

This article was downloaded by: [National Chiao Tung University 國立交通大學]

On: 25 April 2014, At: 06:10

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Computer Assisted Language Learning

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/ncal20>

Scaffolding and web concordancers as support for language learning

Wen-Li Chang^a & Yu-Chih Sun^a

^a Language Teaching & Research Center, National Chiao Tung University, Taiwan

Published online: 04 Sep 2009.

To cite this article: Wen-Li Chang & Yu-Chih Sun (2009) Scaffolding and web concordancers as support for language learning, *Computer Assisted Language Learning*, 22:4, 283-302

To link to this article: <http://dx.doi.org/10.1080/09588220903184518>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

Scaffolding and web concordancers as support for language learning

Wen-Li Chang and Yu-Chih Sun*

Language Teaching & Research Center, National Chiao Tung University, Taiwan

(Received 16 January 2009; final version received 22 May 2009)

The present study investigates the effects of scaffolding and web concordancers on students' proofreading performance. The study addresses the following research questions: (1) How does a concordancer search enhance students' proofreading performance? (2) How does scaffolding for concordancer searches enhance students' proofreading performance? (3) Does scaffolding have a lasting effect on students' concordance-assisted proofreading performance? (4) Does scaffolding affect students' level of certainty about their proofreading performance? (5) What are the students' perceptions of the effects of the web concordancer and scaffolding? A class of 26 senior high school students in Taiwan participated in this study. The results of the present study showed significant improvement in students' proofreading performance with the support of concordancer searches. Proofreading scores of the scaffolding group were significantly higher than the scores of the non-scaffolding group, and this improvement appeared to remain after the removal of scaffolding. Moreover, the prompts boosted the students' level of certainty about their performance in proofreading tasks. As for the results of the study's questionnaire survey, the students' responses suggested an overall favorable perception.

Keywords: scaffolding; concordancer; prompts; language learning; data-driven learning

Introduction

Data-driven learning

Data-driven learning (DDL) highlights learning from a great quantity of linguistic resources or language examples (Hadley, 2002). This key attribute of a DDL setting gives contextualization for the target language to be acquired, so that learners are encouraged to work as linguistic researchers, hypothesizing and testing lexical or grammatical usage patterns (Johns, 1991a, 1991b). DDL has received much attention over the past few years owing to the prevalence of electronic corpora.

Corpus and concordancer

A concordancer is one of the devices employed for DDL in language courses. Learners use a software program (a 'web concordancer') as a tool to search

*Corresponding author. Email: sunyc@mail.nctu.edu.tw

through and analyse corpora that feature electronically stored written texts or transcriptions of spoken language on different topics (Conrad & Rautenhaus, 1994). The output of concordancer searches presents learners with authentic, actual choices that language users make and therefore allows them to explore and discover common and typical patterns of word usage in various styles and genres. Generally speaking, with a corpus and a concordancer, learners have the opportunity to work out language patterns, identify the frequency attributable to use of the patterns and identify the contextual factors that might influence the variance of these patterns (Hadley, 2002).

Several studies have lent support to the beneficial effect of concordancing on language learning. For example in Todd's (2001) study, a class of college students consulted a web-based corpus to help with their self-corrections of lexical errors. The results showed that these students were able to induce valid patterns from their self-selected concordances and make valid self-corrections of their errors (Todd, 2001). In addition, studies have further indicated that inductive learning strategies contributed to improved student performance in concordancing tasks. In Sun and Wang's (2003) study, when a class of eleventh grade students in Taiwan were divided into two groups (one as inductive corpus researchers, the other as deductive corpus researchers), the inductive group improved significantly more than the deductive group in the proofreading task. Similarly, Lee and Liou (2003) probed into the effect of students as corpus researchers by assessing and comparing the lexical performance of students who adopted an inductive approach, a deductive approach and a compromised approach, and the results showed that concordancer searching was beneficial to students who employed inductive learning strategies.

In addition to students' improved performance, studies have also indicated the positive effect of concordancer search on students' learning processes. Specifically, in corpus-based investigations, students attempt to discover the underlying language patterns on their own, and thus they become active participants in the learning process (Brown, 2001; Johns, 1997; Sun, 1999). Further, in this exploratory mode of learning, students are actually engaged in a dynamic learning process where they can apply prior knowledge in examining linguistic resources or concordance output and formulate new language rules that are to be learned. Students are no longer passive recipients of formerly constructed linguistic knowledge from the instructor's perspective. Instead, through corpus consultation, they can develop a sense of responsibility for their own learning and work autonomously and independently in figuring out collocation patterns (Chambers, 2005).

Prior studies have shown that a DDL setting creates a student-centred learning environment in which students are engaged in exploratory concordance-based tasks to expand their language experience (Biber, Conrad, & Reppen, 1998) and to develop appropriate styles and strategies for language-learning purposes and even for general-learning purposes (Chan & Liou, 2005; Lee & Liou, 2003; O'Sullivan & Chambers, 2006). Moreover, learners themselves also show positive reactions to DDL or classroom concordancing due to their growing consciousness of descriptive rather than prescriptive language (Chambers, 2005; Yeh, Liou, & Li, 2007). Nevertheless, concerns regarding difficulties in comprehending and extracting information from a great quantity of language examples are still prevalent in language classrooms (Sun, 2003). Frustration and puzzlement grow stronger in corpus investigations, especially when they involve learners at a lower

proficiency level (e.g., high school students or students learning a second/foreign language). To address these limitations, the study aims to introduce students to scaffolding that supports concordancer searches of corpora and to investigate if such prompts can help eliminate the difficulties encountered by students in concordancer-assisted language learning.

