

## Spacing Effect on Korean Elementary EFL Students' Vocabulary Learning

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### ABSTRACT

This study investigates the effect of spaced input on Korean elementary school students' foreign language (L2) vocabulary acquisition with the purpose of making practical suggestions as to how distributed repetitions of new vocabulary items can be optimally incorporated into regular English classes within the mainstream school curriculum. Although there has been a volume of research supporting the positive effect of spaced repetitions on adult learning, few studies have been conducted with young L2 learners in the classroom setting. The present study thus addresses the question of to what extent Korean elementary school students can learn and retain words better if they encounter words on a spaced schedule. Using a quasi-experimental pre-, post-, delayed-test design, it further attempts to determine the long-term effect of the spaced learning. A total of 135 fourth grade students in six intact classrooms participated in two separate sessions of instruction. They learned new words with four classroom activities each in three different spacing conditions: four 10-minute periods with one activity each, two 20-minute periods with two activities each, and one 40-minute period with all four activities. The results from the two sessions both showed that there was no significant interaction between the three treatments and students' gains in vocabulary while all three groups performed significantly better on the immediate post- and delayed tests alike than on the pre-test. This finding indicates that spaced learning may not bring about a strong facilitative effect on young learners' L2 vocabulary acquisition and that there are possibly other intervening factors that modulate the effect to a larger extent on young learners than on adult learners.

**Key words:** spacing effect, distributed learning, Korean EFL learners, vocabulary learning

## **I. Introduction**

It has been reported that learners can remember information more efficiently when it is presented over smaller sessions than within one single session. This phenomenon is known as spacing effect, which is considered one of the robust findings in memory research (Dempster, 1996; Baddeley, 1990). A good number of studies have demonstrated that learning and retention rates in the spacing condition tend to increase substantially when compared to those in the non-spaced massed learning condition (e.g., Barick et al., 1993; Bloom & Shuell, 1981; Dempster, 1987; Miles & Kwon, 2008). For example, Kornell (2009) had participants learn twenty words in two different conditions. For one group of the participants, four sets of five cards were presented four times each. The other group was presented with all the twenty words four times in a row. It was revealed that the participants learned more new words in the former (i.e., spacing) condition. Nonetheless, many students seem to believe that massed learning is more effective than spaced learning (Salisbury & Klein, 1988). In the study of Kornell (2009), when participants were asked to predict their level of performance on a subsequent memory test, the majority of them responded that they would perform more proficiently if they had been assigned to the massed, rather than spacing, condition. According to Baddeley and Longman (1978), this misconception might arise because an item, when presented several times during a limited period, renders itself instantaneously look more familiar, hence easier to recall later, leading to an overestimation of one's memory ability.

Researchers in L2 vocabulary acquisition have discussed the findings of the effect and its possible applications for L2 learning (e.g., Nation, 2001; Takac, 2008). The benefit of spaced presentations may not appear at short retention intervals. Baddeley (1990) claims that people generally retain information better when instruction and review sessions are spaced at increasing intervals, as opposed to learning the information in one lengthy session. Previous studies have invariably affirmed that spaced input distribution has a positive effect on L2 vocabulary retention (Atkinson, 1972; Bharick, 1979; Bahrick & Phelps, 1987; Bahrick et al., 1993; Bloom & Shuell, 1981; Dempster, 1987; Miles & Kwon, 2008; Landauer & Bjork, 1978; Siegel & Misselt, 1984). For example, Bharick (1979) had students learn fifty English-Spanish word pairs in three conditions: zero interval reviews, one-day interval reviews, and 30-day interval reviews. The 30-day interval group resulted in 2.5 times the retention of the

zero interval group on the retrieval tests. Moreover, Thornbury (2002) suggested a list of factors crucial for transferring vocabulary knowledge to long-term memory, including multiple encounters with the words at space intervals. Schmidt (2000) also argues for the role of expanding rehearsal in vocabulary learning. As most forgetting occurs immediately after initial exposure to the word, repetition and review should take place almost immediately after studying a word for the first time, and it is more effective to study words regularly over several short sessions than to study them for one or two longer sessions (Nation, 2001; Pimsleur, 1967). In the study of Miles and Kwon (2008), long-term gains in the spaced distribution condition measured by a delayed post-test targeting both the receptive and productive knowledge of newly acquired vocabulary were up to three times greater than gains in the massed repetition condition.

