoscedasticity (Pallant, 2005). First, as indicated in Table 8, there was a strong positive correlation between the two factors of usefulness and ease of use ($r = .78$, N = 145, $p < .01$). The second-highest coefficients loaded between intrinsic motivation and self-efficacy ($r = .51$), between memory strategy and determination strategy ($r = .55$), and between intrinsic motivation and

memory strategy (r = .56). In addition, there were two sets of lowest coefficients (both r = .18), showing significant associations between ease of use and self-efficacy and between memory strategy and usefulness.

Second, Factor 1 (intrinsic motivation) was significantly associated with all factors except for Factors 2 (test anxiety) and 8 (social), with coefficients ranging between .26 and .56. The results imply that students who had higher intrinsic motivation were more likely to employ vocabulary strategies (e.g., memory, metacognition, and determination strategies). Despite the tendency for students with greater intrinsic motivation to employ a greater number and a wider variety of vocabulary strategies, they were unlikely to use social tactics, such as interacting with their peers or their teacher when learning vocabulary. Furthermore, the intrinsic type of students had a positive attitude toward learning on Google Docs.

Third, Factor 3 (self-efficacy) was significantly related to all factors except for Factor 8 (social), implying that higher self-efficacy was significantly associated with greater use of memory, metacognition, and determination strategies, and a better perception of Web-based collaboration. In addition, Factor 5 (memory) was significantly associated with all factors except for Factor 10 (ease of use), suggesting that those who had motivational beliefs tended to employ four types of vocabulary strategies and perceived that using Google Docs could enhance their learning of English vocabulary. Lastly, Factor 2 (test anxiety) was not significantly related to any factors; similar to Factor 8 (social), it was not significantly associated with any factors except with Factor 5 (memory), as indicated by the correlation coefficient between the two factors being .30.

Table 8. Pearson's correlations between the subscales

	1	2	3	4	5	6	7	8	9	10
1. INT	1.00									
2. TES	.08	1.00								
3. SEL	.51**	.14	1.00							
4. EXT	.44**	.06	.29**	1.00						
5. MEM	.56**	.04	.41**	.24**	1.00					
6. MET	.42**	.05	.38**	.15	.50**	1.00				
7. DET	.38**	–.01	.31**	.24*	.55**	.47**	1.00			
8. SOC	.05	.16	.11	.09	.30**	.14	.16	1.00		
9. USE	.29**	.10	.20*	.23**	.18*	.10	.09	.05	1.00	
10. EAS	.26**	.13	.18*	.29**	.14	.03	.06	.01	.78**	1.00

Notes. N = 146, $^{*}p < .05$. (two-tailed), $^{**}p < .01$. (two-tailed).

Discussion and conclusions

The aim of this study was to determine how Web-based collaboration influences vocabulary improvements in students of English as an FL and to elucidate the relationships among the subscales of SRvsWBC. A number of statistical results are provided. The first shows that the mean scores in the posttest differed significantly from those in the pretest. Moreover, two types of collaboration that were identified by examining participants' efforts and their types of contribution (passive and active) in one learning task were further analyzed statistically. The results suggest that active collaborators obtained better vocabulary knowledge than did passive collaborators. Such results corroborate the finding of Mendenhall and Johnson (2010) that the use of an online social annotation tool can improve the academic literacy of students who collaborate in small groups. Similarly, Hwang et al. (2007) found that using Web-based annotation tools was associated with learning achievement, in that students who used such tools outperformed those who did not.

The results of our exploratory factor analysis for identifying the subscales of SRvsWBC indicated the good internal consistency of each subscale, with Cronbach's α values ranging between .71 and .95 (with the exception of the social factor in vocabulary strategy use). As predicted, the three theoretical constructs each contained several subscales: (1) motivational beliefs comprised positive motivational orientations, self-perceived ability, and negative test anxiety; (2) vocabulary strategy use comprised memory, metacognition, determination, and social strategies; and (3) perceptions included usefulness and ease of use. It is difficult to compare between the constructs used in different studies since they have examined different constructs; however, to some extent the findings of the current investigation; specifically, that an individual's cognition, motivation, and behavior are interrelated which are supported by the

findings of previous studies, including those of Tseng et al. (2006), Schmidt et al. (1996), and Cho and Jonassen (2009).

