

## REEXAMINING THE EFFECTIVENESS OF VOCABULARY LEARNING VIA MOBILE PHONES

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### ABSTRACT

The purpose of this study is to reexamine the effectiveness of vocabulary learning via mobile phones. Students (N=78) from two intact classes of sophomores at a Chinese university were assigned to two groups: the SMS group (the experimental group) and the paper group (the control group). Then, they were administered a pretest to identify the level of their prior vocabulary knowledge. The results revealed that there was no significant difference ( $p > .05$ ) between the SMS group (Mean=33.34, SD=14.30) and the paper group (Mean=37.13, SD=15.21). Next, they were put into two intervention conditions. The SMS group studied a selected list of vocabulary via mobile phone SMS text messages while the paper group worked on the same list of vocabulary through paper material in a self-regulated manner. Results showed that there was a significant difference ( $p < .05$ ) in the posttests but not in the delayed tests ( $p > .05$ ) between the two groups. The study concludes that vocabulary learning through these two methods is effective in their own way and that a blended approach to vocabulary learning may better help increase the effectiveness from the perspective of sustained retention rates. Finally, the limitations of this study and suggestions for future studies are discussed.

**Keywords:** vocabulary learning; mobile phones; short text messages; mobile learning

### 1. INTRODUCTION

Vocabulary learning is crucially important for foreign or second language learners' fluent communicative ability. As Wilkins (1972) put it, "without grammar very little can be conveyed, without vocabulary nothing at all can be conveyed" (p. 111). Harmer (1994) also echoed, "[I]f language structures make up the skeleton of language, then it is vocabulary that provides the vital organs and the flesh" (p. 153). Increasingly, attention to vocabulary has been an integral part of the learning process for foreign language learners. This is particularly true for Chinese English language learners, who view vocabulary learning as the most important part of their linguistic competence enhancement (Gui, 2006). It has become a phenomenon that vocabulary books or software applications can easily become one of the bestsellers in China as almost every student has a copy of a vocabulary book and they usually spend considerable time each day on intentional English vocabulary learning within their four academic years in college and beyond, in the hope that they can speed up the pace of their vocabulary development.

Generally speaking, vocabulary learning can be categorized into two kinds: intentional and incidental. Intentional vocabulary learning refers to "any activity aiming at committing lexical information to memory" (Robinson, 2001, 271). It involves "invest[ing] the necessary mental effort and memoriz[ing] the words until [learners] know their meanings" (Koren, 1999, p. 2). This is in contrast to incidental vocabulary learning, which refers to vocabulary learning as "a byproduct of something else" (Gass & Selinker, 2001, p. 379) such as reading a passage for comprehension, listening to news for local, national or international events, etc. Even though there have been louder voices acclaiming the effectiveness of incidental vocabulary learning (Chen, 2006; Coady, 1997; Krashen, 1989; Nagy, 1997; Nation, 1990), discordant voices have also been heard (Estes & DaPolito, 1967; Horst, Cobb, & Meara, 1998; Hulstijn, 1992; Hulstijn, Hollande, & Greidanus, 1996; Koren, 1999).

For example, Koren (1999) points out that "incidental vocabulary learning is not particularly efficient, as shown by the literature. Therefore, intentional learning should rather be encouraged" (p. 15). In an experimental study of the effectiveness of incidental and intentional vocabulary learning, Hulstijn (1992) found that the intentional learning group outperformed the incidental group. His findings are also supported by Mondria and Wit-de Boer (1991). Barcroft (2009)

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conducted a recent experimental study of intentional vocabulary learning in terms of the relationship between strategy use and vocabulary learning performance and concluded that students can learn better when using a mnemonic technique and L2-picture association than L2-L1 translation and repetition. When discussing the effectiveness of Chinese learners' intentional and incidental vocabulary learning, Zhao (2007) posited that intentional learning should be encouraged to help increase the vocabulary of non-English-major students who usually have a relatively smaller vocabulary. He also argued that the effectiveness of intentional learning can be enhanced when it is complemented with incidental learning.