Scaffolding instruction

The concept of scaffolding was developed based on Vygotsky's (1978) assumption that the development of human cognition is composed of a current level and a potential level, and that in between these two levels is a level called the zone of proximal development (ZPD). After accurately diagnosing students' current skill levels, educators use scaffolding with the students to advance their competence and, in this vein, to gradually hand the responsibility for learning to the students (Anderson, Armbruster, & Roe, 1990; Wood, Bruner, & Ross, 1976). Beed, Hawkins, and Roller (1991) further pointed out several essential features of scaffolding. One of the features is that the scaffold must be supportive of learners' learning tasks and must be adaptable to learners' current level of understanding so that it can work within the students' prerequisite ZPDs (Anderson, 1989; Greene & Land, 2000; Rosenshine & Meister, 1992).

Another feature of scaffolding is the 'transfer of responsibility' to students – to internalize target skills, achieve higher levels of regulation, and become independent and autonomous learners (Lidz, 1991; Rogoff & Lave, 1984). In Wood et al.'s (1976) definition of scaffolding use, the teacher hands responsibility for learning over to the students as s/he removes the support gradually and as the students' competence improves. This method suggests an additional feature of scaffolding: the framework is a temporary one, being gradually decreased over time as the student becomes more capable and competent (Dixon, Carnine, & Kameenui, 1993; Rosenshine & Meister, 1992).

Another feature of scaffolding that Beed et al. (1991) proposed is related to the types of support that students receive. It is suggested that student learning should be scaffolded under carefully organized step-by-step guidance; that is, teachers should help learners to take one step at a time in a procedure and to use the available opportunities for practice before moving on to the next step (Rosenshine & Meister, 1992).

Ge, Chen, and Davis (2005) proposed three categories of scaffolding prompts:

- (1) *procedural* prompts that function as a guideline to lead students through a problem-solving process;
- (2) *elaborative* prompts that help students elaborate on their prior knowledge and articulate their reasoning processes; and
- (3) *reflective* prompts that serve as cues to provoke students' reflection and metacognitive awareness.

Apparently, each type of prompt has its own specific cognitive function in influencing problem-solving processes, as Ge and Er (2005) indicated, and a combination of different types of scaffolding prompts provides beneficial effects on learning (e.g., Davis & Linn, 2000; Ge & Land, 2003, 2004).

Effectiveness of scaffolding prompts

Several studies have presented evidence of the cognitive benefits of scaffolding prompts, particularly in eliciting learners' self-explanation, self-questioning, self-monitoring, and self-reflection during their learning processes (e.g., Ge & Er, 2005; Ge et al., 2005). Furthermore, the use of scaffolding prompts can guide students in their knowledge construction, knowledge integration, and knowledge representation during their work on complex learning tasks (Bell & Linn, 2000; Van Merriënboer, Kirschner, & Kester, 2003). Prompts can help students link their arguments or explanations with their existing knowledge. Also, in promoting knowledge integration, scaffolding prompts make students' thinking more apparent and explicit, and thus students become better able to recognize areas in which their own understanding is lacking and to engage in knowledge integration. In addition, prompts are considered to be a device for knowledge representation, which presents the structure of an argument in a visible manner, and thus not only help students to engage in their given learning process and to refine their perceptions of the target subject, but even provide a valuable assessment of students for the teacher. All in all, the use of scaffolding prompts is likely to direct students' attention to important aspects of the problem, activate their prior knowledge, elicit their explanations, and prompt them to self-monitor and self-reflect. A number of cognitive and metacognitive functions can be fulfilled by scaffolding prompts, particularly in facilitating students' complex problem-solving processes (Ge et al., 2005).

Proofreading

Mechanical correctness in writing is usually the basis on which the world evaluates one's writing competence (Andrasick, 1993). How proofreading or editing is taught has influence on the way students develop their writing skills, especially revision strategies. That is, whether students can self-edit their writing is important to their writing development.

Hence, explicit instruction on proofreading strategies is beneficial in fostering students' awareness and meta-cognition of editing and proofreading (Andrasick, 1993; Carduner, 2007; Hyland, 2003; Kroll & Schafer, 1984). As Hull (1987) noted, for second language learners, consulting strategies can be very useful because their grasp of the target language is incomplete and they tend to lack the 'ear to hear their own errors' (Cogie, Strain, & Lorinskas, 1999, p. 6). The immediate online assistance (e.g., concordancer) can be extremely helpful in raising students' awareness of language conventions, developing independent and reflective writing skills, and eventually improving their writing products (Hyland, 2003).

With regard to the learning of foreign languages through DDL, little has been done so far to investigate how concordancer searches – mediated by scaffolding prompts – can enhance language learning. Thus, the present study presents a series of scaffolding prompts that serve as guidelines for effective use of corpora and concordancers. The study addresses the following specific research questions:

- (1) How does a concordancer search enhance students' proofreading performance?
- (2) How do scaffolding prompts for concordancer searches enhance students' proofreading performance?

- (3) Do scaffolding prompts have lasting effects on students' concordance-assisted proofreading performance?
- (4) Do scaffolding prompts affect students' level of certainty about their proofreading performance?
- (5) What are the students' perceptions of the effects of concordancer searches and scaffolding prompts?

Method

Participants

The participants in the study were a class of 26 second-year senior high school students (15 males and 11 females) at a private high school in central Taiwan. They were all native speakers of Mandarin Chinese who were learning English as a foreign language (EFL). These students were randomly grouped into an experimental group (with scaffolding prompts) and a control group (without scaffolding prompts), with 13 students in each group. The reliability of the pre-test that the teacher-researcher administered to both groups in Task One was calculated to make sure that the two groups were equivalent in their language proficiency. The resulting reliability of the test was 0.63. An independent *t*-test was performed to examine students' performance on the language test and the results showed that the experimental group ($M = 56.15$, $SD = 16.35$) and the control group ($M = 53.46$, $SD = 9.87$) were equivalent, $t = -5.08$, $p < .05$.