Although the spacing effect has been well documented for adult learning, little research has been conducted with young learners in the EFL classroom where the teacher needs to follow the mainstream curriculum. The majority of English textbooks used in Korean elementary schools allot one class hour to vocabulary learning. The spacing effect can be viewed in three mutually overlapping dimensions: (1) input spacing (distribution of new vocabulary items), (2) review spacing (distribution of reviews of previously learned items), (3) task spacing (distribution of different tasks with new or learned items). The third dimension is selected for this research, proceeding from receptive to productive skills and from more controlled exercises to guided and communicative exercises.

## **II. Method**

The first experiment was conducted with three classes of fourth grade students ( $N = 60$ ) in an elementary school in Gwangju, Korea. One week earlier before the instruction began, a pre-test had been administered, revealing that the three classes had an equivalent level of vocabulary knowledge on average. Thirteen target vocabulary items were selected from the textbook: *run, sit, swim, touch, wash, soccer, basketball, baseball, badminton, bedroom, bathroom, kitchen, living room*. Each vocabulary lesson in the textbook consisted of four activities: (1) "Read and Do," where the form and meaning of the key words were presented, (2) "Exercise," where students read or listened

to the words, (3) "Listen and Write," where students further practiced listening and writing, and finally, (4) "Game," through which students had a chance to produce the words in meaningful interaction. In order to observe the effect of spaced learning, the researchers manipulated the number of activities students engaged in during one class session. Students in Group 1 had learned the vocabulary through four 10-minute sessions with one activity each, whereas Group 2 had done so for two 20-minute sessions with two activities each, and Group 3 for a single 40-minute session with four activities all at once. They had two hours of English class every week. This process was repeated as students had worked through three lessons in the textbook. All the test results were analyzed by SPSS 20.0.

Table 1. Experiment 1 Procedure

	Group 1	Group 2	Group 3
One week earlier		Pre-test	
Treatment (3 lessons)	Activity 1 (10 minutes)	Activities 1-2 (20 minutes)	
	Activity 2 (10 minutes)		
	Activity 3 (10 minutes)	Activities 3-4 (20 minutes)	Activities 1-4 (40 minutes)
	Activity 4 (10 minutes)		
		Immediate post-test	
5 weeks later		Delayed post-test 1	
10 weeks later		Delayed post-test 2	

### III. Results

A mixed between-within subjects ANOVA was conducted to assess the impact of three different learning conditions on participants' scores on the vocabulary test across four time periods.

Table 2. Experiment 1 Descriptive Statistics

Group	Pretest		Post-test		Delayed-test 1		Delayed-test 2	
	M	SD	M	SD	M	SD	M	SD
Group 1 (N = 20)	4.45	3.017	7.80	3.708	7.75	3.932	8.25	3.307
Group 2 (N = 18)	4.61	3.256	6.61	3.583	7.61	3.500	8.11	3.252
Group 3 (N = 22)	4.95	2.591	8.45	2.807	8.68	3.123	8.68	3.242

Note: The maximum score for each test is 13.

