The Effect of Pictorial Presentation of Vocabulary on EFL Learners' Retention

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Abstract

This study aimed at examining the effect of pictorial presentation of vocabulary on EFL students' retention relying on Dual Coding Theory and Additivity Hypothesis, both of which emphasize the additive effect of images on recall. To that end, 63 students who were in grade three of high school served as the participants of the study. They were randomly divided into three groups of still picture experimental, motion picture experimental, and control groups. During the eight sessions of treatment, 40 new words were taught to the three groups. The experimental groups received the words visually, using software, and the control group was instructed in traditional way. The participants were tested for their memory of the target items twice: immediately at the end of the course as a final exam (post-test) to assess their short-term memory and three weeks after the final exam to test their long-term retention. Data analysis using a mixed between-within subjects analysis of variance (split-plot ANOVA/SPANOVA) and a post hoc Scheffé test demonstrated the positive effect of pictorial presentation of vocabulary on the learners' retention of words. The results also revealed that teaching vocabulary using motion picture mode was more effective.

Keywords: Retention, Dual Coding Theory, Additivity Hypothesis, and Picture Superiority Effect

Introduction

Vocabulary learning is essential for acquiring a language (Folse, 2004). Having an extensive vocabulary is believed to help learners to outperform their competence (Nunan, 1999). Moreover, as teachers and researchers have come to understand the role of the lexicon in language learning and communication, the increased attention to vocabulary teaching has become more important (Hunt & Beglar, 2005).

The importance of vocabulary, therefore, has been known for scholars and teachers from the early times of language teaching. Schmitt (2008) stated that for both language teachers and learners, vocabulary is obviously a top priority. Levelt (1989, p. 181 as cited in Gass & Selinker, 2008) claimed that the lexicon is the driving force in sentence production and grammatical and phonological encodings are mediated by lexicon entries. Hunt and Beglar (2005) believe that the heart of language comprehension and use is the lexicon. Hoshino (2010) maintained that vocabulary is the basis of language; thus, we can never underestimate its importance in learning a target language. Godwin-Jones (2010) states that an essential element of language learning is store of words and expressions, a necessary component in all areas of communication. Wilkins (1974; as cited in Chen, 2009) emphasized that without grammar very little can by conveyed; without vocabulary nothing.

However students in the ESL/EFL classrooms have been found to have problems with vocabulary. When you want to say something in a second/foreign language, it is the words that you feel you struggle for rather than the grammar or pronunciation (Cook, 2001). The main problem is that most of the students forget the words they have learnt and they cannot recognize them whenever they come across; or at least they make errors both in perception and production i.e., they cannot recall the words. Politzer (1978, as cited in Chung, 2012) stated that of all error types, learners consider vocabulary errors the most serious which result in semantic interference. Moreover, native speakers find lexical errors to be more disruptive than grammatical errors (Gass & Selinker, 2008).

In SLA research to date, however, there has been much less attention paid to the lexicon than to other parts of language, although this picture is quickly changing (Gass & Selinker, 2008). One of the pressing questions almost all foreign language researchers and practitioners are interested in knowing the answers to is the optimal ways in learning words. One strategy which enjoys the support of an extensive literature is to rehearse verbal information in the contiguity of visual information. Visual aids have long been assumed to be beneficial to second or foreign language learning. Research reported in educational literature suggests that using pictures in teaching results in a greater degree of learning. Tuttle (1975) argued that foreign language students can benefit from many types of visual material e.g., still pictures are proved to be rich resources in the foreign language classrooms. The use of imagery representation of foreign words by actual objects or imagery was also claimed by Kellogg and Howe (1971; as cited in Zarei & Gilanian, 2013) to be facilitative to children's vocabulary learning in a foreign language. Underwood (1989) suggested that we "remember images better than words, hence we remember

words better if they are strongly associated with images" (p. 19). Oxford and Crookall (1990) acknowledged the effectiveness of visual imagery and maintained that visual images make learning more efficient and the pictorial-verbal combination involves many parts of the brain, thus providing greater cognitive power.