Concordancer tools

In order to avoid any unexpected problems in Internet connection and flow of access during the actual implementation of the experiment, two concordancer websites were introduced to the participants and then one of the two websites was randomly assigned to each of the students. The first concordancer was the Virtual Language Center (VLC) sponsored by Hong Kong Polytechnic University (<http://vlc.polyu.edu.hk/concordance/WWWConcappE.htm>) and the other was the NTNU Web Concordancer sponsored by National Taiwan Normal University (<http://llrc.eng.ntnu.edu.tw/English/search/Default.htm>). To avoid a situation where the concordancer's various corpus selections would distract the students, the *Brown Corpus of Standard American English* was assigned to the students for their use.

Scaffolding prompts

In the current study, the students in the experimental group received computer-based help pages, also called scaffolding prompts (see Appendix A), which served to facilitate concordancer searches. These prompts were a combination of procedural, elaborative, and reflective prompts. These prompts were complete sentences written in the students' native Chinese language. The prompts described strategies of successful corpus researchers that several relevant studies had proposed (Kennedy & Miceli, 2001; Sun, 2003; Thurstun, 1996). Table 1 illustrates the stages of the problem-solving strategies included in the prompts, featuring four major goals of concordancer searches: (1) selecting a keyword, (2) analysing concordance output,

Table 1. Scaffolding prompts.

Steps	Strategies
1. Keyword selection	(a) Enter an appropriate keyword or string of keywords. (b) Try a shorter string of keywords. (c) Try different keywords.
2. Concordance analysis	(a) Read words surrounding the keyword in examples. (b) Pay attention to pattern frequency. (c) Skip unclear examples, or link to full texts.
3. Rule formulation	(a) Look back at the question's keyword and its surrounding words. (b) Compare the keyword in the question with the examples. (c) Select the best usage pattern on the basis of surrounding words in questions.
4. Outcome evaluation	(a) Read examples to confirm whether or not a formulated language pattern exists. (b) Read examples to confirm whether or not the formulated language pattern is used frequently. (c) Review the learned usage patterns and skills.

(3) formulating a usage pattern, and (4) evaluating the search outcome and concordancing process.

Proofreading tasks

Several studies have indicated that collocation (word combinations appropriate to the contextual restrictions on the use of word combinations) is one of the most common problems for learners learning English as a foreign language (e.g., Chambers, 2005; Zyzo, Santome, & Heins, 2003). Therefore, the present study investigated students' mastery of collocations (verb + preposition) through four equivalent proofreading measures – with a reliability of .63, .69, .71, and .75 respectively – each of which contained a list of 10 sentences with mistakes in verb + preposition collocation use (see Appendix B for a sample). The reason for the use of error identification of four underlined parts of a sentence in the study is to confine the range of possible areas of errors and thus make the task difficulty more suitable for the high school level participants of the study.

Each correct proofreading answer was given 10 points: five points for the accurate selection of the problematic area and five points for the accurate revision of the collocation use. The expectation was that the proofreading tasks would challenge the students and would thus encourage them to get support from concordancers. The experimental group received scaffolding prompts that served to guide the students' concordancer searches whereas the control group only received concordancer support.

In addition, students had to indicate their level of certainty about their answer to each question by responding to a five-point Likert-scale question (answers ranging from 1 = strongly uncertain to 5 = strongly certain).

Evaluation questionnaire

An evaluation questionnaire was developed to analyse students' perceptions of the concordancer and scaffolding prompts (see Appendix C). The questionnaire comprised two parts. The first part contained eight questions regarding students'

backgrounds, such as access to computers, location of computer use, experience, and difficulties in computer-assisted language learning, and teacher's involvement in computer-assisted language learning. The second part of the instrument comprised seven five-point Likert-scale questions (the answers ranging from 1 = strongly disagree to 5 = strongly agree) and open-ended questions whose function was to identify students' perceptions of and attitudes toward the concordancer and scaffolding prompts in the proofreading tasks (perceptions of, for example, the learning tools' effects on proofreading performance; and attitudes such as students' willingness to promote or recommend the use of either learning tool). The evaluation questionnaire was administered to the participants at the end of the experiment.

Data-collection procedures

During the first week of the experiment, the teacher-researcher administered a 20-minute proofreading pre-test to all participants to collect information about their prior knowledge about collocation use (verb + preposition). Then, in the same class period, the participants received 15 minutes of training on concordancer searches, during which time they received not only an overview of the purpose and function of a concordancer but also a demonstration as to the proper use of the analysis tool. Then the participants were provided with practice tasks. Next, in the second class period of the first week, the participants used a web concordancer to help them perform 30-minute proofreading tasks (10 question-statements each). After that, in the second week of the experiment, the two groups received different versions of a 40-minute concordancing task; the experimental group performed the proofreading task with the guidance of scaffolding prompts (with a 15-minute rehearsal session prior to scaffolding), whereas the control group performed the same task without any scaffolding support. In the third week of the experiment, the participants were administered another 40-minute proofreading task. Finally, in the last week of the experiment, the scaffolding prompts were removed from the experimental group and a 30-minute concordance-based test was administered to both of the groups to examine whether or not there was a lasting effect of the scaffolding support. At the end of the experiment, an evaluation questionnaire was administered to all participants to elicit their perceptions of the concordancer and the scaffolding prompts. Table 2 illustrates overall data-collection procedures.