Figure 1. Experiment 1 Profile Plot

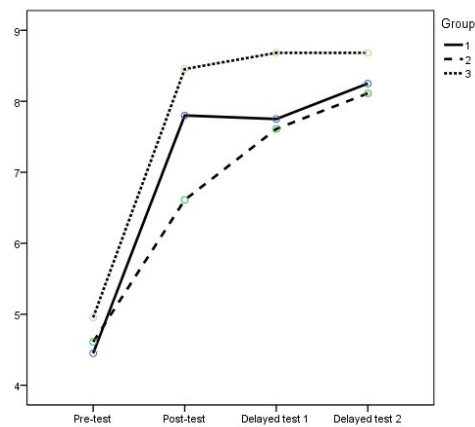


Table 3. Experiment 1 ANOVA Results

Source	SS	<i>df</i>	MS	<i>F</i>	<i>p</i>	Partial Eta Squared
Between						
Intercept	12234.868	1	12234.868	337.368	.000	.855
Group	38.406	2	19.203	.530	.592	.018
Error	2067.140	57	36.266			
Within						
Time	509.231	3	169.744	74.988	.000	.568
Time*Group	16.128	6	2.688	1.187	.315	.040
Error	387.076	171	2.264			

There was no significant interaction between time and group,  $F(6, 171) = 1.187, p = .315$ , partial eta squared = .04. There was a substantial main effect for time,  $F(3, 171) = 74.988, p = .000$ , partial eta squared = .568, with all three groups showing a gain in test scores across the four time periods. The main effect comparing the three groups was not significant,  $F(2, 57) = 19.203, p = .592$ , partial eta squared = .018, suggesting no difference in the effectiveness of the three spacing conditions. In other words, it indicates that scores on the post-tests were not significantly different between groups. These results did not validate the spacing effect; massed and distributed learning did not bring about any significant difference in young L2 learners' vocabulary acquisition.

This might have been because students were already familiar with the words in the textbook. This led the researchers to carry out a follow-up study with words that were not contained in the textbook. Ten new vocabulary items which students can't read and write the words in the vocabulary session were selected from the spoken dialogues of the lessons: *hungry, thirsty, late, forty, clock, snake, bicycle, bird, spider, balloon*. The follow-up study was conducted with two lessons in the same fashion as in the first experiment.

Table 4. Experiment 2 Descriptive Statistics

Group	Pretest		Post-test		Delayed-test	
	M	SD	M	SD	M	SD
Group 1 (N = 26)	4.15	2.880	5.62	2.815	5.31	3.185
Group 2 (N = 24)	3.92	2.185	5.92	2.339	5.17	2.496
Group 3 (N = 25)	3.32	2.495	4.60	2.255	4.40	2.198

Note: The maximum score for each test is 10.

Figure 2. Experiment 2 Profile Plot

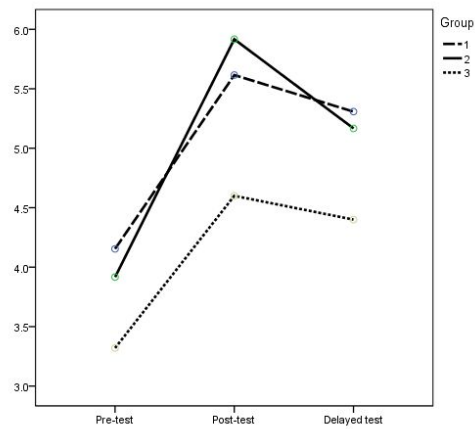


Table 5. Experiment 2 ANOVA Results

Source	SS	<i>df</i>	MS	<i>F</i>	<i>p</i>	Partial Eta Squared
Between						
Intercept	4987.724	1	4987.724	279.013	.000	.795
Group	41.127	2	20.563	1.150	.322	.031
Error	1287.095	72	17.876			
Within						
Time	100.451	2	50.226	52.250	.000	.421
Time*Group	3.783	4	.946	.984	.418	.027
Error	138.422	144	.961			

Again, there was no significant interaction between time and group,  $F(4, 144) = .946$ ,  $p = .418$ , partial eta squared = .027, while there was a substantial main effect for time,  $F(2, 144) = 52.250$ ,  $p = .000$ , partial eta squared = .421. The three groups were not significantly different in their performance on the three vocabulary tests,  $F(2, 72) = 1.150$ ,  $p = .322$ , partial eta squared = .031.

