Visual Mnemonic Technique: An Effective Learning Strategy[1]

Técnica Mnemotécnica Visual: Una Estrategia Efectiva de Aprendizaje.

**Parisa Farrokh, Hengameh Vaezi
and Hamed Ghadimi[2]***

Islamic Azad University, Iran

Abstract

This study was designed to investigate the impact of visual mnemonic technique on young and adult Iranian English learners' vocabulary learning. The current study followed a quasi-experimental design. 48 female students were selected based on their performance on the Quick Placement Test. The participants were divided into four groups, two experimental and two control groups. Prior to the treatment, the participants of both groups were given a pre-test to determine the knowledge of vocabulary. Then, the experimental groups received the visual mnemonic technique for 8 sessions. The control groups went through a traditional method of teaching vocabulary. After 8 sessions, a post-test was administered to all groups. Two-way ANOVA between groups was run to the results of the vocabulary tests. The results exhibited that the experimental groups who received instruction on mnemonic technique outperformed their counterparts in post-test of vocabulary. However, the differences between the effects of mnemonic technique for young and adult learners who received the specific treatment were not statistically significant (P≥ .05).

Keywords: Adult Language Learners; English Learning; Images; Learning Strategy; Mnemonic Techniques; Visual Mnemonic Technique; Vocabulary Learning

Resumen

Este estudio se diseñó para investigar el impacto de la técnica mnemotécnica visual en el aprendizaje de vocabulario de los estudiantes de inglés iraníes jóvenes y adultos. El presente estudio siguió un diseño cuasi experimental. 48 estudiantes femeninas se seleccionaron basado en su desempeño en la Prueba Rápida de Nivel. Las participantes se dividieron en cuatro grupos, dos experimentales y dos de control. Previo al tratamiento, a las participantes de ambos grupos se les dio una prueba previa para determinar su conocimiento de vocabulario. Luego, los grupos experimentales recibieron la técnica mnemotécnica visual por 8 sesiones. Los grupos de control pasaron por un método tradicional de enseñanza de vocabulario. Después de 8 sesiones, se administró una posprueba. Se realizó un ANOVA bidireccional entre grupos con los resultados de las pruebas de vocabulario. Los resultados mostraron que los grupos experimentales que recibieron instrucción sobre la técnica mnemotécnica superaron a sus contrapartes en la prueba posterior de vocabulario. No obstante, las diferencias entre los efectos de la técnica mnemotécnica para aprendices jóvenes y adultos que recibieron el tratamiento específico no fueron estadísticamente significativas (P≥.05)

Palabras clave: aprendices adultos de lengua; aprendizaje de inglés; imágenes; estrategia de aprendizaje; técnica mnemotécnica; técnica mnemotécnica visual; aprendizaje de vocabulario.

Resumo

Este estudo foi desenhado para investigar o impacto da técnica mnemotécnica visual no aprendizado de vocabulário dos estudantes de inglês iranianos jovens e adultos. O presente estudo seguiu um desenho quase experimental. 48 estudantes femininas selecionaram-se baseado em seu desempenho na Prova Rápida de Nível. As participantes foram divididas em quatro grupos, dois experimentais e dois de controle. Prévio ao tratamento, às participantes de ambos grupos lhes foi dada uma prova prévia para determinar seu conhecimento de vocabulário. Depois, os grupos experimentais receberam a técnica mnemotécnica visual por 8 sessões. Os grupos de controle passaram por um método tradicional de ensino de vocabulário. Depois de 8 sessões, administrou-se uma post-prova. Realizou-se um ANOVA bidirecional entre grupos com os resultados das provas de vocabulário. Os resultados mostraram que os grupos experimentais que receberam instrução sobre a técnica mnemotécnica superaram a suas contrapartes na prova posterior de vocabulário. Porém, as diferenças entre os efeitos da técnica mnemotécnica para aprendizes jovens e adultos que receberam o tratamento específico não foram estatisticamente significativas (P≥.05)

