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Strategy Use in CALL-Based Self-Directed Foreign Language Vocabulary Learning

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Abstract

This paper explores whether the CALL-based self-directed vocabulary learning could significantly improve students' strategy use and thereby enhance their self-directed vocabulary learning in comparison with the paper-based version. Subjects for the study were sixty-one freshmen from two classes at a university in China. They were randomly assigned to adopt a newly-developed learning system and a corresponding printed material. Subjects completed pre- and post- questionnaire surveys at the start and end of the study respectively, through which data were collected on students' satisfaction levels with their strategy use. It was ultimately revealed that there were key differences in strategy use between the two groups.

Keywords: CALL; vocabulary learning strategies; self-directed vocabulary learning

Vocabulary learning plays a crucial role in the success of foreign language (FL) learning because words lie at the foundation of sentence construction as basic building blocks. Vocabulary knowledge is the most important factor in academic achievement for FL learners (Saville-Troike, 1984). The degree of vocabulary uptake has a direct effect on the accuracy and efficiency of language communication, including comprehension and production. A large number of studies have reported that vocabulary knowledge is a key indicator of overall language ability and that vocabulary learning is significantly relevant to the development of all language learning skills (Lee, 2003; Lee & Muncie, 2006; Nagy, 2005; Nation, 2001, 2006). Without a large vocabulary base and precise vocabulary knowledge, learners are most likely to be stuck when they attempt to communicate.

However, despite the great importance of vocabulary learning, it seems to be the most difficult aspect for FL learners even if they are eager to learn as many words as they can and take in a large amount of knowledge of these words in depth. In China, college students often complain about their vocabulary learning. Teachers are often unable to focus on vocabulary in depth in class due to the limited class time. To a great extent, vocabulary learning is left to students' out-of-class study. In addition, some research (Li, 2010; Liu & Zhang, 2005; Wu & Wu, 2008; Xu, Peng, & Wu, 2004) finds that Chinese college students depend too much on their teachers, are used to being passive recipients, and lack autonomy. They usually engage in rote memorization with word lists and decontextualized mechanical drills in self-directed

vocabulary learning (Wu, 2011). In other words, they seldom think of or utilize more useful and appropriate vocabulary learning strategies, which is most likely caused by the lack of strategy knowledge, learning resources, and tools. Under such conditions, both long-term word retention and good word transfer are hard to achieve.

As a result, the improvement of self-directed vocabulary learning has become urgent in order for Chinese college students to learn vocabulary independently as well as successfully. With the rapid development of computer technology in recent decades, computer-assisted language learning (CALL) has been widely applied in FL teaching and learning. CALL has many beneficial features incorporating texts, images, audio and video recordings, immediate and individualized feedback, hands-on learning tools, and opportunities for authentic online interactions. Such features are considered favorable to both learning efficiency and learner autonomy. Obviously, its potential could also be explored in terms of facilitating vocabulary learning. Therefore, in this paper, CALL, assumed to be an effective way of advancing learning conditions, are expected to facilitate the development of various vocabulary learning tasks so as to promote students' use of various vocabulary learning strategies, thereby improving self-directed vocabulary learning.

Vocabulary Learning Strategies

Vocabulary learning strategies constitute a subclass of learning strategies applicable to a wide variety of learning tasks. Rubin (1987) defines learning strategies as the processes by which information is obtained, stored, retrieved and used. As seen from the definition, learning strategies cannot be separated from what is being learnt or the process of learning. In order to control their learning, learners need to understand their own learning processes, be capable of making informed choices about their learning paths, and be proactive in managing and monitoring their own learning, all of which require learners to use effective language learning strategies (Figura & Jarvis, 2007). Successful self-directed learners usually develop a series of strategies suitable for themselves to guarantee their effective control of language learning (Cohen, 2000; Ni, Chatupote, & Teo, 2008). Good autonomous learners can grasp a wide variety of learning strategies better and utilize them more efficiently than poor learners (Dickinson, 1993), and this also applies to vocabulary learning (Kojic-Sabo & Lightbown, 1999).