Most of the studies which have investigated the effects of using pictures in second language vocabulary learning suggest that, visual presentation of vocabulary is more effective for retention and retrieval. This picture superiority effect (PSE) means that pictures are better recognized and recalled than their labels (Paivio, Rogers, & Smythe, 1968, as cited in Oates & Reder, 2010). Some studies suggest that visual presentation is more effective for long-term retention and retrieval (Engle, Mobley & Linda, 1976; Dean, Yerkovich & Gray, 1988; Krisner, 1974, as cited in Nassaji, 2004).

Most linguistic theories place the lexicon in a central place, which also suggests its importance in language learning (Gass & Selinker, 2008).Among them are dual coding theory and Additivity Hypothesis.

Dual Coding Theory: According to the Dual Coding Theory, two different systems – a verbal and a nonverbal system exist for information storage in human memory. Information in a symbolic representation is stored in the verbal system, while nonverbal information is stored in the other system. Dual coding theory proposes that the way learners comprehend pictures differs greatly from that of comprehending textual information (Paivio, 1971, as cited in Nassaji, 2004). In other words, text is processed by the verbal cognitive subsystem, while a picture is processed by the non-verbal cognitive subsystem. The two systems are independent, but the point is that they allow for better recall if information is coded in both systems. It was hypothesized that when students are instructed via imagery interventions, they would demonstrate better mastery of the vocabulary than when presented with only the word, because including both a verbal context and imagery creates a highly effective combination for learning vocabulary (Sadoski, 2005).

Additivity hypothesis: Paivio (1975, as cited in Pichette, 2002) states that, a word accompanied by a picture of the concept, shows an additive effect on recall when compared to the recall of a word or picture alone. Oxford and Crookall (1990) believe in positive effects of visual images on L2 vocabulary learning stating that the pictorial-verbal combination involves many parts of the brain, thus providing greater cognitive power.

There are many reasons for using visual elements in language teaching and many memory theorists believe that pictures are better remembered than words on recognition tests (e.g., Anderson, 2009) because pictures or illustrations are analogs of experience and are only one step removed from actual events. According to Harmer (2001), visual things make the learning process easier. As a result, they are used by teachers for better learning. And, also according to Carney (2002), visual elements increase students learning because there is more concentration for them.

A number of studies have investigated the effects of using pictures in second/foreign language vocabulary learning (Rahimi & Sahragard, 2008; Diane

Pyle, 2009; Yanguas, 2009) and suggest that visual presentation is more effective for retention and retrieval. One of the early research available in literature is Paivio, Yuille, and Smythe, (1968, as cited in Iheanacho, 1997); and Paivio and Csapo (1969, as cited in Iheanacho, 1997). In these researches, different groups of participants were asked to memorize lists of words using the same words for which imagery ratings had been taken. Participants learned more high-imagery words than low-imagery words. The same results were reported by Schwartz and Reisberg (1991) in the impact of imagery on long-term remembering. Furthermore, a study conducted by Paivio (1971, as cited in Nassaji, 2004) revealed that when learners are instructed to use images to commit a list of words to memory, recall is facilitated dramatically.

Kellogg and Howe's (1971, as cited in Zarei & Gilanian, 2013) study compared written words with pictures as cues for oral acquisition of Spanish vocabulary by children. The pictures yielded faster learning of new words than the written stimuli and the effect was retained in the long-term memory by greater recall shown in pictures rather than other forms. The research done by Pishghadam, Khodadady, & KhoshSabk (2010) examined the effects of visual-intelligences-based and verbal-intelligences-based teaching of vocabularies on Iranian EFL students' vocabulary retention and production. Data analysis demonstrated that the students' retention of words in visual experimental group was enhanced by visual intelligence-based teaching of vocabularies, while verbal experimental group and control group did not. Studies on the effects of modality of presentation on human memory (Penney, 1989; Beaman, 2002; Bird & Williams, 2002;) have shown that visual presentation is more effective in retention and retrieval.

Some studies (Reid, 1996; Zimmerman, 1997) showed the effectiveness of motion pictures versus still pictures on vocabulary learning. The difference between them is that motion pictures create the illusion of movement which helps to explain abstract concepts (Rieber, 1994). In Iheanacho's (1997) study, students who learned through motion graphics performed significantly better on the recall tests than those who learned through still graphics. In Asoodeh's (1993) study participants who used animated visuals scored significantly higher than those who used static visuals. Arkan and Taraf (2010) examined the effectiveness of authentic animated cartoons in teaching English to young Turkish learners. The study compared the instruction effects based on traditional grammar and vocabulary teaching and the one on authentic animated cartoons pursuing the same purpose. Results pointed out to the experimental group's outperformance in learning target grammar points and vocabulary items.