Over the past few years, studies of vocabulary learning in second/foreign languages can be roughly divided into two kinds: vocabulary learning with technology and without technology. Quantitatively, the second category is by far the most numerous (e.g., Bloom & Shuell, 1981; Carter, 1987; Cohen, 1987; Crow, 1986; Fraser, 1999; Gass, 1988; Harmon & Hedrick, 2005; Hulstijn, Hollander, & Greidanus, 1996; Holley, 1973; Jenkins, Stein, & Wysocki, 1984; Judd, 1978; Kasper, 1993; Kempe, Brooks, & Christman, 2009; Kojic-Sabo & Lightbown, 1999; Laufer, 2009; Laufer & Girsai, 2008; Laufer & Hulstijn, 2001; Min, 2008; Nation, 2001; Papagno, 1991; Parry, 1991; Prince, 1996; Read, 2004; Singleton, 1997; Sonbul & Schmitt, 2009; Tinkham, 1997; Tseng, Dörnyei, & Schmitt, 2006; Tseng & Schmitt, 2008; Waring & Nation, 2004; Webb, 2007, 2008). These researchers address the issue of vocabulary learning more from the perspective of mnemonic devices, learning strategies, the impact of reading, the role of context, as well as syntactic and thematic analysis.

Notwithstanding, technology-based studies, more specifically the studies of vocabulary learning with computer-mediated communications (CMC) technologies, are well represented (e.g., Al-Seghayer, 2001; Chun & Plass, 1996; Cobb, 1999; Grace, 1998; Groot, 2000; Horst, Cobb, & Nicolae, 2005; Hulstijn, 2000; Jones, 2003, 2006; Jones & Plass, 2003; Koren, 1999; Luk & Ng, 1998; Loucky, 2003; Nakata, 2008; Okuyama, 2007; Svenconis & Kerst, 1994; Tsoua, Wang, & Li, 2002; Yeh & Wang, 2003; Yoshii & Flaitz, 2002). These studies have revealed a number of encouraging results, which demonstrate that vocabulary learning with computers can be more effective than through the use of traditional learning methods (Tsoua, Wang, & Li, 2002), or traditional tools such as dictionaries (Luk & Ng, 1998) and vocabulary lists (Nakata, 2008), just to name a few.

Compared to CMC, only a handful of studies have investigated in any depth the pedagogical use of mobile phones for vocabulary learning (e.g., Cavus & Ibrahim, 2009; Levy & Kennedy, 2005; Kennedy & Levy, 2008; Lu, 2008; Song, 2008; Stockwell, 2007; Stockwell, 2010; Thornton & Houser, 2001; Thornton & Houser, 2005). Vocabulary learning with mobile phones allows learners to be exposed to spaced repetition of vocabulary items, which is believed to be more effective than massed repetition (Nation, 2001), as in the case of traditional book-based self-regulated vocabulary learning. Such findings have been proven by Bloom and Shuell's empirical study (1981) of two groups of students (N=56) in learning French vocabulary words. The students were randomly assigned to two treatment situations: the experimental group with distributed (spaced) practice and the control group with massed practice. The posttest results did not show a significant difference between the two groups, but the results of the delayed test four days after the experiment revealed that the group with spaced practice performed significantly better than the group with massed practice. It is posited that this difference stems from the fact that the experimental group had the opportunity of "practicing [both] the vocabulary words themselves ... [and] their recall from long-term memory" (Bloom & Shuell, 1981, p. 247) while the control group could "only have the opportunity to recall information from short-term memory during learning" (p. 247).

However, such findings are contradicted by Lu's (2008) findings when mobile phone usage is involved. In her experimental study, students (N=30) were assigned to two intentional vocabulary learning conditions. In one condition, there were 15 students who used mobile phones for spaced target vocabulary learning and another 15 students who utilized print material for massed learning of the same vocabulary words. Each group learned 14 words under one learning condition for one week, and then switched conditions and learned another 14 words the following week. The posttest results show that the mobile phone groups performed better than the paper groups in terms of vocabulary gains within such a one-week learning period. However, the delayed tests revealed that vocabulary gains remained the same across the two conditions.

The findings are to some extent in line with those of some of the recent studies of vocabulary learning with mobile phones. Thornton and Houser (2005) made a comparative study of the effectiveness of vocabulary learning through email and via mobile phones, revealing that the mobile phone group had achieved more vocabulary gains than both the email group and the group who used paper materials as a medium of vocabulary delivery. They concluded that this medium of mobile phones can "capture their interest, and pushing study opportunities at students via mobile e-mail is effective in helping them acquire new vocabulary" (p. 226).