Data analysis

Table 3 highlights the research questions and their corresponding data collection procedures.

Results

Research question 1: How does a concordancer search enhance students' proofreading performance?

A comparison between students' proofreading performance without concordancer support and students' proofreading performance with concordancer support was conducted. Table 4 indicates that the mean score (out of 100) when using concordancer support ($M = 54.81$, $SD = 13.30$) was higher than the mean score when not using concordancer support ($M = 43.65$, $SD = 15.59$). The results of a

Table 2. Procedure of sessions.

Week	Session	Control group	Exp group	Time
1	1.	Task 1: Pre-test (without any support)	Task 1: Pre-test (without any support)	20
	2.	Training on concordancer	Training on concordancer	15
	3.	Task 2: Pre-test (with concordancer support)	Task 2: Pre-test (with concordancer support)	30
2	4.	–	Training on using scaffolding prompts with concordancer tool	15
	5.	Task 3: Concordancer	Task 3: Concordancer + Scaffolding	40
3	6.	Task 4: Concordancer	Task 4: Concordancer + Scaffolding	40
4	7.	Task 5: Post-test (with concordancer support)	Task 5: Post-test (with concordancer support)	30
	8.	Questionnaire survey	Questionnaire survey	20

Table 3. Data analysis.

Research questions	Participants	Task	Data analysis
Research question 1	Both experimental group and control group (n = 26)	Task 1 and task 2	Paired <i>t</i> -test
Research question 2	Experimental group (n = 13) Control group (n = 13)	Task 3 and task 4	Independent <i>t</i> -test
Research question 3	Only experimental group (n = 13)	Task 2 and task 5	Paired <i>t</i> -test
Research question 4	Experimental group (n = 13) Control group (n = 13)	Task 3 and task 4	Independent <i>t</i> -test
Research question 5	Both experimental group and control group (n = 26)	Evaluation questionnaire	Descriptive analysis

Table 4. Results of the *t*-test for the mean scores of the non-concordance test and the concordance test.

Types of tasks	N	Sub-skills	Mean	Mean	S.D.	d.f.	<i>t</i> value	<i>P</i>
Without concordance	26	Identification	24.23	43.65	15.59	25	–3.65	.001**
		Correction	19.42					
With concordance	26	Identification	31.54	54.81	13.30			
		Correction	23.27					

** $p < .01$.

paired *t*-test further indicated that there had been significant improvement in the students' proofreading performance with concordancer support ($t = -3.65$, $p < .01$). All of these findings lent support to the assertion that the web concordancer positively affected students' collocation use (verb + preposition) in the proofreading tasks, and the findings were consistent with the results of several prior studies reporting positive effects of web-concordancer use on language learning, particularly

regarding students' significant collocation improvement (Chan & Liou, 2005; Yeh, Liou, & Li, 2007).

Research question 2: How do scaffolding prompts for concordancer searches enhance students' proofreading performance?

A comparison was conducted between the two groups of students to see whether or not the proofreading performance of the experimental group (using a concordancer with scaffolding-prompt support) was significantly different from the proofreading performance of the control group (using a concordancer only). The averages of the mean scores in Task 3 (out of 100) and Task 4 (out of 100) were calculated for the experimental group and the control group respectively. Table 5 indicates that the mean score of the scaffolding group ($M = 96.54$, $SD = 5.16$) was higher than the mean score of the non-scaffolding group ($M = 90.00$, $SD = 8.90$). Table 5 further presents the results of an independent t -test, suggesting that there were significant differences between the mean scores in the scaffolding group's concordance-based proofreading tasks and the corresponding mean scores for the non-scaffolding group ($t = -2.29$, $p < .05$). This positive effect of scaffolding prompts on students' proofreading performance was consistent with the results of several previous studies on scaffolded instruction in science (e.g., Bell & Linn, 2000; Davis & Linn, 2000).

Research question 3: Do scaffolding prompts have lasting effects on students' concordance-assisted proofreading performance?

The prompts for the experimental group (the group with scaffolding prompts) were removed after two rounds of concordancer searches which were aided with scaffolding prompts. Table 6 indicates that the experimental group's post-test scores ($M = 91.54$, $SD = 8.26$) were significantly higher than the group's pre-test scores

Table 5. Results of the t -test for the mean scores of the scaffolding group and the non-scaffolding group aided with the concordancer searches.

Types of tasks	N	Sub-skills	Mean	Mean	S.D.	d.f.	t value	P
Experimental group (with scaffolding)	13	Identification	47.31	96.54	5.16	19.25	-2.29	.030*
		Correction	49.23					
Control group (without scaffolding)	13	Identification	47.88	90.00	8.90			
		Correction	42.12					

* $p < .05$.

Table 6. Results of the t -test for the pre-test and the post-test mean scores of the scaffolding group.

Group	N	Sub-task	Mean	Mean	S.D.	d.f.	t value	P
Concordance-based pre-test	13	Identification	31.54	56.15	16.35	12	-6.97	.000**
		Correction	24.61					
Concordance-based post-test	13	Identification	45.58	91.54	8.26			
		Correction	45.96					

** $p < .01$.

($M = 56.15$, $SD = 16.35$). Table 6 further reports that the mean scores for this group (out of 100) in the concordance-based pre-test and post-test were significantly different ($t = -6.97$, $p < .001$). This possible sustaining effect of scaffolding prompts has been highlighted in several previous studies on students' growing competence after the decrease of scaffolds (Dixon et al., 1993; Rosenshine & Meister, 1992).

Research question 4: Do scaffolding prompts affect students' level of certainty about their proofreading performance?