Research questions

The overall objective of the study was to find out the answers to the following questions:

1. Does pictorial presentation of vocabulary have any effect on EFL learners' vocabulary retention?

2. Do modes of presentation differ in their effectiveness on vocabulary retention?

3. Does time have any effect on EFL learners' vocabulary retention?

4. Is there any interaction between time and modes of vocabulary presentation?

Methodology

Participants

The participants were 63 male students in high school in Ardabil. They were in grade three, ranging in age from 16 to 17 and had received six years of formal English instruction at school. They shared the same first language background, all being bilinguals in Azeri-Turkish and Persian. The participants were selected based on their English background knowledge. In order to do this, a group of 85 students were asked to complete a questionnaire. Then a selection test (proficiency) was executed in order to regard the homogeneity of the class in terms of their general English knowledge and to exclude the outliers. After the test, 63 students were selected as having the scores of 1 standard deviation far from the mean.

According to the questionnaire, none of the participants reported a history of auditory or eyesight problems at the time of the experiment. They reported that they had not engaged in activities involving language learning tasks. The researcher could be sure, therefore, that there was not any external learning effect other than the teaching program.

Materials

Forty words were chosen from the students' high school textbook (grade four/pre-university) about which the students had no information in advance according to the questionnaire and pre-test. For the control group, only the students' textbook was taught. For the experimental groups, the pictures of the words were provided, as well. The still pictures were digital and real pictures gathered from the Internet. The motion pictures were animated ones fitting to the objectives of the study and were designed as computer software including animated flash pictures. At the time of the experiment the students had studied nearly up to the end of their third grade high school textbook and they were going to start the fourth grade high school textbook after passing the third grade final examination. The material, therefore, was one step beyond the students' general English knowledge and suitable for the study.

Design

This study is within the framework of experimental design of research, namely, pretest-posttest equivalent groups design. There were three groups in the study, two experimental groups and one control group.

Procedure

1. The participants were randomly assigned to three groups of still picture experimental (n = 21), motion (animated) picture experimental (n = 21), and control groups (n = 21) to be instructed in three different classes by different modalities. Two days before starting the treatment, participants took the pre-test to ensure that the words were not familiar to the students in advance. So the 40 words mentioned were presented for the participants in the pre-test in the form of multiple-choice recognition items. The pre-test results displayed that the participants were homogeneous in terms of their information of the new words.

2. The classes were held twice a week in 45-minute sessions totally being eight treatment sessions. For the treatment groups, computer software was designed in which pictures were introduced in different time intervals on the screen and then the necessary practices were executed. For the control group, the same words were taught through reading sample sentences of the textbook explaining and giving the Persian equivalents. After teaching the material, activities were performed as the supplementary practice.

3. At the end of the project the post-test was administered immediately for all three groups to test their short-term retention – Immediate Recall Test (IRT). After three weeks, the post-test was administered unexpectedly for the three groups – Delayed Recall Test (DRT), to test their long-term retention. The 3-week time interval between the immediate and delayed post-tests was considered according to Ebbinghaus's (1964, as cited in Averell & Heathcote, 2011) forgetting curve. The post-test and pre-test were the same.
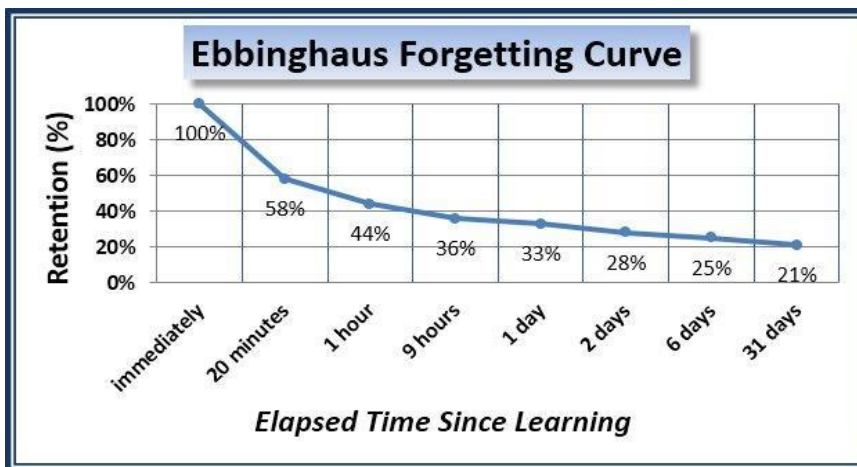