Başoğlu and Akdemir (2010) conducted a comparative study of vocabulary learning with mobile phones and with paper flashcards. The experimental group used the vocabulary program on the phones to study the target words for six weeks in their extracurricular hours while the control group worked on the same words on paper flashcards during the same

time span. Their findings reveal that “vocabulary learning programs running on mobile phones improved students’ acquisition of English vocabulary more than traditional vocabulary learning tool, flash cards” (p. 6).

Song’s (2008) investigation also lends support to the findings of the previous studies. Song conducted a pilot study of the hybrid use of SMS and the web in vocabulary learning. She found that this mobile technology can help “marginally” improve the participants’ vocabulary learning performance. Her findings were echoed by Cavus and Ibrahim’s (2009) experimental study, revealing that spaced vocabulary learning with mobile phones was effective in terms of helping learners to learn the target English words.

Such effectiveness may be due to the affordances of this technology such as “immediacy in receiving the learning content, flexibility and portability of learning in time and place and very low cost” (Song, 2008, p. 95). Song argued that the use of this mobile technology can motivate learners to learn as well as remind them to work on the required learning tasks. Li (2009) joined Song in arguing that flexibility and motivation afforded by this technology enable learners to learn anywhere and anytime as well as to be more engaged in working on new vocabulary. Levy and Kennedy (2005) also found that this way of learning is beneficial to vocabulary learning in terms of “the impact educationally may reach far beyond the initial message, especially with the more motivated students” (p. 81), for it enables learners to learn beyond the linguistic form. Likewise, Cavus and Ibrahim (2009) concurred that students “expressed their satisfaction and enjoyment of learning away from the classroom with the help of their mobile phones” (p. 88).

Mobile phone technology has the potential to increase learners’ efficiency, especially in situations where self-regulated learners lack the ability to learn well in an autonomous manner (Zhang & Song, 2009). One of the plausible explanations of the above phenomena stems from Channell’s (1988) theory on learners’ active role in the process of vocabulary acquisition. In particular, she maintained that “[l]earners should be encouraged to make their own lexical associations [between a learner’s first and second language knowledge] when they are actively learning new vocabulary. (However, at present we do not know which kind of associations are the most useful in aiding retention)” (p. 94). When they are actively engaged in making conscious links, learners tend to give their focal attention to both form and meaning, which is believed to give rise to language acquisition (Kormos, 2006; Schmidt, 2001).

A second explanation, which is in line with Channell’s conceptual framework on the active role of the learner, is based on the noticing hypothesis proposed by Schmidt (1990). According to this hypothesis, noticing, which is “the subjective manifestation of attention, and further, that attention is the necessary and sufficient condition for storage in memory” (Alanen, 1995, p. 259), can facilitate input to be processed in short-term memory and to be converted to intake. Schmidt (2001) argued that “noticing requires of the learner a conscious apprehension and awareness of input” (p. 26). It is a necessary condition for language learning to occur and “the first step leading to a deeper information processing” (Pavičić Takač, 2008, p. 75). When they have opportunities to expose themselves to a higher frequency of target words, learners are better able to notice them and have a higher likelihood of integrating them into their developing interlanguage system.

Although most studies have identified the potential and effectiveness of the use of mobile phones in vocabulary learning, less encouraging results have been reported by Stockwell (2007, 2010). The results of both of his studies showed that vocabulary learning via mobile phones was not more advantageous than through desktop computers. No consistent differences were identified in terms of learners’ performance in vocabulary learning with the two technologies. Moreover, in his most recent study, Stockwell (2010) found that contrary to previous studies (e.g., Başoğlu & Akdemir, 2010; Cavus & Ibrahim, 2009; Levy & Kennedy, 2005; Kennedy & Levy, 2008; Lu, 2008; Mconatha, Praul, & Lynch, 2008) learners and teachers were reluctant to adopt mobile phones for vocabulary learning. This may be due to the costs of the hardware, preference for familiar and proven computer technology, and the shortcomings of the mobile device such as a small key pad and display screen, which result in “a higher cognitive burden” (Stockwell, 2007, p. 380). Nevertheless, he is optimistic about the role of mobile phones in language learning and teaching.

Although previous studies are commendable, two critical parameters merit further investigation. First, existing studies are region-specific and were undertaken outside of mainland China. In such a scenario, learner characteristics may be different, which, accordingly, may result in differences in the performance of learning. Second, previous studies are seriously limited by small sample size, a short learning cycle, as well as small target vocabulary size. In order to address these issues, this study explores the effectiveness of vocabulary learning with mobile technologies from a Chinese students’ perspective. More specifically, it seeks to reexamine whether the use of mobile phone SMS can better enhance students’ English vocabulary learning than the traditional use of print material. This study raises the following research questions:

- (1) Is vocabulary learning via mobile phone SMS more effective than the traditional way of learning through the paper medium?