Numerous attempts have been made to classify language learning strategies (O'Malley & Chamot, 1990; Oxford, 1990). In the past few decades, researchers have also investigated the taxonomy of vocabulary learning strategies based on these general learning

strategies. For instance, Stoffer (1995) categorizes fifty-three vocabulary learning strategies into nine groups, including strategies involving authentic language use, creative activities and physical actions, strategies used for self-motivation, strategies used to organize words, create mental linkages and overcome anxiety, memory strategies and auditory strategies. Gu and Johnson (1996) established three dimensions, including beliefs about vocabulary learning, metacognitive and cognitive strategies (guessing, dictionary, note-taking, rehearsal, encoding, activating). Schmitt's taxonomy (1997) shows two dimensions with six categories: discovery (determination, social) and consolidation (social, memory, cognitive, metacognitive). In addition, many qualitative and quantitative studies on vocabulary learning strategies and students' use of these strategies have been conducted in China (Fan, 2003; Gu, 2005; Lin, 2003; Wang, 2008; Zhang, 2004). Factors such as gender, proficiency level and learning outcomes have been correlated with the use of vocabulary learning strategies. Thus, a deep understanding and better use of vocabulary learning strategies are essential skills for learners to achieve successful self-directed vocabulary learning.

Effects of CALL on Vocabulary Learning

Nowadays, with the rapid development of computer technology and the advancement of pedagogical methodology, the potential of CALL has been explored extensively in language learning (Benson, 2001; Chambers & Davies, 2001; Debski & Levy, 1999; Levy, 1997; Warschauer & Kern, 2000; Wu & Wu, 2008, 2009). It is also applied widely in facilitating vocabulary learning.

First, the tutor role of CALL is presented in vocabulary learning. The findings in the research (Christensen, Merrill, & Yanchar, 2007; Duquette, Renié, & Laurier, 1998; Zapata & Sagarra, 2007) show that students perform well with computer-based drill and practice programs in both breadth and depth of vocabulary knowledge and the programs can provide them with better learning opportunities. CALL brings a variety of pedagogic tasks that would be difficult to be delivered effectively through any other medium and thereby be likely to produce more learning. In addition, researchers have attempted to develop CALL programs specific to vocabulary learning. Goodfellow's *Lexica* (1994) requires users to group words according to form, meaning and context, and then find the meanings and usages of the words with the help of lexical tools. *CAVACO* (Groot, 2000) encourages learners to deduce word meanings and usages from contexts during three stages of acquiring vocabulary, namely noticing, storage and consolidation. Learners can make a significant collocation improvement after using five web-based practice units in the format of textual explanation, semantic grid

analysis, a bilingual concordancer called *TOTALrecall* and interactive exercises (Chan & Liou, 2005). Also, Jaén and Basanta (2010) update an online vocabulary modular course *ADELEX* to be a fully virtual course, which assesses and develops lexical competence.

Second, the tool role of CALL has a significant effect on vocabulary learning. The following conditions identified in the CALL environment can enhance word recall and retention: when a word is presented in the form of text-related images instead of video and text or text only (Chun & Plass, 1996; Yanguas, 2009; Yun, 2011); when electronic dictionaries as online reference tools help students access target vocabulary (Loucky, 2005; Peters, 2007; Wang, 2012); and when word meanings are provided with electronic glosses (Abraham, 2008; de Ridder, 2002; Lenders, 2008). Additionally, as an important tool for vocabulary learning, the concordancer can provide learners with rich semantic, syntactic and collocational information about a new word presented in different contexts (Bloch, 2009; Horst, Cobb, & Nicolae, 2005). Online activities with a concordancer can offer richer input and encourage deeper processing. Moreover, many software tools can facilitate vocabulary learning. For instance, *WordNet* is an online lexical reference system whose design is based on psycholinguistic theories of human lexical organization and memory. *ALEXIA* system (Chanier & Selva, 1998) is a network module, plotting the graphs of lexical semantic relations automatically. Finally, *TextLadder* (Ghadirian, 2002) can select, screen and arrange texts to solve the problem of how to bring FL learners with limited vocabulary knowledge to the point where they can comprehend authentic texts in a target field adequately.