Palavras chave: aprendizes adultos de língua; aprendizado de inglês; imagens; estratégia de aprendizado; técnica mnemotécnica; técnica mnemotécnica visual; aprendizado de vocabulário

Introduction

Vocabulary is regarded as the most important element to language and is of great significance to language learners. Theorists and researchers in the field contend that lexical competence plays a principal role in second or foreign language learning. Virtually, without vocabulary, it is very difficult, if not impossible, to engage in meaningful interaction with others. Lewis (2005) stated that "vocabulary and lexical units are at the heart of learning and communication. No amount of grammatical or other type of linguistic knowledge can be employed in communication or discourse without the mediation of vocabulary" (p. xi). Sinclair (1988) believes that a lexical mistake often causes misunderstanding, while a grammar mistake rarely does. According to Nation (2001), vocabulary forms the biggest part of the meaning of any language, and vocabulary is the biggest problem for most learners.

In addition, students are exposed to a lot of new vocabulary during lessons: by the teacher, by texts or other materials they work with. On the other hand, in order to be a successful language learner, it is important to have a good memory to learn and keep the vocabularies in the memory. There are a number of ways which can improve the function of our memory. The mnemonic techniques are suggested in the field of language learning as a tool to remember vocabulary (Raugh & Atkinson, 2001).

Mnemonic is a device, procedure, or operation that is used to improve memory and anyone can use to cue the brain to remember important facts. Mnemonic devices are not used for comprehension, rather for facts and making lists of events that are relevant to an individual's life (Butler, 2007).

The mnemonic techniques can have significant uses for both teaching and learning. The aim of using the mnemonic techniques is to make learners both learn and remember effectively and to keep the information in their long-term memory. Also, these techniques can lead to having active and eager learners in classes (Thompson, 2014). There are different classifications of mnemonic devices. Thompson (1987), for example, arranges mnemonic strategies into five classes; linguistic, spatial, visual, physical response, and verbal methods. Oxford (1990), on the other hand, identifies four major strategies namely, creating mental linkages, applying images and sounds, reviewing well, and employing action. While Baddeley (1999) believes that mnemonic devices are classified into visual imagery strategies and verbal strategies.

Considering language learning conditions in Iran, in which learners usually define, memorize word lists with their relevant synonyms / antonyms or use translation techniques, there appears a need for students to be presented with some non-verbal techniques of vocabulary teaching to be better able to learn, retain and recall vocabulary. Therefore, this study aims to investigate the effect of visual mnemonic technique on recalling the English language vocabularies among young and adult Iranian learners based on Thompson's classification.

The following research questions were formulated for the present study:

RQ1. Do mnemonic techniques have any statistically significant effect on young and adult Iranian EFL learners' vocabulary learning?

RQ2. Is there any significant difference between the final achievement of young and adult learners who learned the target language vocabulary through the mnemonic techniques?

The following null hypotheses were suggested:

H01: mnemonic techniques do not have any statistically significant effect on young and adult Iranian EFL learners' vocabulary learning.

H02: There is not any significant difference between the final achievement of young and adult learners who learned the target language vocabularies through the mnemonic techniques.

Literature Review

Psychologists, linguists, and language teachers have been interested in vocabulary learning strategies for a long time (Levenston, 1979). Scientists advocated that memory techniques are considered as 'powerful mental tools' for language learners to cope with vocabulary mastering difficulties, due to the fact they make getting to know easier, faster, more enjoyable, more self–directed, more effective, and more transferable to new situations (Bakken,2017; Gu & Johnson, 1996).

In fact, memory has a key effect on eventual vocabulary and grammar achievement. There are two basic types of memory: short-term memory and long-term memory. Short-term memory keeps the information which is being processed (a new word which is encountered for the first time). It is fast but it can hold information for a very short time due to its small storage capacity. Long-term memory, on the other hand, has an unlimited storage capacity but is relatively slow.