- (2) What are the advantages and disadvantages of vocabulary learning via SMS?
- (3) How do learners use mobile phones for vocabulary learning?
- (4) What are the implications for pedagogical practice?

This study is of significance for three reasons. The results could give rise to a wider effective pedagogical deployment of mobile technologies in language learning, which may again bring forth more in-depth studies of the use of technology in the development of the four language skills. In addition, they can also inform technology-based language program designers and language learning software developers by catering for the needs of language learners. Moreover, they can contribute to the current body of literature relevant to the use of mobile technologies in language education.

## 2. METHODOLOGY

### 2.1. Subjects.

Two intact classes of students (N=78) participated in a quasi-experimental study. The students were all self-motivated to improve their vocabulary due to the fact that they all had to take the nationally recognized College English Test (CET), which is normally a pre-requisite for virtually any bachelor's degree program in China. They were from one of China's key universities located in a metropolitan city in North China. The two classes, in which there were 40 (Class A) and 38 (Class B) students respectively, were placed in two treatment scenarios when they embarked on vocabulary learning. Specifically, students in Class A (the experimental group) studied the same vocabulary items in a different manner, namely, with mobile phone SMS text messages and those in Class B (the control group) worked on a given list of vocabulary on paper material. Due to the failure in submitting one or two tests during the experimental period, only 32 students in Class A (M=5, F=26) and 30 students (M=4, F=26,) in Class B had full records of the test results, which were included in later data analysis. The age of the students from Classes A and B ranged from 18 to 21 years old (Mean=19.69, SD=.64) and from 19 to 22 years old (Mean=20.13, SD=.86), respectively.

### 2.2. Implementation

#### 2.2.1. A TOEFL vocabulary test

The purpose of this test was to determine the subjects' current state of vocabulary knowledge before experiments were launched. In order to identify students' initial vocabulary level, a vocabulary section of a TOEFL test was employed. The section was composed of 30 multiple-choice items, in which a vocabulary word was underlined in a statement and test takers were asked to choose the word in the four choices that had the same meaning as the one underlined in the statement. The results of the test served to identify whether there were any differences in students' initial vocabulary level between the two groups.

#### 2.2.2. Post-intervention vocabulary test

The purpose of the tests was to determine whether the subjects had the same level of vocabulary before an intervention was made, whether vocabulary learning would improve after the intervention was implemented, and whether the subjects had any differences in the level of the target vocabulary after a short period when the intervention was carried out. The vocabulary items originated from the above-mentioned TOEFL vocabulary test. The words (N=130) were extracted from the TOEFL test items the students were expected to learn. This vocabulary list covered pronunciation (indicated in phonetic transcription), part of speech, Chinese translation, and sentence examples containing the word. These were delivered to the subjects of the two groups for learning through two different kinds of media, namely paper material and SMS text messages. Of the total vocabulary, 100 were randomly chosen for testing by placing all the vocabulary in a list numbered through the use of Microsoft Excel function

#### 2.2.3. Written report

Within a one-week period after the posttest was completed, the subjects in the experimental group were asked to make comments on their learning experience in terms of how learning could be better enhanced. The written report covered eight open-ended questions, ranging from effective use of mobile phones for vocabulary learning to its advantages and disadvantages. It was submitted through a learning system after completion.

### 2.3. Procedures

Two different treatments were given to the two groups in terms of learning 130 words with mobile phones in the experimental group (Class A) and a list of the same words with paper material in the control group (Class B). The list of vocabulary was delivered to the experimental group via SMS, five items at a time on a daily basis, through Fetion, a free messaging software application provided by China Mobile. Bulk messages could be delivered to a group of maximally 32 people at one time, just enough to accommodate the experimental group. In contrast, the vocabulary words were made available to the control group through a face-to-face distribution of the entire list of 130 vocabulary items on sheets of paper at the beginning of the study. Members of the control group determined for themselves the number of words to learn each day, as they would with a vocabulary book in a traditional real-life way of self-regulated vocabulary learning outside of the classroom setting.