It is worth noting that, as previous research has suggested, motivational beliefs involve self-efficacy, intrinsic value, and test anxiety (Pintrich & de Groot, 1990). However, the factorability of the 18 items suggested that they could be subdivided into 4 distinct factors: intrinsic motivation, extrinsic motivation, test anxiety, and self-efficacy. In particular, splitting the motivation item into two subscales was supported by theoretical assumptions in L2 acquisition, such as has been reported by Gardner and Lambert (1972) and Dörnyei (1990), and whereas intrinsic motivation as an integrative-oriented motive refers to learners' desire for and interest in learning the target language, the extrinsic motivation acted as an instrumental motive, whereby the students studied the target language for some utilitarian purposes, such as obtaining a better job.

The positive internal aspect of motivational beliefs (intrinsic motivation, extrinsic motivation, and self-efficacy) was found to be significantly associated with contextual factors, such as memory, metacognition, and determination strategies, and with the perception of Web-based collaboration in this study. It is postulated that students who are motivated to learn any given materials self-regulate their own learning and engage in cognitive processing, and in turn will achieve success in what they attempt. Such robust evidence has been found not only in traditional classroom-based studies (e.g., Pintrich & de Groot, 1990; Schmidt et al., 1996) but also in technology-based studies (e.g., Chang, 2005; Cho & Jonassen, 2009; Lee et al., 2005).

The social strategy was reported to be less frequently employed than other strategies, such as memory, and it was less likely to be associated with other factors in this study. These results parallel those of studies of L2 learning strategies (e.g., Bedell & Oxford, 1996). In contrast, such strategic processing (e.g., interacting with others and receiving support from peers and teachers) was found to play an essential role in learning an FL (e.g., Bown, 2009; Lai et al., 2012). There are several possible reasons for the differences between the findings of this study and those of previous studies. First, strategy use is influenced by multidimensional factors, such as culture, motivation/attitude, and willingness, as pointed out by Politzer and McGroarty (1985), who stated that Asian learners are unlikely to engage in socially strategic processing. Second, as their English teacher, one of the researchers in the present study found that most of the students were less willing to participate in collaborative work or group discussions in the classroom, and these informal classroom observations were consistent with the results obtained in the questionnaire survey.

The results of this study, which suggest positive attitudes toward learning in a Web-based collaborative environment, are in line with the findings of previous studies of the use of technology for learning beyond the classroom (e.g., Lai & Gu, 2011; Lai et al., 2012) and the associated enhancement of motivation and confidence (e.g., Kabilan et al., 2010). Such perceived usefulness and ease of use underscore the psychometric properties of goal-orientation, self-perceived abilities, and free agency of decision-making (Davis, 1989).

The evidence drawn from the current work suggests that it is essential for teachers to understand what types of vocabulary strategies their students tend to employ when learning new vocabulary words both inside and outside the classroom, and to further help students to regulate their own strategic processing by employing new strategies, such as social and metacognition strategies, which are effective but unfamiliar to them. Moreover, using Web-based tools—such as the one used in this study or others such as Facebook—is beneficial not only to support learning by students but also to increase their motivation and interests in the target language. However, several caveats still need to be addressed. First, this study examined the general aspects of SRL by the participants of this study rather than the details of how students regulate their learning in a given environment. Considerable efforts are still required to assess the development of self-regulated vocabulary strategy use in a longitudinal research paradigm. Second, how the participants performed in the learning tasks as part of a group collaboration might have been affected by their internal or emotional state; for example, participants who were shy or had a low proficiency level in English might not have felt comfortable providing answers to the given questions or commenting on the answers provided by others. Moreover, the classification of passive and active collaboration is limited to a single learning task that was chosen at random; thus, the classification is context-specific and subject to change according to the contents of the learning activities. In other words, the presence of less complex vocabulary in a given text might have encouraged more active collaboration, or vice versa. These aspects require further investigation. Finally, the difference in vocabulary improvements between those who tend to collaborate with each other and those who tend to work alone also needs to be explored further.