Figure 1: Ebbinghaus's (1964) forgetting curve

Results

Data analysis

Based on the requirements of the study – randomizations, pretesting, treatment, control group, and post-testing, an experimental design was chosen to gather the necessary information. A 0-1-point scale was used for scoring the multiple-choice tests where "0" represents no response or an incorrect choice and "1" represents a correct choice and a mixed between-within subjects analysis of variance (SPANOVA / split-plot ANOVA) was run to investigate the research hypotheses.

Before doing the analysis itself, the assumptions and prerequisites of the analysis were examined:

1) using the Kolmogorov-Smirnov Test and considering the significance level of .05 (p > .05), the normality of data distribution was established in immediate recall test (IRT) and delayed recall test (DRT) conditions in that the results were greater than .05;

2) the homogeneity of variances for each combination of the groups of the two factors i.e., the within-subjects factor and the between-subjects factor was proved using Levene's test of equality of error variances in that the values were above the significant level (p > .05);

3) the homogeneity of inter-correlations or the equality of the covariance was tested using Box's M statistic. Considering the alpha level of (p > .001), the statistic was not significant and the assumption had not been violated.

Descriptive statistics of the variables

Table 1 provides the descriptive statistics of IRT and DRT for the different presentation modes.

Table 1. Descriptive Statistics of Treatments and Control Groups with IRT and DRT

	Groups	Mean	Std. Deviation	N
IRT	Control	13.7600	2.72764	21
	Still	16.5200	3.09731	21
	Motion	18.4400	2.91662	21
	Total	16.2400	3.46738	63
DRT	Control	8.5600	2.00167	21
	Still	10.7200	2.37206	21
	Motion	12.4800	2.14321	21
	Total	10.5867	2.68677	63

Discussion

Before going over the details of the data analysis, it would be beneficial to clarify that the term "retention", here, refers to both short-term and long-term retention in that it was tested immediately and similarly after three weeks of teaching the material. The data were analyzed in terms of: 1) the effect of three modes of presentations on short-term and long-term memory; and 2) the interaction effect between the two while the level for statistical significance was set at .05 for all the analyses.

In assessing the main effect considering the tests of between-subjects effects in terms of the presentation modes –RQ 1, as table 2 displays, the null hypothesis was rejected (P < .05) claiming that the difference in retention of vocabulary between the control and experimental groups was statistically significant (p = .00). So we come to the conclusion that pictorial presentation of vocabulary positively influences EFL learners' vocabulary retention.

Table 2. Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	25268.627	1	25268.627	2098.571	.000	.906
Groups	451.453	2	229.727	17.297	.000	.312
Error	914.920	72	12.860			

To identify the exact locations of the differences in the means of the groups – RQ 2, the result of the post hoc Scheffé test was analyzed (table 3). In multiple comparisons of the means, the mean difference between all the groups is significant at the .05 level, i.e., p < .05. So our hypothesis that motion pictorial presentation of vocabulary affects differently on vocabulary retention than still pictorial presentation, was statistically supported.

Table 3. Multiple Comparisons of Groups by Scheffé test

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Control	Still	-2.4600[*]	.71722	.004	-4.2527	-.6673
	Motion	-4.3000[*]	.71722	.000	-6.0927	-2.5073
Still	Control	2.4600[*]	.71722	.004	.6673	4.2527
	Motion	-1.8400[*]	.71722	.043	-3.6327	-.0473
Motion	Control	4.3000[*]	.71722	.000	2.5073	6.0927
	Still	1.8400[*]	.71722	.043	.0473	3.6327

In assessing the main effect considering the tests of within-subjects effects in terms of time – RQ 3, as shown in table 4, the null hypothesis was rejected (P < .05) claiming that the effect of time on retention of vocabulary was statistically significant (p = .00) with the effect size of 0.97 while F = 3029.933. It means that retention of words in short-term memory is more than their retention in long-term memory.