In examining the effects of scaffolding on learning through concordancer searches, both the experimental group (with scaffolding prompts) and the control group (without scaffolding) were asked about their certainty level on their answers (1 = strongly uncertain to 5 = strongly certain) in all proofreading tasks they were assigned. Table 7 shows that the mean certainty ratings for the scaffolding group ($M = 4.19$, $SD = .30$) were higher than those of the non-scaffolding group ($M = 3.75$, $SD = .45$). The results of an independent t -test also suggested that there was a significant difference in certainty levels between the scaffolding group and the non-scaffolding group ($t = -2.80$, $p < .05$). The results were in line with prior studies on students' enhanced confidence resulting from scaffolding (e.g., Torgerson, Blasko, Kazmerski, & Cornwell, 2003).

Research question 5: What are the students' perceptions of the effects of concordancer searches and scaffolding prompts?

The results of the first part of the questionnaire indicate that even though all students had easy access to computers and Internet resources, none of them reported having ever received any computer-assisted language learning instruction in school. More than half of them (63%) reported only having used an online dictionary to assist language learning. Even though most of them (80%) did not consider it difficult to learn English from the Internet, none of them actually had any experience with it. In other words, the participants in the study considered both corpus investigation and scaffolding instruction to be new language learning experiences.

The second part of the questionnaire investigated students' perceptions of the two language-learning tools. Table 8 summarizes the percentage of responses to a five-point Likert scale (1 = strongly disagree and 5 = strongly agree).

Open-ended questions further elicited students' comments on their learning experiences in the DDL setting with scaffolding instruction. Table 9 presents the categories and the frequency of the students' comments regarding concordancer searches.

In general, the students had positive reactions to the corpus and the concordancer, particularly regarding their effects on learning English collocation

Table 7. Certainty level of the scaffolding group and the non-scaffolding group.

Concordance-based proofreading task	N	Mean	S.D.	d.f.	t value	p
Experimental group (with scaffolding)	13	4.19	.30	20.85	-2.80	.01*
Control group (without scaffolding)	13	3.75	.45			

* $p < .05$.

(verb + preposition). These findings from the present study corroborate with the questionnaire results discussed in several prior studies (e.g., Chambers, 2005; Lee & Liou, 2003; O'Sullivan & Chambers, 2006). Students also made some negative comments on concordancer searches, however, which suggests that students still encountered difficulties during their search process. All these student-perceived

Table 8. Students' responses to the questionnaire about concordancer and scaffolding (%).

Item on the questionnaire	N	1	2	3	4	5
1. I enjoyed learning English collocation through a corpus and concordancer.	26	0	8	38	50	4
2. I think the web concordancer was helpful to my performance on the proofreading tasks.	26	0	0	26	62	12
3. I think the web concordancer was user-friendly.	26	4	4	54	38	0
4. I think the scaffolding prompts helped me solve problems with the concordancer search.	13	7	15	15	63	0
5. I think the prompts were helpful in guiding me to consult web corpora and perform proofreading tasks.	13	0	0	7	93	0
6. I think I'll consult web corpora to learn about English collocation in the future.	26	0	12	4	84	0
7. I think I'll recommend others seek help from the prompts during corpus consultation.	26	0	15	0	92	0

Table 9. Open-ended responses concerning concordancer searches (N = 26).

Student responses	Number of times reported
<i>Advantages of concordancer searches</i>	
Great quantity of linguistic examples	16
Display of contextualized linguistic examples	15
Display of apparent collocation patterns	12
<i>Disadvantages of concordancer searches</i>	
Confusion in analysing concordance output	6
Frustration in dealing with unfamiliar vocabulary	3
Difficulty in selecting a key term	2
Uncertainty in assessing search outcomes	1

Table 10. Open-ended responses concerning scaffolding prompts (N = 13).

Student responses	Number of times reported
<i>Advantages of scaffolding prompts</i>	
Explicit guidance on concordancer-search procedures	7
Comprehensive perspective of concordancer searches	4
Definite goals of concordancer searches	3
Demonstration of effective strategy use	3
Promotion of metacognitive activity	2
<i>Disadvantages of scaffolding prompts</i>	
Exhaustion due to reading so many scaffolding prompts	2

disadvantages of concordancer searches indicated students' desire to receive mediation or supervision during corpus consultation, as discussed in several previous studies (e.g., Maddalena, 2001; O'Sullivan & Chambers, 2006; Thurstun, 1996).

Table 10 presents categories of the students' comments on scaffolding prompts, lending support to the assertion that scaffolding can play a supportive role in concordancer searches. Even so, there is still a small percentage of students (10%) who felt impatient while working on the prompt-supported data-driven task due to the perceived time-consuming nature of reading the prompts. This suggests a possible benefit of further pedagogical innovation on how to design prompt tasks that are both effective as well as maintaining motivation among the students.

Conclusion

As the results indicate, concordancer searches can improve students' proofreading performance on verb + preposition collocation. The results corroborate prior research in which concordancer searches aided students in being able to induce a rule from many examples and helped them work as linguistic researchers to figure out common collocation use (e.g., Chan & Liou, 2005; Hadley, 2002; Yeh et al., 2007). With further guidance through the use of prompts in students' concordancer searches, students' improvement in language production is more likely to be attained, and their improvement may be carried on even after the removal of prompts. The results suggest that prompts may provide a transition to independent work, which would have to be examined in future research.