For the experimental group, mobile phone numbers were first collected from the subjects with their oral consent. Based

on the subjects' preferred times of message delivery gathered prior to the start of this experiment, an SMS message consisting of 5 vocabulary items was sent out on a regular basis twice a day, one during the lunch break at 12 pm and the other during the dinner break at 5:30 pm. Such message delivery lasted 26 days from April 2 to 27, 2009. The group took the posttest at the end of the experiment on April 28.

As indicated previously, the entire 130 item vocabulary list printed on sheets of paper was distributed face-to-face to the control group after it had completed the same TOFEL test and the pretest as the experimental group. This took place the day after the experimental group received its first SMS vocabulary messages due to the fact that the control group had a different class schedule from the experimental group. The control group was instructed to memorize all the vocabulary items on a daily basis in a self-regulated manner within the same period of time as the experimental group. Similarly, a posttest was administered to them one day after the experiment was completed because the group started to work on the list of vocabulary items one day later after vocabulary items were delivered to the experimental group.

Next, both groups were given a delayed test in the fifth week but on a different day (the experimental group on Thursday while the control group on Friday) although the delay for each group remained the same. The test was administered face-to-face and test papers were collected within the given half-an-hour period.

The subjects in the experimental group were also asked to submit a written report on their experiences of vocabulary learning with mobile phones through a learning system within a one-week period. 25 subjects submitted their report, which was used as qualitative data for later analysis.

Preliminary analyses of the results of these tests were performed and the results of any subjects who had failed to show up during the testing period or failed to submit the test papers were excluded from the data. An alpha level of .05 was used for all statistical analyses.

### 3. RESULTS

#### 3.1 Level of vocabulary knowledge before and after treatments

Table 1 shows the vocabulary scores of the two groups before and after the treatments were implemented. As indicated above, in the pretests before the treatment, the CG had higher scores than the EG. When the difference between the two groups was measured by a two-tailed independent-samples T test, there remained no significant difference in the vocabulary level of the two groups ( $t(60)=-1.01, p>.05$ ), as was also evidenced by the TOFEL test. After the treatment, which lasted three weeks, the results of the posttests revealed that the EG did better than the CG. A two-tailed independent-samples T test confirmed that there existed a significant difference in the test results between the two groups ( $t(60)=2.45, p<.05$ ). In the delayed tests, the EG had a higher retention rate than the CG. However, a two-tailed independent-samples T test ( $t(60)=.47, p>.05$ ) indicated that there was no significant difference in their performance five weeks after the treatment.

Table 1: Performance of the two groups before and after treatments

Tests	EG		CG	
	Mean	SD	Mean	SD
Pretest	33.34	14.30	37.13	15.21
Posttest	88.41	12.00	79.70	15.87
Delayed Test	66.44	20.74	64.23	15.81

EG=Experimental Group; CG=Control Group

To summarize, the two groups evidenced no significant difference in terms of their level of vocabulary size before the treatment was carried out. After the treatment, there was a significant difference between the two groups in terms of their vocabulary gains, revealing that the EG had learned more effectively than the CG. However, the delayed test indicated no significant difference in vocabulary retention rates.

### 4. DISCUSSION

#### 4.1 Effectiveness of vocabulary learning via mobile phone SMS

Vocabulary learning involves memorizing the sound, written form, and meaning of a word as well as having the ability to retrieve the three from memory. The quality of such retrieval, from the cognitive perspective, largely depends on the effective use of short-term and long-term memory. Short-term memory (STM), which is also called, working memory, refers to “representations that are currently being used or have recently used and last for a short duration” (Proctor & Vu, 2003, p. 43). It is characterized by its limited capacity, in which received input stays transiently and slips away unconsciously. Conversely, long-term memory (LTM) refers to “representations that can be remembered for durations longer than can be attributed to STM. LTM can involve information presented minutes ago or years ago” (p. 44).

In vocabulary learning, the ultimate goal of learners is to enable newly acquired vocabulary to be not only kept in LTM but also stored in it in terms of effective retrieval of a lexical item for active use. However, newly learned vocabulary items are usually stored in STM and very few words can be transferred into LTM directly without “multiple encounters with a lexical item, cognitive depth, affective depth, personalization, imaging, use of mnemonics and conscious attention that is necessary to remember a lexical item” (Pavičić Takač, 2008, p. 10). As Wang and Thomas (1992) found, rote learning or memorizing vocabulary through rote learning is more effective than imagery-based instruction. In order to remember vocabulary long-term, reinforcement in terms of frequent review, strong self-motivation and active associations is needed to help smooth the process (Bornstein, n.d.).

