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Original Research Article

Long-term Effects of Pictorial Cues, Spaced Retrieval, and Output-based Activities on Vocabulary Learning: The Case of Iranian Learners

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Abstract: Vocabulary learning is an indispensable part of language learning/acquisition. This study sought to examine the blended impact of word learning strategies namely pictorial cues, spaced repetition and output-based activities on word recall in the long run among Iranian EFL learners at high school level. To this end, 65 subjects from preexisting classes were conveniently selected and divided into experimental and control groups. The experimental group was exposed to the treatment for a whole academic year. To find the possible effect of the treatment on word recall, a one-way repeated measure ANOVA was run. The results of the statistical analyses showed that not only word learning improved from baseline to time 2 (posttest), but also the effect of the treatment was durable over time. Put it another way, in delayed posttest the means for the experimental subjects decreased but not significantly corroborating the effectiveness of these blended teaching techniques in the long run. The pedagogical implication of the current study is for teachers to implement these techniques in their classes to enhance word learning among their students. Additionally, material developers can also take benefit from the findings of this research in providing better materials.

Keywords: Output-based activity, pictures, spaced retrieval, vocabulary, word recall.

INTRODUCTION

The importance of vocabulary in learning an L2 cannot be called into question. Among scholars who have worked on vocabulary, Harmer (2001) sees it as the key organ and the flesh of the skeleton of the language. Besides, Mediha and Enisa (2014) are of the view that no message can be conveyed without vocabulary. Additionally, the way Wilkins (1972) sees it, in learning an L2, having a large vocabulary size is more important than grammar. Thus, acquiring new words is an indispensable part in mastering any second or foreign language (Schmitt, 2008).

Arguing for *picture superiority effect,* a number of researchers have shown that pictures are remembered and recalled easier and faster than their verbal counterparts (Paivio & Csapo, 1973; Paivio *et al*., 1968; Snodgrass *et al*., 1974). According to Paivio's (1971, 1976) *dual-coding theory*, as pictures are more probable to represent both visual and image codes in memory, they are recalled faster compared to words.

Another pedagogical technique which is consistently becoming more and more popular in academic setting is *spaced retrieval*. There is some agreement that strong impacts on learning can be resulted if learners repeatedly retrieve the knowledge (Roediger & Karpicke, 2006a, 2006b). In learning new vocabularies, most forgetting occurs at initial stages (Schmitt, 2000). To obviate this pitfall, Baddeley (1990) and Pimsleur (1967), proposing the principle of *expanding rehearsal*, suggest that learners should review new material soon after the

initial encounter and then at gradually increasing intervals.

In addition to what went before, output-based activities can also affect vocabulary learning. Input-oriented scholars (e.g., Krashen, 1982, 1983, 1985) believe that input alone suffices in learning an L2. Other L2 researchers, however, have argued otherwise and believe that input alone cannot result in acquiring an L2 (see for example, Swain 1995; Swain & Lapkin, 1995; Toth, 2006). According to the output hypothesis formulated by Swain (1995, 2000, 2005), output pushes learners from semantic processing to syntactic processing which she considers essential in L2 acquisition.

As English teachers, we almost always see that our students do not progress to our standards and they usually perform poorly in both quizzes and even high-stakes tests. Therefore, this current research is a pedagogical intervention aimed at facilitating vocabulary growth among EFL learners and thus it investigates the long-term impacts of pictorial cues, spaced retrieval, and output-based tasks on acquiring new words among Iranian EFL learners at senior high-school level. Furthermore, to the best of what the researchers know, up to the present time no researcher has ever attempted to investigate the combined effect of these techniques on vocabulary growth. It is for this research that we believe conducting a new research can fill the gap in the literature and see whether these techniques, if combined, can really enhance vocabulary learning among EFL students.

LITERATURE REVIEW

Visual aids as still pictures (Tuttle, 1975; Zarei & Gilanian, 2013) are regarded as a facilitating strategy and proved to be rich resources in helping learners' learning vocabulary of a foreign/second language. Underwood (1989) claimed that learners "remember images better than words" (p. 19). Oxford and Crookall (1990) also granted high primacy to this picture superiority effect and claimed that visual presentation of imagery make learning more efficient. Nassaji (2004) also acknowledged the effectiveness of visual presentation of images for second language vocabularies long-term retention and retrieval. A number of studies (Rahimi & Sahragard, 2008; Yanguas, 2009) have scrutinized the effects of utilizing pictures in second/foreign language vocabulary learning and suggested that visual presentation e.g., pictures, is highly effective strategy in terms of vocabularies' retention and retrieval.