Third, regarding the medium role of CALL, the technology underlying multimedia environments allows new forms of interaction, emphasizing the learning process rather than the mere provision of correct answers. With the appearance of the Internet, computer-mediated communication (CMC) has become one of the most important ways for human interaction. Numerous studies (Abrams, 2003; Bueno-Alastuey, 2011; Hauck & Youngs, 2008; Jauregi & Bañados, 2008; Kitade, 2008; Yanguas, 2012; Zeiss & Isabelli-Garcia, 2005) have been conducted to explore various forms and functions of CMC. Kern (2006) summarized CMC as, "... not a single, uniform genre of language use, but rather a constellation of genres related partly to the particular medium and partly to the particular social and cultural contexts of a given act of communication" (p. 193). It may be specifically used for vocabulary learning so that learners can negotiate meanings and solve problems in word learning with their teachers, peers and even native speakers collaboratively. In spite of significant research to date, more empirical studies are still needed to investigate the effect of the medium role of CALL on vocabulary learning.

The Study

Research Questions

The aim of the study was to explore whether CALL-based self-directed vocabulary learning could significantly improve students' strategy use, thereby enhancing their self-directed vocabulary learning. For the study, two vocabulary learning materials were newly developed. One group of students used a learning system embedded with diversified vocabulary learning tasks and systematic vocabulary learning processes, including word concentration, word construction, word confirmation, word connection, word consolidation and word composition (Wu, 2012). The system was named *Learning Vocabulary In Domain* (Figures 1 & 2) and was developed to help students discover and construct new word knowledge in an authentic environment based upon their existing mental lexicon, working either individually or in collaboration with others. The second group studied using printed material with almost the same tasks and processes. The tasks embedded in the system were included in the printed material as long as they could be delivered in the printed form. The following specific research questions were posed to be answered in order to achieve the aim of the study:

1. Could students' adoption of the intended materials (either the learning system or the printed material), significantly better stimulate their overall strategy use than that of the traditional material¹?
2. Are there any advantages of the intended materials over the traditional material in stimulating each strategy use?
3. Could students' adoption of the learning system with computer applications significantly better enhance their overall strategy use than that of the printed material?
4. Is there any advantage of the learning system over the printed material in enhancing each strategy use?

¹ The traditional material here refers to the vocabulary learning material Chinese college students usually use, which only provides word lists and mechanical exercises.

Figure 1. Main Page Screen

Figure 2. Main Task Screen

Subjects

Sixty-one freshmen in two classes were invited to be the subjects in this study, who were all non-English majors randomly selected from a key university in China. For the purpose of guaranteeing the validity of the study outcome, the English scores of the two classes in the placement test held immediately after college entrance were compared by an Independent samples t-test. The results in Table 1 showed that there was no detectable difference between the two classes in the placement test scores. In other words, the two groups of students were at a similar English proficiency level at the start of the study. Later, they were randomly assigned to engage in the newly-developed learning system and the corresponding printed material.

Table 1. Independent Samples T-test on the English Scores of the Two Classes in the Placement Test

Group	N	Mean	SD	t	df	Sig. (two-tailed)
learning system	31	69.61	12.32	-.581	59	.563
printed material	30	67.90	10.59			

Procedures

The study lasted eight weeks, including one training week, five learning weeks and two surveying weeks. In the training week, the researcher as a tutor explained the intended materials respectively to the two groups, covering learning objectives and tasks. The training was given to each group for two hours altogether. During the five learning weeks, both groups were required to study on their intended materials twice a week, one hour for each

time in the Learner Autonomy Center (LAC) for language studies. During the surveying weeks, pre- and post- questionnaire surveys were carried out.