In view of these findings, one may reasonably conclude that students receiving scaffolding support in the experimental group could successfully realize a transfer of responsibility, as discussed in previous studies on scaffolding (Lidz, 1991; Rogoff & Lave, 1984). In addition, the support of prompts seems to have helped create a situation where students exhibited more confidence in their concordancer searches. The significant correlation between confidence level and performance on proofreading appears to support further the assertion that scaffolding effectively facilitates concordance-assisted learning. This positive effect of scaffolding echoes the results of prior studies, indicating that students become more capable and competent with the support of scaffolding (Dixon et al., 1993; Rosenshine & Meister, 1992).

The results of the survey also indicate that, with the support of scaffolding prompts, students themselves become consciously aware of the positive effects of concordancer searches. That is, students realize that their use of web concordancers places the students themselves in a position of control, encouraging them to expand language experiences and to discover possible explanations for descriptive language use. Furthermore, scaffolding prompts also help the students discover their own intentions, as discussed in several previous studies on scaffolding (e.g., Yelland & Masters, 2007), and this enables the students to enter a process of self-discovery via their concordancer searches and, thereby, to develop self-monitoring and self-evaluating strategies. Likewise, researchers have also asserted that a number of cognitive and metacognitive strategies can be acquired by employing scaffolding prompts, particularly in facilitating complex problem-solving processes (Ge et al., 2005).

Overall, scaffolding does more than simply ensure the benefits of concordancer searches. This powerful tool promotes the positive effects of concordancers on

students' learning outcomes and learning processes. To this end, scaffolding helps students acquire learner efficacy in language learning, and even for general purposes. Consequently, as reported in prior studies on the effects of instructional scaffolds (Kauffman, 2004; Van Merriënboer et al., 2003), experimenting with web concordancers under the supervision of scaffolding prompts has become a practical and replicable experience for students.

Although the present study has presented evidence of the benefits of concordancers and scaffolding prompts, there are still some limitations of the study. First, it is possible that improved scores on successive concordancer searches (related to research question one) could have come from learning from one test to the next that the focus was on particles (prepositions), and so any improved identification and correction could have been a result of learning from prior tests. Second, this research was conducted on a fairly small scale. One class of students constitutes a small sample size, and thus the data from this study are insufficient as a basis for discovering a myriad of possible variations in the students' proofreading performance for concordancer searches with or without the support of scaffolding prompts. Finally, the four proofreading measures developed in the study only reach moderate reliabilities, which present a shortcoming of the study.

To extend the present research and to further investigate the effects of web concordancers and scaffolding prompts, future studies should probe into the issues more deeply by including the following. First, proofreading tasks could contain more items or items at higher difficulty levels and of greater diversity in language focus, so that the tasks may better challenge the students and may, thus, provoke greater variation in their performance. Similarly, researchers could choose tasks other than proofreading, such as matching words, filling in missing words, or writing authentic essays. Second, instead of providing teacher-prepared prompts, future research can create an online community in which learners either cooperatively learn by providing peer-scaffolding prompts for each other or work in groups to solve a given learning problem. Third, scaffolding prompts may become more adapted to the students' changing levels of understanding, so that how the prompts scaffold the students' tasks will vary with the proficiency level of the students, and thus the students may feel less uncomfortable with the intervention of scaffolds. Fourth, as the type of collocation in the study is restricted to verb + preposition collocation, further study exploring other types of collocation is called for to generate more comprehensive understanding of the effects of concordancer and scaffolding on collocation learning. Last, qualitative analyses of students' cognitive stages in the learning process are worth further exploration.

Notes on contributors

Wen-Li Chang received her TESOL master's degree from National Chiao Tung University. She is a lecturer at National Chung Hsing University in Taiwan.

Yu-Chih Sun is an associate professor in the TESOL program at the National Chiao Tung University, Taiwan. Her research interests include computer-assisted language learning, academic writing, and speech instruction.

References

- Anderson, L. (1989). Classroom instruction. In M. Reynolds (Ed.), *Knowledge base for the beginning teacher* (pp. 101–115). Oxford: Pergamon Press.