In an attempt to see whether using pictures can facilitate vocabulary learning, Mansourzadeh (2014) compared two techniques in presenting vocabularies (i.e. presenting vocabularies through pictures vs. audio-visual aids) to Iranian EFL learners. Using a pretest posttest design, the researcher found out that the picture group outperformed the control group. He went on to conclude that:

1. By looking at the pictures, learners can understand difficult words
2. Learning vocabularies can be made more enjoyable if teachers use pictures when presenting words
3. Even in teaching structures and phonetic forms of the words, pictures can be exploited
4. If instructors use pictures, their class will be more enjoyable to learners
5. The use of pictures can arise curiosity in learners to attempt to learn additional words.

In another study, Andra *et al*., (2020) sought to explore the effectiveness of gestures and pictures on vocabulary memory. They investigated the probable effect of the mentioned techniques on 8-year-old primary school students' novel L2 acquisition. These researchers showed that both pictures and gestures enhanced vocabulary learning in their subjects. Furthermore, the effect was long lasting.

In addition to the above studies, Barani *et al*., (2010) wondered whether picture into picture audiovisual aids can promote vocabulary learning. In comparing the experimental group scores with that of the control group, these L2 researchers showed how the experimental group outperformed the control group substantiating the impact of pictures on L2 vocabulary enrichment.

Yet, in another study, Carpenter and Olson (2012) compared vocabulary learning from two perspectives: through pictures vs. through L1 to L2 translation. Their study suggested that words are better learned from pictures. They concluded that using pictures, foreign vocabulary learning and be enhanced as long as learners are not too confident in pictures' power to assist them in vocabulary learning.

Retrieval as one of the memory processes stands for the act of recalling information from memory (Wojcik, 2013; Gordon, 2020). Retrieval is an important process as it provides two forms of benefit to learning. The first is related to the synchronous promotion of effective encoding (Karpicke & Roediger, 2008; Grimaldi & Karpicke, 2012). The second benefit is related to boosting long-term retention in terms of the frequency and spacing of retrieval opportunities (Roediger & Karpicke, 2006). Spacing is an act of intervening

materials which occurs effortful, though short enough to prevent forgetting. This strategy resulted in long-term recall (Karpicke & Roediger, 2007).

Karpicke and Roediger (2006) worked on the effect of testing on multi-trial free recall. In their study, subjects learned lists of words across multiple study and test trials and took a final recall test. They found that repeated recall of previously recalled items enhanced retention by more than 100% relative to dropping those items from further testing. Thus, the key to long-term retention is repeated retrieval, they suggested.

In another study, Karpicke and Bauernschmidt (2011) sought to understand whether particular schedules of spaced retrieval (e.g., gradually expanding the interval between tests) produce the best learning. They should that repeated retrieval with long intervals between each test produced a 200% improvement in long-term retention relative to repeated retrieval with no spacing between tests. They went on the show that although expanding schedules afforded a pattern of increasing retrieval difficulty across repeated tests, this did not translate into gains in long-term retention. Repeated spaced retrieval had powerful effects on retention, but the relative schedule of repeated tests had no discernible impact.

Swain (1993) formulated the Output Hypothesis corresponding to Krashen's (1985) input hypothesis and defined output as "the act of producing language (speaking or writing) constitutes, under certain circumstances, part of the process of second language learning" (P. 471). Krashen (1981) believes that learners become fluent speakers and writers in a second language naturally after "building up sufficient competence through comprehending input and they must not be forced to produce language, while Output Hypothesis, proposed by Swain (1995) states that it is only through ways of language production (output) that second language acquisition may be more likely to occur and learners can realize the extent of their competence in language. Noticing, Hypothesis testing, and meta-linguistic reflection are the three major function of output which were posited (Swain, 2005). The ability of movement from semantic to syntactic processing is regarded as the key feature of output (Swain, 1995).

In comparing the effect of input-based and output-based activities on L2 vocabulary learning among intermediate EFL learners, Namaziandost and his associates (2019) disclosed that both input-based and output-based groups outperformed the control group in both posttest and delayed posttest. Notwithstanding, there was not a significant difference in vocabulary gains between the two experimental groups. Their study indicated that learners could both benefit from both input-informed and output-oriented activities in learning L2 vocabularies.

Kaivanpanah *et al*., (2020), in another investigation, attempted to explore the effect of input-based and output-based tasks with different and identical degrees of involvement loads on Iranian EFL learners' incidental vocabulary learning. Their study revealed that input- and output-based tasks with identical involvement loads had a positive significant effect on students' vocabulary learning and retention at both the post-test and the delayed post-test. Additionally, they showed that output-based tasks with higher involvement loads had a positive significant effect on students' vocabulary learning in both the post-test and delayed post-test while input-based tasks with higher involvement loads had no significant effect on students' vocabulary learning and retention at the post-test and delayed post-test.

As can be inferred from the literature, it is not quite clear whether these three techniques (namely, pictorial aids, spaced retrieval and output-based activities), if combined, in vocabulary instruction, can really promote L2 vocabulary. Therefore the following research question is raised.