Instruments

Quantitative research

A questionnaire survey (see Appendix) was the instrument chosen for the quantitative research. The pre-questionnaire was composed of three parts. The first part solicited the following personal information:

Gender

Department to which the student belongs

English score in College Entrance Examination

Experience of using electronic language learning tools

The second part of the survey consisted of a questionnaire with twenty-five items. The aim of the survey was to discover the effect of the traditional material that students used to adopt in their self-directed vocabulary learning so as to see whether students utilized various vocabulary learning strategies and to what extent their strategy use was stimulated in the conventional environment. The noted taxonomies of vocabulary learning strategies proposed by Gu and Johnson (1996) and Schmitt (1997) were taken as the references for the strategy classification in this part. They were applied with an adjustment particularly for EFL Chinese students. For the convenience of later statistical analyses, the 7-point Likert scale was employed to show the effect of the traditional material from “not effective at all” to “extremely effective” in the second part of the questionnaire.

With regard to the post-questionnaire, only the second part of the pre-questionnaire remained with a new aim of investigating the effects of the intended materials adopted by the two groups of subjects in the study.

Qualitative research

Interviews and observations were used as the instruments in the qualitative research guided by the questionnaire. The qualitative methods were expected to provide more detailed information about students' actual use of the intended materials and their reflections on the use.

Data collection and analytical methods

The pre-questionnaire was distributed to sixty-one subjects by their English teachers in class at the start of the study while the post-questionnaire was sent to the subjects by the researcher as a tutor in the LAC at the end of the study. The questionnaire survey lasted about twenty minutes. All of the subjects gave responses to both surveys. Then, the raw data collected were analyzed by using SPSS.

For the purpose of answering the research questions, firstly, comparisons were first made between the results of the pre- and post- questionnaire surveys within each group. Specifically, a comparison of students' satisfaction levels with the effects of the traditional and intended materials was made within each group by Independent samples t-test to check whether the intended material was significantly more satisfying to students than the traditional in stimulating their overall strategy use. Besides, students' satisfaction levels with the effects of the traditional and intended materials on each strategy use were also compared within each group by Mann-Whitney U test to see whether there was an advantage of the intended material over the traditional.

Secondly, comparisons were made between the two participating groups according to the data collected from the post-questionnaire survey. That is, a comparison of students' satisfaction levels with the effects of the intended materials on their overall strategy use was drawn between the groups by Independent samples t-test to identify whether students were more satisfied with the learning system than the printed material. In addition, students' satisfaction levels with the effects of the intended materials on each strategy use were also compared between the groups by Mann-Whitney U test to judge if there was an advantage of the learning system over the printed material.

Regarding the interviews, six students were randomly selected from each participating group. Three students from the same group were invited to each half-hour interview. Thus, two interviews were held at a relatively late period of the study. In addition, the researcher as a tutor observed the subjects' learning in the LAC. The observation focused on how they carried out their self-directed vocabulary learning on the intended materials.

Results and Discussion

Comparisons within groups

- 1. Comparisons of students' satisfaction levels with the effects of the traditional and intended materials on overall strategy use*

The results of the comparisons of students' satisfaction levels within the two participating groups are displayed in Table 2. Firstly, the mean scores (4.55 and 5.20) show that students' satisfaction levels with the effect of the learning system on their overall strategy use in self-directed vocabulary learning were much higher than those with the effect of the traditional material. The Independent samples t-test shows the t-test value of -3.751 with 60 degrees of freedom meaning that the result was significant at the 1% level ($p=0.000<0.01$). In other words, satisfaction levels were significantly raised after students used the learning system.

Secondly, the mean scores (4.54 and 4.87) illustrate that students were more satisfied with the effect of the printed material on their overall strategy use in self-directed vocabulary learning than that of the traditional material. But the Independent samples t-test value of -1.967 with 58 degrees of freedom was insignificant at the default 5% level ($p=0.054>0.05$). This indicates that no detectable difference could be found between the two sets of satisfaction levels. That is, the satisfaction levels were not significantly improved after students adopted the printed material. The results might imply a probable advantage of the learning system over the printed material in stimulating students' overall strategy use, which will be further discussed in the following sections.