The findings of the current study echo those of the study conducted by Lu (2008), showing that short-term spaced vocabulary learning via mobile phones can be more effective than massed vocabulary learning through the paper medium. This may be due to the students’ easy access to the mobile device, which results in their repeated exposures to and frequent practice of the vocabulary items in a spaced manner on a daily basis. Such a learning approach is conducive to enhanced vocabulary learning (Byrnes & Wasik, 2009; Waring & Nation, 2004). This view has also been reported by the learners.

Currently I had myself more exposed to the words that I had to memorize than I had done before. Everyday when I was on my way to the canteen in the mornings and to the classroom, as well as on my way back to the dormitory, I always read and memorized the words via my mobile phone. This improved frequency of exposure has led to enhanced vocabulary learning fairly naturally. (200905101745)

However, such newly learned words are only tenuously acquired. As these words are just temporarily held in working memory, they have not become part of the learners’ linguistic system. When learners do not give themselves repeated exposures to the words, they can be easily dropped from working memory. Only when they are integrated into long-term memory, can they be “firmly attached to a network of words, ideas, and concepts that the brain can access easily” (Wolfe & Nevills, 2004, p. 128). Since the words are temporarily existent in short-term memory, problems of effective retrieval of the words surface over a longer period time when the learners do not access the words regularly. That may illustrate why the delayed tests fail to show greater effectiveness of vocabulary learning with mobile phones. Some of the learners noted this problem as follows:

The primary challenge, in my eye[s], is [whether] we could learn the words instantly and persistently. If we can keep learning words this way everyday and make it a habit, we can gain a lot. If we leave today’s words to tomorrow, all the efforts may be in vain. (200905094710)

One of the problems [of learning with mobile phones] is that the words that have been remembered can slip away quickly. Also, I often got myself confused with some of the English words and their Chinese translations. This is really annoying for me. (200905072156)

#### 4.2. Advantages of vocabulary learning via mobile phones

This effectiveness may be achieved due to various advantages. Firstly, learning vocabulary with a mobile phone can allow learners to take advantage of fragmented time. Chinese learners usually try to accomplish two goals in vocabulary learning. One is to recognize the words they have learned so that they are able to pass the required tests, without turning the words into part of their linguistic system. These words are usually referred to as passive words, which may not be used effectively by learners but can be recognized in terms of their meanings. The other is to recognize and use the words they have acquired. Learners are capable of using them not only in doing tests but also in their everyday communication. Generally, the words that can be recognized only are low in retention rates while those that can be both recognized and used are high. Learners are able to learn the targeted words anytime and anywhere. Such an advantage of mobile learning has been acknowledged by dozens of subjects in their written report.

Reading words from text messages is really a time killer during meals, and it helped us make full use of fragmented time. On the other hand, it feels like a memo reminds us of learning English and studying vocabulary. For me, the former is the most significant advantage. That’s because I happen to have the habit of reading i-news on my mobile phone. And remembering words on the phone fulfills me more with my meals. (200905065932)

I think it's helpful for learning English. It’s an effective way to learn more vocabulary. Perhaps we don’t have the habit to bring the vocabulary book with us wherever we go, but we carry a cell phone with us all the time. We can use the short spare time when we are riding the subway or in the queue..... (200905071529)

I think it is a good way because I bring my mobile phone almost everywhere and at any time.

Sometimes I don't have things to do, such as when traveling in the subway, I can read the vocabulary many times and to remember them. In a word, it can help me to make use of leisure time to learn vocabulary. (200905091522)

So, too, it makes vocabulary learning more convenient. Mobile phones have become a necessity for Chinese students. Over the years, they have developed a habit of reading mobile newspapers and short stories on the phone, which are delivered by SMS. Likewise, they can also learn vocabulary more conveniently. The following are the comments made by some of the students:

The first advantage for vocabulary learning via mobile phones is convenience. The second is convenience and the third is still convenience. (200905045443)

[There are two advantages:] Convenience: the words can [be] kept in my cell phone so that I could recite them no matter where [and when]. Recommendation: it can remind me of reciting new words. (200905091955)

I think it is a really good method and a good idea to enlarge my vocabulary. For one reason, it is convenient. I don't need to take the heavy vocabulary book. Using this method, I can recite English words everywhere and every time. For another reason, the message can remind me in case I forget reciting when there are too many things need to deal with. (200905091955)

Moreover, it enables learners to acquire vocabulary in a motivated manner. When vocabulary messages are received by the learners during lunch and dinner times regularly, they are reminded to give their attention to the words they are expected to work on. To some extent, message ring tones during this period of time became a reminder for them to concentrate on daily vocabulary tasks. This could give rise to a stimulating effect, which can result in helping them to form the habit of self-regulated learning.