Acknowledgements

The authors would like to thank the Ministry of Science and Technology, Taiwan, R.O.C., for financially supporting this research under Grant Nos. NSC 101-2511-S-003-031-MY3, and MOST 103-2628-S-003-002-MY3 and MOST 103-2511-S-424-004-. They are also thankful that this research is partially supported by the "Aim for the Top University Project" and "Center of Learning Technology for Chinese" of National Taiwan Normal University (NTNU), sponsored by the Ministry of Education, Taiwan, R.O.C., the "International Research-Intensive Center of Excellence Program" of NTNU and the Ministry of Science and Technology, Taiwan, R.O.C. under Grant No. NSC 103-2911-I-003-301.

References

Bedell, D. A., & Oxford, R. L. (1996). Cross-cultural comparisons of language learning strategies in the People's Republic of China and other countries. In R. L. Oxford(Ed.) *Language learning strategies around the worlds: Cross-cultural perspectives (Technical Report #13)* (pp. 47-60). Honolulu, HI: University of Hawai'i, Second Language Teaching & Curriculum Centre.

Bown, J. (2009). Self-regulatory strategies and agency in self-instructed language learning: A situated view. *The Modern Language Journal*, *93*(4), 570-583.

Chang, M. M. (2005). Applying self-regulated learning strategies in a Web-based instruction – An investigation of Motivation perception. *Computer Assisted Language Learning*, *18*(3), 217-230.

Cheng, G., & Chau, J. (2013). Exploring the relationship between students' self-regulated learning ability and their ePortfolio achievement. *Internet and Higher Education*, *17*, 9-15.

Cho, M. H., & Jonassen, D. (2009). Development of the human interaction dimension of the self-regulated learning questionnaire in asynchronous online learning environments. *Educational Psychology*, *29*(1), 117-138.

Cho, M. H., & Kim, B. J. (2013). Students' self-regulation for interaction with others in online learning environments. *Internet and Higher Education*, *17*, 69-75.

Chisholm, R. M. (1990). Coping with the problems of collaborative writing. *Writing Across the Curriculum, 2*, 90-108.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319-340.

Dörnyei, Z. (1990). Conceptualizing motivation in foreign-language learning. *Language Learning*, *40*(1), 45-78.

English Club. (2010). *Memorandum*. Retrieved August 26, 2011, from http://www.englishclub.com/esl-exams/ets-toeic-practice-7.htm

Field, A. (2009). *Discovering statistics using SPSS*. London, England: SAGE Publication Ltd.

Gao, F. (2013). A case study of using a social annotation tool to support collaboratively learning. *Internet and Higher Education*, *17*, 76-83.

Gardner, R. C. (1985). *Social psychology and second language learning. The role of attitudes and motivation*. London, UK: Edward Arnold.

Gardner, R. C., & Lambert, W. E. (1972). *Attitudes and motivation in second language learning*. Rowley, MA: Newbury House Publishers.

Holden, H., & Rada, R. (2011). Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance. *Journal of Research on Technology in Education*, *43*(4), 343-367.

Hsin, C. I., Lin, S. S. J., & Yeh, C. C. (2005). Pilot analysis of motivational strategies in learning calculus among technology college students: Motivational strategies in learning calculus. *Journal of National University of Tainan*, *39*(2), 65-82.

Hwang, W. Y., Wang, C. Y., & Sharples, M. (2007). A study of multimedia annotation of Web-based materials. *Computers & Education*, *48*, 680-699.

Kabilan, M. K., Ahmad, N., & Abidin, M. J. Z. (2010). Facebook: An online environment for learning of English in institutions of higher education? *Internet and Higher Education*, *13*(4), 179-187.

Kessler, G., Bikowski, D., & Boggs, J. (2012). Collaborative writing among second language learners in academic Web-based projects. *Language Learning & Technology*, *16*(1), 91-109.

Lai, C. (2013). A framework for developing self-directed technology use for language learning. *Language Learning & Technology*, *17*(2), 100-122.

Lai, C., & Gu, M. Y. (2011). Self-regulated out-of-class language learning with technology. *Computer Assisted Language Learning*, *24*(4), 317-335.

Lai, C., Wang, Q., & Lei, J. (2012). What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. *Computers & Education*, *59*(2), 569-579.

Lantolf, J. P., & Thorne, S. L. (2007). Sociocultural theory and second language learning. In B. van Patten & J. William (Eds.), *Theories in second language acquisition: An introduction* (pp. 201-224). Mahwah, NJ: Lawrence Erlbaum.