Table 2. Independent Samples T-test on Students' Satisfaction Levels with the Effects of the Traditional and Intended Materials on Overall Strategy Use

Group	N	Mean	SD	t	df	Sig. (2-tailed)
learning system _Pre	31	4.55	0.73	-3.751	60	0.000
learning system _Post	31	5.20	0.65			
printed material _Pre	30	4.54	0.68	-1.967	58	0.054
printed material _Post	30	4.87	0.63			

2. Comparisons of students' satisfaction levels with the effects of the traditional and intended materials on each strategy use

As for each strategy use shown in Figure 3, the satisfaction levels for most strategies were increased after students adopted the learning system. In particular, there were significant increases with eight strategies according to the Mann-Whitney U test results. In interviews, a student expressed his preference for the learning system as it provided immediate feedback with useful phonetic rules or tips to help him understand word pronunciation, which was

important to pronunciation accuracy. Also, students enjoyed reading the latest authentic articles indicating target words from popular online newspapers in the reading task. They appeared to be more interesting and motivating than older texts included the conventional textbook. However, the length of a few reading passages and the number of new words in some readings had to be controlled to avoid frustrating the students. Also, the dictation task was appreciated by students because it was considered to be convenient to complete a dictation by themselves. One interviewee also shared her idea that the guessing word meaning from either textual or prolific contexts left her with a deep impression of target words and their distinctive features while she hardly made such a guess in the traditional learning environment due to a lack of motivation. Furthermore, students said that the computer-mediated word test tasks were more favorable than those in the traditional material because the feedback with language hints or keys was offered in real time to students. Through observation it was noticed that the tasks requiring students to ask teachers or peers for new word knowledge and using new words in authentic interactions at the electronic forum effectively elicited students' word discovery and production along with less anxiety.

* The difference is significant at the 0.05 level.

Figure 3. Mann-Whitney U Test on Students' Satisfaction Levels with the Effects of the Traditional Material and the Learning System on Each Strategy Use

In addition, as presented in Figure 4, the satisfaction levels for most strategies were raised after students employed the printed material. Particularly, significant increases applied to three strategies based on the Mann-Whitney U test results. In interviews, students claimed that the dictation task encouraged them to perform it because they would not have thought of doing dictation by themselves if it had not been indicated. Besides, students agreed that the tasks requiring them to guess word meanings from either textual or prolific contexts were beneficial to their vocabulary learning for the depth of processing and elaboration of new words. They were hardly motivated to do so in the traditional learning environment. From above, despite some merits of the printed material, the advantage of the learning system in stimulating students' each strategy use seemed to be made salient.

* The difference is significant at the 0.05 level.

Figure 4. Mann-Whitney U test on Students' Satisfaction Levels with the Effects of the Traditional Material and the Printed Material on Each Strategy Use

Comparisons between groups

1. Comparison of students' satisfaction levels with the effects of the intended materials on overall strategy use

The results of the comparison between the satisfaction levels of the two participating groups are listed in Table 3. The mean scores (5.20 and 4.87) indicated that the students

adopting the learning system were most satisfied with their overall strategy use in self-directed vocabulary learning than those utilizing the printed material. However, this could not pinpoint exactly if there was a detectable difference between the satisfaction levels of the two groups. The Independent samples t-test result showed a significantly large difference between them. The t-test value of 2.023 with 59 degrees of freedom was significant at the 5% level ($p=0.048<0.05$). It strongly rejected the null hypothesis that there was no detectable difference between the satisfaction levels of the two groups. In other words, computer applications as the only factor differentiating between the learning system and the printed material had a significant effect on enhancing students' overall strategy use.

Table 3. Independent Samples T-test on Students' Satisfaction Levels with the Effects of the Intended Materials on Overall Strategy Use

Group	N	Mean	SD	t	df	Sig. (2-tailed)
learning system	31	5.20	0.65	2.023	59	0.048
printed material	30	4.87	0.63			

2. Comparison of students' satisfaction levels with the effects of the intended materials on each strategy use

After the comparisons of the satisfaction levels with the effects of the intended materials on overall strategy use between the two groups above, the comparison of students' satisfaction levels with the effects of the materials on each strategy use was drawn. As demonstrated in Figure 5, the satisfaction levels of the students using the learning system ranked higher with twenty strategies than those of the students working on the printed material, though no detectable differences between those satisfaction levels were found from the Mann-Whitney U test results. The encouraging results were mostly attributed to the computer applications in the learning system, which existed as the only difference between the two materials. Therefore, as seen from the ranking results for each strategy use between the two groups, the students studying on the learning system were more satisfied with the utilization of vocabulary learning strategies than those on the printed material.