It is useful and efficient. Yes, it is a good way because in this way we can learn vocabulary regularly and effectively. It urges us to learn English persistently. (200904306697)

I think it's a good way as the messages everyday will remind me that I need to memorize some words. You see, I always forget to do that if no one reminds me to do that. (200904274802)

This way of learning makes me spend more time on memorizing words. Besides, it can also help me to learn autonomously in the sense that I can make good use of the fragmented time to learn the words that I need in addition to what I have been expected to learn by the professor. (200905087259)

Furthermore, it becomes more efficient for a learner to memorize target words within a given period. As the students are exposed to the regular limited number of words each day, a huge learning task has been divided into multiple mini-tasks, which makes it psychologically less overwhelming to deal with learning tasks. One of the students made the following comment:

Increasing one's vocabulary is a long-term and challenging task to accomplish. However, when the vocabulary words are broken down into everyday mini-tasks, it is easy for me to deal with. (200905034832)

#### 4.3. Disadvantages of vocabulary learning with mobile phones

Although advantages of learning with mobile phones are apparent, there are also some disadvantages, which are embedded in the nature of the modern technology. First, unlike computer RAM, mobile phone memory is normally not large enough to store all the words received. Information storage for a learner becomes problematic, especially when vocabulary items are received beyond what can be stored in a phone's memory. When this problem arises, learners tend to delete some messages or some vocabulary items to save more space for incoming messages, including vocabulary messages. Even worse, dysfunction can occur when messages are stored beyond the memory capacity of the device. For some learners, phonetic symbols cannot be properly displayed on their phones. Learners with such phones have a negative experience with this type of learning, which affects their learning efficiency. Finally, long messages are delivered as segmented shorter ones. As with most mobile phone systems, there is a word limit in messages delivered by the Fetion messaging service. When words in a message exceed the limit, the system automatically segments the message into two or more separate mini-messages. Such mini-messages are not necessarily received in the correct sequence, which is both confusing and annoying. The following is one of the comments from the students' written reports:

Sometimes, a long message has been cut into multiple messages, which are sent separately but received not in the order of times. They look very messy. (200905045443)

From a pedagogical perspective, there are also a few weaknesses. First, messaging could be a source of annoyance and distraction. Students may feel distracted or disturbed when they are concentrating on their school work or other things that are unrelated to vocabulary learning. Unless a proper schedule has been set up with them and it has been closely followed, learning with mobile phones, especially via SMS, can be annoying, with messages coming from all sources, including friends' messages and others. A few students made such a comment:

I think learning vocabulary through instant messaging via the mobile phone is a new method. It's convenient and efficient. It encourages me to make full use of time. However, as I can get dozens of messages each day, including notices from my volunteer's union and the monitor of my class, as well as newspaper from the China Mobile and so on, sometimes I would be fed up with the instant messages. (200905107561)

Second, reviewing a particular learned word can be troublesome. It can be quite time consuming to locate previous messages, especially for students who receive dozens every day. In contrast, such a problem does not exist in learning with the paper medium. Some of the students make the following comment:

It's not convenient to find out the vocabulary messages among tens and tens of short messages. Besides, there [is] always something wrong with the words shown on the phone. (200905107561)

When messages are large in number, it is difficult to review the words in early messages. (200905071765)

Third, words learned solely with a mobile phone cannot be remembered long. Successful learning with mobile phones involves multiple learning strategies. When students embark on vocabulary learning with a mobile phone, some of them choose to rely on the medium only while others resort to other media for assistance. When students adopt the first method, they tend to memorize words by interacting with the screen, which involves merely superficial cognitive processing. Such mnemonic strategies end up failing to transfer learned words into long-term memory because effective vocabulary learning involves not only multiple encounters with a lexical item but also active retrieval (Pavičić Takač, 2008).

When students take the second learning approach, they tend to use mobile phones as a supplementary tool for vocabulary learning. In other words, they do not rely on the tool but seek to use other resources for the facilitation of their learning. One of the most frequently used methods is copying the easy-to-forget words on a sheet of paper. When they have sufficient time, they read, write, and use the target words. When they don't have much time, they tend to repeat what the students do in the first method.