The aim of vocabulary learning and teaching is to transfer the lexical information from the short-term memory to the long-term memory. Therefore, mnemonics is a memory enhancing instructional strategy that involves teaching students to link new information taught to information they already know (Schmitt, 2000). Because, if material is presented in a way which fits in or relates meaningfully to what is already known, then it will be retained for relatively long periods and thus retrieval through verbal or visual clues becomes quite easy.

For vocabulary learning, mnemonic techniques are used to relate the word to some previously learnt information, using some form of imagery or grouping. Since mnemonics are techniques or devices, either verbal or visual in nature, that serve to improve the storage of new information, and the recall of information contained in memory, have been proven to be extremely effective in helping people remember things (Amiryousefi & Ketabi, 2011; Mastropieri & Scruggs, 1989; Solso, 1995).

According to Levin (1993), "Mnemonic devices are proved to be effective in all ages. They are, however, more useful for low level students because they are involved mostly in activities requiring them to remember and recall information" (Levin, 1993, p. 235). According to Pressley, Samuel, & Hershey (2002), the mnemonic technique refers to a strategy that relates the pronunciation of a word to the one that the learners already know in their mother tongue or the target language. They then make an image to help language learners to remember the association. Actually, mnemonic instruction is one way that teachers can help students learn to cue their brains to recall facts and other information. This instruction includes multiple strategies such as rhyming, visual representations and placement, songs, poems, and anything that personally relates to a student and his or her personal life. These strategies could be effective for students struggling to remember information taught.

Wright (1999) mentioned that language learners consider these techniques helpful specially for learning the vocabularies which are difficult to remember since the mnemonic techniques obviously connect the new information with something else that you already are familiar with or know and can be easily remembered. Meanwhile, non-verbal memory storage is more stable than verbal over intervals of hours to days. Similarly, Gians and Redman (2001) asserted that objects and pictures can facilitate recall. They further stated that images provide direct retrieval paths back to the language. Therefore, non-verbal mnemonic devices like images can be effective for vocabulary development.

Wu and Chang (2005) revealed that the mnemonic techniques were the essential medium for learning and gaining knowledge of vocabulary and also supported that teaching students' memory strategies would promote elementary school students' English vocabulary learning. Atay and Ozbulgan (2007) investigated the effects of memory strategy instruction along with learning through context on the ESP vocabulary recall of Turkish EFL learners. The study showed that verbal mnemonic strategies were more effective than non-verbal. In this respect, Hatch and Brown (1995) argued that non-verbal mnemonic devices like images are helpful for children rather than adult learners.

Ashouri and Moghadam (2015) attempted to find out the effectiveness of visual mnemonic devices. They applied both imagery and pictures to aid the learners memorize and recall the vocabularies with delayed time intervals. The result demonstrated that learners' delayed recognition of second language vocabulary was not influenced by

the passage of time, therefore, words learned via visual mnemonics instruction were retrieved well both in the process of immediate and delayed retention. Raugh and Atkinson (2001) conducted a study to check the effect of the key word mnemonic technique on learning Spanish vocabularies. The results indicated that the key word mnemonic device was totally effective for the language learners. Following this line of research, Pressly et al. (2002) studied on children 3 to 6 years of age learning simple Spanish vocabulary items through keyword method. The results showed that children who used the keyword method remembered more vocabulary than children who were not instructed in keyword method usage. Carlson, Kincaid, Lance, and Hodgson (1976), however, found significantly better recall when a group trained on the method of loci.

In another research, which was done by Roedigeron (2003), the effectiveness of four mnemonic techniques; "imagery, the link method, a peg system and the method of loci" on learners' vocabularies was reported (p.66).

Azmi, Najmi, and Rouyan (2016) examined the effectiveness of using mnemonic techniques in learning English vocabularies. They investigated the students' perspectives and point of view of the linguistics mnemonic technique in teaching and learning English vocabularies. The results received from the questionnaire demonstrated the effectiveness of using linguistics mnemonic techniques in learning English vocabularies as well as the students' response towards the technique. They concluded that linguistics mnemonic technique is one of a number of procedures that has proved useful for the task of acquiring definitions of new foreign language words particularly for immediate recall.