- Anderson, R.C., Armbruster, B.B., & Roe, M. (1990). Improving the education of reading teachers. *Daedalus*, 119, 187–210.
- Andrasick, K.D. (1993). Independent repatterning: Developing self-editing competence. *The English Journal*, 82(2), 28–31.
- Beed, P., Hawkins, M., & Roller, C. (1991). Moving learners toward independence: The power of scaffolded instruction. *The Reading Teacher*, 44(9), 648–655.
- Bell, P., & Linn, M.C. (2000). Scientific arguments as learning artifacts: Designing for learning from the web with KIE. *International Journal of Science Education*, 22(8), 797–817.
- Biber, D., Conrad, S., & Reppen, R. (1998). *Corpus linguistics: Investigating language structure and use*. Cambridge: Cambridge University Press.
- Brown, H.D. (2001). *Teaching by principles: An interactive approach to language pedagogy* (second ed). London: Longman.
- Carduner, J. (2007). Teaching proofreading skills as a means of reducing composition errors. *Language Learning Journal*, 35(2), 283–295.
- Chambers, A. (2005). Integrating corpus consultation in language studies. *Language Learning & Technology*, 9(2), 111–125.
- Chan, T.P., & Liou, H.C. (2005). Effects of web-based concordancing instruction on EFL students' learning of verb-noun collocations. *Computer Assisted Language Learning*, 18(3), 231–251.
- Cogie, J., Strain, K., & Lorinskas, S. (1999). Avoiding the proofreading trap: The value of the error correction process. *The Writing Center Journal*, 19, 7–32.
- Conrad, B., & Rautenhaus, H. (1994). *Innovations in teachers' education: Using the concordancer as a means for students at university and at school level*. Paper presented at the Meeting of EUROCALL, 15–17 September at Karlsruhe, Germany.
- Davis, E.A., & Linn, M.C. (2000). Scaffolding students' knowledge integration: Prompts for reflection in KIE. *International Journal of Science Education*, 22(8), 819–837.
- Dixon, R., Carnine, D., & Kameenui, E.J. (1993). Using scaffolding to teach writing. *Educational Leadership*, 51(3), 100–101.
- Ge, X., & Land, S.M. (2003). Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions. *Educational Technology Research and Development*, 51(1), 21–38.
- Ge, X., & Land, S.M. (2004). A conceptual framework of scaffolding ill-structured problem solving processes using question prompts and peer interactions. *Educational Technology Research and Development*, 52(2), 5–22.
- Ge, X., Chen, C.H., & Davis, K.A. (2005). Scaffolding novice instructional designers' problem-solving processes using question prompts in a web-based learning environment. *Journal of Educational Computing Research*, 33(2), 219–248.
- Ge, X., & Er, N. (2005). An online support system to scaffold real-world problem solving. *Interactive Learning Environments*, 13(3), 139–157.
- Greene, B., & Land, S. (2000). A qualitative analysis of scaffolding use in a resource-based learning environment involving the World Wide Web. *Journal of Educational Computing Research*, 23(2), 151–180.
- Hadley, G. (2002). An introduction to data-driven learning. *RELC Journal*, 33(2), 99–124.
- Hull, G. (1987). The editing process in writing: A performance study of more skilled and less skilled college writers. *Research in the Teaching of English*, 21, 8–29.
- Hyland, K. (2003). *Second language writing*. Cambridge: Cambridge University Press.
- Johns, T. (1991a). From printout to handout: Grammar and vocabulary teaching in the context of data-driven learning. In T. Johns & P. King (Eds.), *Classroom concordancing*, *ELR Journal*, 4 (pp. 27–45). Birmingham: University of Birmingham.
- Johns, T. (1991b). Should you be persuaded: Two samples of data-driven learning. *English Language Research Journal*, 4, 1–13.
- Johns, T. (1997). Contexts: The background, development, and trialling of a concordance-based CALL program. In A. Wichmann, S. Fligelstone, T. McEnery, & G. Knowles (Eds.), *Teaching and language corpora* (pp. 100–115). London: Longman.
- Kauffman, D.F. (2004). Self-regulated learning in web-based environments: Instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs. *Journal of Educational Computing Research*, 30(1&2), 139–161.

- Kennedy, C., & Miceli, T. (2001). An evaluation of intermediate students' approaches to corpus investigation. *Language Learning & Technology*, 5(3), 77–90. Retrieved May 20, 2006, from <http://lt.msu.edu/vol5num3/kennedy>
- Kroll, B.M., & Schafer, J.C. (1984). Error analysis and the teaching of composition. In Sandra McKay (Ed.), *Composing in a second language*. Rowley, MA: Newbury House.
- Lee, C.Y., & Liou, H.C. (2003). A study of using web concordancing for English vocabulary learning in a Taiwan high school context. *English Teaching & Learning*, 27(3), 35–56.
- Lidz, C. (1991). *Practitioner's guide to dynamic assessment*. New York: Guilford.
- Maddalena, S.R. (2001). An investigation into how corpus analysis may be used in the second language classroom to solve some of the problems surrounding non-native speakers' understanding of seemingly synonymous words. (ERIC Document Reproduction Service No. ED 458795).
- O'Sullivan, Í., & Chambers, A. (2006). Learners' writing skills in French: Corpus consultation and learner evaluation. *Journal of Second Language Writing*, 15(1), 49–68.
- Rogoff, B. & Lave, J., (Eds.). (1984). *Everyday cognition: Its development in social contexts*. Cambridge, MA: Harvard University Press.
- Rosenshine, B., & Meister, C. (1992). The use of scaffolds for teaching higher-level cognitive strategies. *Educational Leadership*, 49(7), 26–33.
- Sun, Y.C. (1999). Web-based concordancing: Challenges and opportunities for English language teaching. Proceedings for the English International Symposium on English Teaching (pp. 517–526). Taipei: Crane.
- Sun, Y.C. (2003). Learning process, strategies, and web-based concordancers: A case-study. *British Journal of Educational Technology*, 34(5), 601–613.
- Sun, Y.C., & Wang, L.Y. (2003). Concordancers in the EFL classroom: Cognitive approaches and collocation difficulty. *Computer Assisted Language Learning*, 16(1), 83–95.
- Thurstun, J. (1996, March). *Teaching the vocabulary of academic English via concordances*. Paper presented at the Annual Meeting of the Teachers of English to Speakers of Other Languages, Chicago, IL.
- Todd, R.W. (2001). Induction from self-selected concordances and self-correction. *System*, 29(1), 91–102.
- Torgerson, C.N., Blasko, D.G., Kazmerski, V.A., & Cornwell, J.A. (2003). Scaffolding students from knowing to applying: Using COR to teach observational research methods. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 5(2). Retrieved June 26, 2008, from <http://imej.wfu.edu/articles/2003/2/02/printver.asp>
- Van Merriënboer, J.J.G., Kirschner, P.A., & Kester, L. (2003). Taking the load off a learners' mind: Instructional design for complex learning. *Educational Psychologist*, 38(1), 5–13.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. and Trans.). Cambridge, MA: Harvard University Press.
- Wood, D., Bruner, J.S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100.
- Yeh, Y., Liou, H.C., & Li, Y.H. (2007). Online synonym materials and concordancing for EFL college writing. *Computer Assisted Language Learning*, 20(2), 131–152.
- Yelland, N., & Masters, J. (2007). Rethinking scaffolding in the information age. *Computers & Education*, 48(3), 362–382.
- Zyzo, W., Santome, K., & Heins, D. (2003). *1001 common Chinese errors in English*. Taipei, Taiwan: Crane.