Whenever I received the words, I copied them on a small book. Then, I memorized them with different methods. In this way, I could keep all those words in the book. When there was no space left in the book, I could delete those I had known. For me, this combined way of learning was most effective. (200905051898)

In my opinion, I think reading words on the [screen] is far from enough. I personally vote for writing down the words on a dedicated notebook which [could] keep record of all the words I have received. What's more, it's a good way to go over the vocabulary I've learned before. (200905065932)

I copied the words in the messages in a book. After I read a word, I wrote it a few times. This could help strengthen my memory of the word. (200905072156)

#### 4.4. Implications for pedagogical practices

Vocabulary learning with mobile phones is a novel way of transforming language learning with technology. It allows learners to take advantage of emerging technologies to enhance their learning efficiency. However, owing to the constraints of the technology, several issues need to be considered in relation to the pedagogical use of such a technology. First, mobile phones can only be used as a complement of traditional vocabulary learning such as use of vocabulary books and dictionaries, as well as context-based vocabulary learning. There is no denying that learning with mobile phones can bring convenience and that such a technology can allow learning to take place anywhere and anytime. Nevertheless, the innate weaknesses of SMS technology reduce the possibilities of its effective application in learning, especially in terms of lack of multiple ways of interaction between a learner and the technology.

Second, delivery schedules should be worked out together with students. As students have different learning schedules and habits, unexpected messaging could be disturbing and distracting, which may also be discouraging instead of motivating in learning.



Third, there may be a conflict between teachers' work schedules and vocabulary delivery schedules. This can be problematic especially when students prefer to have a delivery schedule that conflicts with teachers' teaching schedule. Before this instructional method is adopted, teachers need to plan ahead to avoid such troublesome conflicts or think of other technologies that could support timed message delivery.

Fourth, intended messages may not be received by students. The success of instant vocabulary delivery is crucially important for learners because they expect it to happen and are psychologically ready for the messages. However, the quality of message delivery depends on numerous factors. What's more, no message delivery technology is perfect and no technology is always reliable in general. Intended messages may eventually end up missing in the delivery process. This requires that teachers inform their students of such unexpected happenings and make them responsive to them. Nevertheless, countermeasures should be taken well in advance.

Finally, a blended approach to vocabulary learning may be more effective. As is revealed from this study, short messaging technology can effectively facilitate vocabulary learning on the strength of the technology's advantages, especially when students are able to be more frequently exposed to target vocabulary words in intentional learning. However, the disadvantages of the technology have minimized the long-term effects, resulting in no significant difference between the two learning approaches. Students' reports have demonstrated that both approaches have their innate advantages and disadvantages. When a blend of the two approaches is adopted, the novel approach may complement traditional approaches to offset their respective weakness. However, before this proposed blended approach can be realized, the question of how the effectiveness of each can be augmented needs to be addressed. This is a subject for further testing and research.

## 5. CONCLUSIONS

This study has made several findings. First, students can learn vocabulary more effectively short-term via mobile phones than with paper material, but the effectiveness can be only achieved through repeated exposures, which is also supported by Lu's (2008) findings. When exposures become less frequent, retention rates decline to such an extent that there is no significant difference identified between the two approaches. Second, both learning approaches have their own advantages and disadvantages. A blended approach to vocabulary learning may help increase the effectiveness from the perspective of sustained retention rates. Third, even though mobile phone technology can play a crucially important role in vocabulary learning, effective learning may occur only when the weakness of the technology is counterbalanced by taking a blended learning approach.

In anchoring the findings of this study to the larger research literature, some of its limitations must be acknowledged, which may offer opportunities for further research. First, this study employs a quasi-experimental mixed approach and so inevitably involves uncontrolled environmental variables which could influence the findings. Second, the subjects were all from a non-Western educational background and largely limited to students of arts. Whether the same results would be obtained with students from other backgrounds majoring in other disciplines remains to be determined. Third, the fact that the experimental group had a fixed exposure schedule to the new vocabulary, whereas the control group did not, may have had as much influence on the outcome as the use of SMS itself. In order to unequivocally establish the influence of mobile phone technology on vocabulary learning, any future studies will need to better identify and control the frequency and duration of students' exposure to target vocabulary. Lastly, as they may impact upon learning effectiveness, effective methods and tools for relevant data collection need to be developed and their effects on learning performance also require further attention.

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