Lee, M. K. O., Cheung, C. M. K., & Chen, C. Z. (2005). Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, *42*(8), 1095-1104.

Levine, A., Reves, T., & Leaver, B. L. (1996). Relationship between language learning strategies and Israeli versus Russian cultural-educational factors. In R. L. Oxford (Ed.), *Language learning strategies around the world: Cross-cultural perspectives (Technical Report13)* (pp. 35-45). Honolulu, Hawaii: University of Hawaii.

Liu, S. H. J., Lan, Y. J., & Jenkins, J. R. (in press). Technology-enhanced strategy use for second language vocabulary acquisition. *English Teaching & Learning*, *38*(2), 105-132.

McLoughlin, C., & Lee, M. J. (2010). Personalised and self-regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. *Australasian Journal of Educational Technology*, *26*(1), 28-43.

Mendenhall, A., & Johnson, T. E. (2010). Fostering the development of critical thinking skills, and reading comprehension of undergraduates using a Web 2.0 tool coupled with a learning system. *Interactive Learning Environments*, *18*(3), 263-276.

Mizumoto, A., & Takeuchi, O. (2009). Examining the effectiveness of explicit instruction of vocabulary learning strategies with Japanese EFL university students. *Language Teaching Research*, *13*(4), 425-449.

Nyikos, M., & Fan, M. (2007). A review of vocabulary learning strategies: focus on language proficiency and learner voice. In Cohen, A. D., & Macaro, E. (Eds.) *Language learner strategies: Thirty years of research and practice* (pp. 251-273). Oxford, UK: Oxford University Press.

Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. Boston, MA: Heinle and Heinle/Cengage.

Oxford, R. L. (2011). *Teaching and researching language learning strategies*. Harlow, England: Pearson/Longman.

Oxford, R. L., & Nyikos, M. (1989). Variables affecting choice of language learning strategies by university students. *Modern Language Journal*, *73*(3), 291-300.

Pallant, J. (2005). *SPSS survival manual: A step by step guide to data analysis using SPSS for Windows (Version 12)*. Maidenhead, UK: Open University Press.

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review*, *16*(4), 385-407.

Pintrich, R. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. J*ournal of Educational Psychology*, *82*(1), 33-40.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational and Psychological Measurement*, *53*(3), 801-813.

Politzer, R. L., & McGroarty, M. (1985). An exploratory study of learning behaviours and their relationship to gains in linguistic and communicative competence. *TESOL Quarterly*, *19*(1), 103-123.

Schmitt, N. (2000). *Vocabulary in language learning*. Cambridge, England: Cambridge University Press.

Schmitt, R., Boraie, D., & Kassabgy, O. (1996). Foreign language motivation: Internal structure and external connections. In R. Oxford (Ed.), *Language Learning Motivation: Pathways to the New Century* (Technical Report #11) (pp. 9-70). Honolulu, HI: University of Hawai'i, Second Language Teaching & Curriculum Centre.

Sotillo, S. (2005). Corrective feedback via Instant Messenger learning activities in NS-NNS and NNS-NNS dyads. *Computer-Assisted Language Instruction Consortium Journal*, *22*(3), 467-496.

Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences* (pp. 409-426). Cambridge, UK: Cambridge University Press.

Swain, M., & Lapkin, S. (2000). Task-based second language learning: The uses of the first language. *Language Teaching Research*, *4*(3), 251-274.

Tsai, P. S., & Tsai, C. C. (2013). College students' experience of online argumentation: Conceptions, approaches and the conditions of using question prompts. *Internet and Higher Education*, *17*, 38-47.

Tseng, W. T., Dörnyei, Z., & Schmitt, N. (2006). A new approach to assessing strategic learning: The case of self-regulation in vocabulary acquisition. *Applied Linguistics*, *27*(1), 78-102.

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

Warschauer, M. (1996). Comparing face-to-face and electronic discussion in the second language classroom. *Computer-Assisted Language Instruction Consortium Journal*, *13*(2&3), 7-26.

Yilmaz, Y., & Granena, G. (2010). The effects of task type in synchronous computer-mediated communication. *The Journal of the European Association for Computer Assisted Language Learning*, *22*(1), 20-38.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329-339.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*(1), 3-17.