Figure 5. Mann-Whitney U Test on Students' Satisfaction Levels with the Effects of the Intended Materials on Each Strategy Use

Conclusions

From the comparisons within the two participating groups based on the data collected from the pre- and post- questionnaire surveys in the study, it was revealed that students' adoption of the learning system could significantly better stimulate their overall strategy use in self-directed vocabulary learning than that of the traditional material, and the insignificant result shown with the printed material provided some evidence for the advantage of the learning system over it. It was also discovered that there were advantages of both intended materials over the traditional material in stimulating each strategy use.

In addition, the comparisons between the two participating groups according to the data collected from the post-questionnaire survey demonstrated that students' adoption of the learning system with computer applications could significantly better enhance their overall strategy use in self-directed vocabulary learning than that of the corresponding printed material. In short, CALL-based self-directed vocabulary learning could significantly improve students' strategy use, thereby enhancing their self-directed vocabulary learning.

With regard to the limitations of this study, self-report data might be taken into account because the retrospective reporting has long been considered disputatious in psycholinguistic research. However, it has been confirmed that the survey results in this study are consistent with those obtained through the comparisons of the subjects' performance in

word test after they use the learning system and the printed material respectively (Wu, 2015). Therefore, the validity of the self-report results obtained from this study is reinforced. In the further study, it is expected to analyze the reasons why students are much more satisfied with the CALL-based self-directed vocabulary learning from the perspective of SLA theories.

Notes on the contributor

Jing Wu is an associate professor in the College of Foreign Languages and Literatures at Fudan University in China. Her research interests include computer-assisted language learning (CALL), EFL learning and teaching, vocabulary acquisition and self-directed learning.

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Appendix

Questionnaire Survey on Self-directed English Vocabulary Learning

I. Personal information

* Sex: ☐ Male ☐ Female

* Department: _____

* English score in College Entrance Examination: _____

* Have you ever used any electronic tools (including electronic dictionaries and software) to learn vocabulary?

☐ Yes (please specify) _____ ☐ No

II. Effect of the current self-directed vocabulary learning material

Question 1: In the current self-directed vocabulary learning, do you use the following vocabulary learning strategies?

☐ a. No (No need to answer the second question) ☐ b. Yes (Please go ahead)

Question 2: Does the current self-directed vocabulary learning material help you utilize the following strategies effectively?

Not effective at all ← ☐1—☐2—☐3—☐4—☐5—☐6—☐7→ extremely effective

1. Recall words that belong to the same domain as a new word before learning it.
2. Learn pronunciation of a new word.
3. Learn word formation and etymology of a new word.
4. Group words that sound alike or that are formed in similar ways to a new word.
5. Read as much as possible.
6. Dictation.
7. Learn part of speech of a new word.
8. Look up dictionaries to find out meanings and family members of a new word.
9. Learn word chunks of a new word, including collocational patterns and idioms.
10. Make up grammatical sentences by using a new word.
11. Make flash cards.
12. Guess meaning of a new word from textual contexts.
13. Imagine pictures or even watch videos related to a new word.
14. Use semantic mappings to associate a new word with its related words, such as synonyms, antonyms and hyponyms.
15. Make use of the loci method.
16. Use semantic grids to guess meaning of a new word.
17. Ask teachers or peers for new word knowledge such as L1 translation, paraphrase, synonyms or sentences the word occurs in.
18. Make use of the keyword method.
19. Make use of word scales.
20. Guess meaning of a new word from prolific contexts.
21. Connect a new word with personal experiences.
22. Use word test.
23. Discover meaning of a new word through group activities.
24. Use a new word in speech or writing.
25. Take notes about a new word.