In analyzing the interaction effects of the groups and the kind of memory on vocabulary retention – RQ 4, an interaction was found between the presentation mode and short-term and long-term memory of words, meaning that the impact of one variable is influenced by the level of the second variable and there is the same change in scores over time for the three different groups. Based on the findings, the Wilk's Lambda result in table 4 is statistically significant for time*groups (p = .009) i.e., p < .05. The groups and short-term and long-term memory, therefore, influence vocabulary retention with the effect size of .124, while F = 5.073.

Table 4. Multivariate Tests of Interaction Effects

| Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.977	3029.933[a]	1.000	72.000	.000	.977
	Wilks' Lambda	.023	3029.933[a]	1.000	72.000	.000	.977
	Hotelling's Trace	42.082	3029.933[a]	1.000	72.000	.000	.977
	Roy's Largest Root	42.082	3029.933[a]	1.000	72.000	.000	.977
Time * Groups	Pillai's Trace	.124	5.073[a]	2.000	72.000	.009	.124
	Wilks' Lambda	.876	5.073[a]	2.000	72.000	.009	.124
	Hotelling's Trace	.141	5.073[a]	2.000	72.000	.009	.124
	Roy's Largest Root	.141	5.073[a]	2.000	72.000	.009	.124
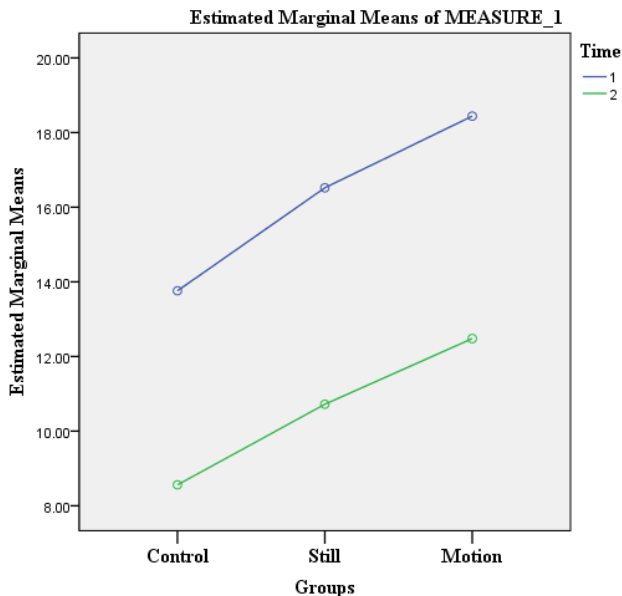
Figure 2: The effect of retention and presentation modes in remembering the words

Finally, the analysis of within-subjects (interaction effect) and between-subjects data of multiple comparisons showed that still pictorial vocabularies were better recalled than control group vocabularies (p = .004) and motion pictorial vocabularies were better recalled than still pictorial ones (p = .043). In general, based on estimated marginal means, as figure 1 shows, motion pictures have more effects on word retention in short-term and long-term memory and its effect is the highest point in short-term memory. It is also clear that the function of short-term memory in all the groups is higher than the long-term memory.

Conclusions

It is important to note that the results of the study suggest that presenting vocabulary in different pictorial modes has tremendous positive effects on short-term and long-term retention. The noticeable finding of the present study is the effect of motion pictures on retention while both of the experimental groups had the equal opportunity of training and practice in terms of time. This is in line with Al-Seghayer (2001) who argued that the video builds a better mental image. Furthermore, motion pictorial media in animated form has an advantage to real videos. Therefore, they are highly useful in language classrooms. Considering the importance of vocabulary on the four macro-skills, and in relation to the present study, it is recommended that the authors of educational general English textbooks have a closer look at learners' vocabulary power importance and include suitable

pictures in their books and present multimedia software along with the textbook to improve the learners' vocabulary learning and understanding of the situation in dialogues and reading comprehension texts. The future research in the domain also could be carried out with the students in different levels, ages, nationalities, and gender regarding individual differences of participants in their ability to recall and also differences of vocabulary items in their potentiality to be recalled.

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