This finding indicates that spaced learning may not bring about a strong facilitative effect on young learners' L2 vocabulary acquisition. There appears to be other intervening factors that modulate the effect to a larger extent on young learners than on adult learners, which remains to be specified in future studies.

## REFERENCES

- Atkinson, R. (1972). Optimizing the learning of a second language vocabulary. *Journal of Experimental Psychology*, *96*, 124-129.
- Baddeley, A. D. (1990). *Human Memory: Theory and Practice*. Needham Heights, MA: Allyn and Bacon.
- Baddeley, A. D., & Longman, D. J. A. (1978). The influence of length and frequency on training sessions on the rate of learning to type. *Ergonomics*, *21*, 627-35.
- Bahrck, H. P. (1979). Maintenance of knowledge: Questions about memory we forgot to ask. *Journal of Experimental Psychology: General*, *108*, 296-308.
- Bahrck, H. P., & Phelps, E. (1987). Retention of Spanish vocabulary over 8 years. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *13*, 344-349.
- Barick, H. P., Bahrck, L. E., Bahrck, A. S., & Bahrck, P. O., (1993). Maintenance of foreign language vocabulary and the spacing effect. *Psychological Science*, *4*(5), 316-321.
- Bloom, K. F., & Shuell, T. J. (1981). Effects of massed and distributed practice on the learning and retention of second-language vocabulary. *Journal of Educational Research*, *74*, 245-248.
- Dempster, F. N. (1987) Effects of variable encoding and spaced presentations on vocabulary learning. *Journal of Educational Psychology*, *79*, 162-170.
- Dempster, F. N. (1996). Distributing and managing the conditions of encoding practice. In E. L. Bjork & R. A. Bjork (Eds.), *Memory* (pp. 318-339). London: Academic Press.
- Kornell, K. (2009). Optimizing learning using flashcards: Spacing is more effective than cramming. *Applied Cognitive Psychology*, *23*, 1297-1317.



- Landauer, T. K., & Bjork, R. A. (1978). Optimum rehearsal patterns and name learning. In M. Gruneberg, P. E. Morris & R. N. Sykes (Eds.), *Practical Aspects of Memory* (pp. 625-632). London: Academic Press.
- Miles, S., & Kwon, C. J. (2008). Benefits of using CALL vocabulary programs to provide systematic word recycling, *English Teaching*, 63(1), 199-216
- Nation, I. S. P. (2001). *Learning Vocabulary in Another Language*. Cambridge: Cambridge University Press.
- Pimsleur, P. (1967). A memory schedule. *Modern Language Journal*, 51(2), 73-75.
- Salisbury, D. F., & Klein, J. D. (1988). A comparison of a microcomputer progressive state drill and flashcards for learning paired associates. *Journal of Computer-Based Instruction*, 15, 136-143.
- Siegel, M. A., & Misselt, A. L. (1984). Adaptive feedback and review paradigm or computer-based drills. *Journal of Educational Psychology*, 76, 310-317.
- Takac, V. P. (2008). *Vocabulary Learning Strategies and Foreign Language Acquisition*. Bristol, UK: Multilingual Matters Limited.
- Thornbury, S. (2002). *How to Teach Vocabulary*. Harlow: Longman.
- Schmitt, N. (2000). *Vocabulary in Language Teaching*. Cambridge: Cambridge University Press.

## **BIODATA**

Lee Eulsoon has been teaching for 13 years as an elementary school teacher since 2001. She received an MA in 2006 from Gwagju National University of Education and she is taking a Ph.D. course in Chonnam University. She has been involved with teacher education programs as a teacher trainer. Her professional interests include lessons using storybooks and international classroom exchange program. Currently, she is working at Dongun elementary school. Email: [yesmygod@daum.net](mailto:yesmygod@daum.net)