Research Question

Can pictorial aids, spaced retrieval and output-based activities affect L2 learners' vocabulary gain?

METHODOLOGY

Participants and design

The subjects who took part in this study were 65 grade 10 senior high school students of a large school in Khuzestan, Iran among whom 33 subjects served as the experimental group and 32 subjects served as the control group. All the participants of the study had studied English for three years in junior high schools as a compulsory course of study. It is worth noting that because the classes were already existed, the subjects were selected through convenient sampling selection. In addition, because the subjects could not be randomly chosen, this study enjoyed a quasi-experimental design (Ary *et al*., 2019).

Instruments

In the current research, first of all to ensure that no subject know the words to be taught in advance, a pretest (i.e. a teacher-made test using the would-be taught words) were distributed to the subjects. As the experiment progressed and finished, a posttest (i.e. another teacher-made test again) was

used. After a three-week interval to see whether the effect of instruction was long-lasting, a delayed posttest (i.e. another instructor-made test) was administered. Taking insights from Fazilatfar and Kargar Behbahani (2016), our teacher-made tests had the same format but they were of different versions of the same kind of a test.

MATERIALS

In the present study, Vision 1 book published by the ministry of education of Iran was selected as the teaching material. Additionally, the treatment lasted a whole academic year. Teaching sessions were divided into some sections, one for pictorially presenting learners with the words they were supposed to learn, another sections for going back to the words already presented, and another sections for asking students to either write a composition or submit a summary of the lesson using the words they had studied.

Procedure

As mentioned above, the treatment phase of the study lasted a whole academic year. Teaching sessions were divided into several subparts. In the first lesson which dealt with a *Saving Nature* title, several words were pictorially presented to experimental learners (e.g. goat, wolf, cheetah, Earth, tiger, forest, destroy, etc.). In the next sessions, when students became familiar with the words, the instructor moved to another part of the lesson (i.e. Reading section) and the teacher had time to review the words taught to learners. When the reading section was finished, the students were required to write a summary of the text as their homework and bring their summaries to class next session. Additionally, when the whole lesson was finished, they were also required to submit a summary of the whole lesson using the words they had learned in the lesson. This circle continued for the next three lessons as well. Besides, it is worth mentioning that the control group were just taught the words using direct translation. Furthermore, no review of the previously taught words was done for them by the teacher. They were not also required to provide output using the instructed words.

RESULTS

As in the above-stated treatment the same subjects are tested more than twice on a single continuous variable, we can use a repeated measure design (Rezai, 2015). This design is often used in longitudinal studies where subjects are tested in different time intervals (Rezai, 2015). In the line chart provided below data can be inspected visually.

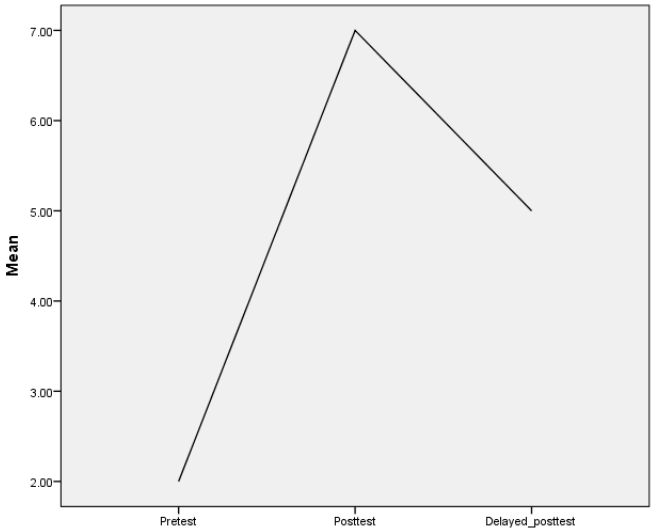

Figure 1: Line Chart for the Three Time Periods

As can be inferred from the above line chart, subjects went knowing almost nothing in time 1 (pretest) to knowing a lot in time 2 (immediate posttest), and then their means decreased a little in time 3 (delayed posttest), but not to an inordinate degree.

Table 1: Descriptive Statistics

	Mean	Std. Deviation	N
Pretest	2.8231	2.06804	65
Posttest	7.1077	3.90962	65
Delayed_posttest	5.8692	3.96003	65

As the above table reveals, subjects in both posttest and delayed posttest significantly improved their vocabulary.