Appendix A. Scaffolding Prompts

This is Question 1 (out of 10 questions).

She has moved to Canada since childhood, but she still keeps in contact of her friends by telephone.

Question 1, Step 1

- The problem area in the question statement is underlined.
- From the underlined area, please pick out a keyword or a meaningful key phrase (such as *keep*, *in contact*, or *keep in contact*).
- Enter fewer keywords that guarantee more example sentences.
- Try different keywords when there is an invalid search outcome.

Question 1, Step 2

- Read the words surrounding the key term in the examples to check its usage.
- Pay attention to the usage patterns that occur frequently in examples.
- Skip unclear examples, or click on the highlighted key term to see the key term in a full text.

Question 1, Step 3

- Look back at the key term in the question and its surrounding words.
- Compare and contrast the use of the key term in the question with that in the examples.
- Meanwhile, find which word in the question has been added/deleted, or which word in the question has been mistakenly used and determine how to correct it.
- Select the best usage pattern based on the surrounding words in the example sentences.

Question 1, Step 4

- Double check the selected usage pattern in the example sentences.
- Make sure the selected usage pattern is frequently used in the examples.
- Think back on the rules you just learned, and on the skills you just used for formulating rules from examples and for consulting a web corpus. Then think if all the concordancing steps can make the use of a concordancer more effective.

Appendix B. Sample Proofreading Task

Instruction: Each question below has one mistake underlined. Please mark the mistake (A, B, C, or D) and make the appropriate correction.

Example

It is uncomfortable to have someone that you have no idea about stand beside you and

A

B

C

watch on every move you make.

✎ **Correction** (watch every move you make)

- (1) John asked Claire to marry with him, but she turned him down because she still

A

B

felt insecure about their relationship. Poor John, this is the third time he has been

C

refused by Claire!

D

- (2) It is not easy dealing clients from different countries because sooner or later the

A

B

difference in culture will turn out to be a problem.

C

D

- (3) To be a good salesclerk, you are supposed to have a friendly attitude at every

A

B

C

customer you give service to.

D

- (4) Even though it was only one hour after the devastating earthquake, the rescue

A

team sent by the government went to the disaster area without delay regardless to

B

C

D

the aftershocks there might be.

- (5) As part of this company, you are required to call to all your clients personally

A

B

C

and say happy New Year to them.

D

- (6) We are interested at buying several items from your store and being your agents

A

B

to promote the items in different areas. How much cut-down can you offer us

C

on the price?

D

(7) Even though his wife left him without a word, he doesn't want to show out his

A

B

feelings in front of others. He thinks he has to be tough.

C

D

(8) Every year, when it's Chris's birthday, he'll bring his colleagues back home and

A

B

share to them a nice chocolate cake that his wife makes for him.

C

D

(9) His family had tried to convince him not to make a fool of himself, but he still

A

B

decided to take revenge for the drunken driver who had killed his father by

C

D

accident.

(10) I need someone to walk home with me after work because the only access of my

A

B

C

place is along a really narrow and dark road.

D

Appendix C. Evaluation Questionnaire

Part A: Computer-assisted learning experiences

- (1) I have easy access to computers. Yes No
- (2) I usually use the computer at _____. Home Dorm Other
- (3) Teachers offer me online resources or computer-aided programs to assist language learning in English courses.
 - Yes. Please describe how these resources were used:
 - No
- (4) I consult online resources or computer programs to learn English.
 - Yes. Please describe the type of resources:
 - No

(5) I have difficulties in consulting online resources or computer programs to learn English.

- Yes. Please describe the problem:
 No

(6) I consult online resources or computer programs to learn English with the support of teachers or online support.

- Yes. Please describe the process:
 No

(7) I have used a web concordancer in addition to the concordancer of the Virtual Language Center (VLC) or the National Taiwan Normal University (NTNU).

- Yes. Please describe the concordancer and the search process:
 No

(If yes, answer question 8; if not, please skip question 8.)

(8) Teachers offer me online resources or computer programs to assist concordancer searches in English courses.

- Yes. Please describe how these resources were used:
 No

Part B: Impression of the web concordancer and scaffolding prompts

(1) I enjoyed leaning English collocation through a corpus and concordancer.

- Strongly disagree Disagree Neutral Agree Strongly agree

(2) I think the web concordancer was helpful to my performance in the proofreading tasks.

- Strongly disagree Disagree Neutral Agree Strongly agree

What aspects were improved?

(3) I think the web concordancer was user friendly.

- Strongly disagree Disagree Neutral Agree Strongly agree

What aspects were difficult?

(4) I think the scaffolding prompts helped me solve problems with the concordancer searches.

- Strongly disagree Disagree Neutral Agree Strongly agree

What aspects were helpful?

(5) I think the prompts were helpful in guiding me to consult the web corpus and perform the proofreading tasks.

- Strongly disagree Disagree Neutral Agree Strongly agree

What aspects were helpful?

(6) I think I'll consult web corpora to learn about English collocation in the future.

Strongly disagree Disagree Neutral Agree Strongly agree

Why?

(7) I think I'll recommend others to seek help from scaffolding during corpus consultation.

Strongly disagree Disagree Neutral Agree Strongly agree

Why?

(8) Open-ended questions

- (1) What are the advantages of a web concordancer?
- (2) What are the disadvantages of a web concordancer?
- (3) What are the advantages of scaffolding prompts in assisting concordancer searches?
- (4) What are the disadvantages of scaffolding prompts in assisting concordancer searches?