Table 2: Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.667	62.957[b]	2.000	63.000	.000	.667
	Wilks' Lambda	.333	62.957[b]	2.000	63.000	.000	.667
	Hotelling's Trace	1.999	62.957[b]	2.000	63.000	.000	.667
	Roy's Largest Root	1.999	62.957[b]	2.000	63.000	.000	.667
a. Design: Intercept Within Subjects Design: Time							
b. Exact statistic							

Table 3: Pairwise Comparisons

Measure: MEASURE_1						
(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-4.285*	.398	.070	-5.264	-3.305
	3	-3.046*	.456	.070	-4.168	-1.925
2	1	4.285*	.398	.000	3.305	5.264
	3	1.238*	.268	.000	.579	1.898
3	1	3.046*	.456	.000	1.925	4.168
	2	-1.238*	.268	.000	-1.898	-.579
Based on estimated marginal means						
*. The mean difference is significant at the ,05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

All in all, a one-way repeated measure ANOVA was conducted to measure the combined effect of pictorial cues, spaced retrieval, and output-based activities on word recall among Iranian EFL Learners at senior high school level. The descriptive results (mean and standard deviation) are presented in table 1. There was also a significant effect for time, Wilks' Lambda = 0.333, F (2, 63) = 62.957, p = 0.001, multivariate eta squared = 0.667 indicating a large effect size. The pairwise comparison of the results showed that the vocabulary gain increased from time 1 to time 2 and from time 1 to time 3, but decreased from time 2 to time 3 although this decrease was not statistically significant as the p value exceeded that of 0.05.

DISCUSSION

Although a large body of research has been conducted to examine the effectiveness of pictures on vocabulary learning, the impact of spaced retrieval on memory and long-term retention, and also the effect of output on learning, no study has tried to explore the effect of these three techniques altogether. Therefore, this paper sought to examine to mixed effects of pictorial cues, spaced repetition, and output-based activities on word recall among Iranian EFL learners at high school level.

The results obtained from the current research showed that the above-mentioned techniques, if mixed, can ameliorate vocabulary learning. This finding is in line what Paivio's (1971, 1976) dual-coding theory which states that pictures are more probable to represent both visual and image codes in memory, they are recalled faster compared to words. This study also found some support for the effectiveness of pictures on vocabulary learning, of course combined with spaced repetition and output. Additionally, picture superiority effect states that pictures are remembered and recalled easier and faster than their verbal counterparts (Paivio & Csapo, 1973; Paivio *et al*., 1968; Snodgrass *et al*., 1974) which is again in line with the findings of the current study. In addition to these studies, the results of the current investigation are in line with those of Andra (2020), Barani *et al*., (2010), and Carpenter and Olson (2012) reported above.

Another purpose behind conducting this research was to find out whether spaced retrieval, if blended with other techniques, could improve word recall. The principle of expanding rehearsal proposes that learners should review new material soon after the initial encounter and then at gradually increasing intervals (Baddeley, 1990 & Pimsleur, 1967). This study also provided some evidence that spaced retrieval together with pictorial cues and output-oriented activities could be regarded as a safe word learning strategy whose effect is long-lasting. This finding is in line with that of Karpicke and Roediger (2006). However, as opposed to

Karpicke and Bauernschmidt (2011) who failed to show that the impacts of spaced repetition is long-lasting, this research found that spaced repetition could have a durable impact on word recall among Iranian EFL learners.

The last objective of the current exploration coped with the impact of output, combined with other techniques, on word recall. Output hypothesis put forward by Swain (1995) as a reaction to Krashen's (1982, 1983, 1985) input hypothesis, states that input alone is insufficient in language acquisition and it is output which pushes learners from semantic processing to syntactic processing posing a high emphasis on the impact of output on acquisition.

The findings of the current study showed that output-based activities blended with spaced retrieval and pictorial cues, not only help learners improve their word learning but that its effect is durable over time. This is in line with a large body of research specially those of Kaivanpanah *et al*., 2020; Swain 1995; Swain & Lapkin, 1995; Namaziandost *et al*., 2019; and Toth, 2006 reported above.

One of the implications of this study is that ESL/EFL teachers can implement all these techniques together in their classes because this study corroborated the effect of these techniques on word learning even in the long run. Students who were exposed to such kind of instruction reported to have enjoyed more. If implemented, these strategies could provide learners with more joyful activities and classes. Another implication of this study is for material developers. Taking insights from this study and other research conducted in the field, they can provide better materials and enhance learning among material users.

CONCLUSION

This study aimed at finding a panacea for EFL learners whose word learning strategies lags behind those of their native speaking peers. The findings of the study reported above should that pictorial cues, spaced repetition of the presented words, and output-based activities can enhance word learning among Iranian EFL learners altogether.

Despite the merits of the work, this study has some shortcomings to be discussed. This study neither examinee the mediating role of gender nor examined the role of age. The role of proficiency was not also taken into account. Additionally, the study did not take into account working memory capacity, field-dependence/field-independence. Hence, it is not clear whether learners with different features or learning style perform similarly or differently when taught through these techniques. Future studies could take into account these features and provide the EFL community with a better picture about the effect of these techniques on vocabulary learning.

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