Fasih, Izadpanah, and Shahnavaz (2017) provided support for key word mnemonic technique to improve reading comprehension. Results showed that the use of keyword mnemonic vocabulary instruction improved the reading comprehension of third grade senior high school students and they were very satisfied to use this technique for learning new materials in order to enhance their reading comprehension in the future. Also, students showed greater gains on assessments during the mnemonic condition. More importantly, mnemonic vocabulary instruction increased student engagement and motivation toward new vocabularies and they showed greater gains on the assessments.

Method

The design of the study

The current study follows quasi- experimental design in which subjects of the study were non-randomly selected, were made homogeneous, and then their intact classes were randomly assigned into two experimental groups and two control groups in order to investigate the research question of the study.

Participants

The study was conducted with 48 young and adult pre-intermediate Iranian EFL learners who were studying English at Kish Language Institute in Rasht. The participants were selected from 60 female learners who took part in conversation classes; 24 participants were randomly chosen as the young and adult experimental groups. Young and adult learners' age varied from 18-24 and 26-35 respectively.

In order to make sure of homogeneity, the participants were selected out of 60 pre-intermediate learners based on their results in the Quick Placement Test. Having calculated the mean and Standard Deviation (SD) , participants with the score of 1SD above and below the mean (1SD from the mean) were selected to conduct the study. They were divided into four groups: (two experimental and two control groups). The experimental groups received 8-session treatments in which they encountered the mnemonic technique, however, the control groups received no treatment.

Instruments

To answer the research questions and to test the hypotheses of this study, the following instruments and materials were used. The Quick Placement Test, which is a flexible test of English language proficiency developed by Oxford University Press to give teachers a reliable and time-saving method of finding out a student's level of English. The next instrument was a pre-test. The purpose of this test which was administered before the treatment was to find the possible initial differences between the knowledge of vocabulary in the experimental and control groups. In so doing, a vocabulary test was used to test the participants' knowledge of vocabulary. This test was taken from *English Vocabulary in Use Pre-Intermediate* (Redman, 2017) and *The World of Words* (Richek, 2010). It included 20 multiple questions. The test was utilized to measure the vocabulary knowledge of the learners in all groups before the treatment. No changes or modifications were made to the test.

The other instrument was a post-test. A test similar to the pre-test was used as post-test after 8 sessions of instruction at the end of the treatment. This test which was administered after the treatment sessions was equal in all respects to the pretest. In the current study, the focus of attention was on pre-intermediate level students. The researcher introduced the *English Vocabulary in Use Pre-Intermediate* (Redman, 2017) and The *World of Words* (Richek, 2010) to be worked on in all groups.

Procedure

This study was conducted in July and August 2019 in four classes including 12 female students at Kish Language Institute in Rasht. They were divided into two young and adult experimental groups and two control ones. The homogeneity of the subjects at the beginning of the study was examined through administering of Quick Placement Test to make sure the subjects were homogeneous in terms of their proficiency level. In order to compare the effect of treatment on students' vocabulary knowledge, before the treatment, the pre-test was given.

The control groups followed the traditional method. The teacher taught vocabulary by using dictionary definition, i.e., synonyms or antonyms, and examples. The researcher applied the visual mnemonic technique in the experimental groups. New words were paired with their definitions, equivalents, examples and images. In contrast to the experimental groups, images were not used in control groups while instructing vocabulary.
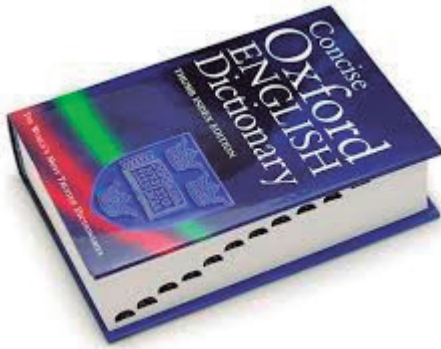
Here are some examples:

Abridge: Shorten (a book, film, speech, etc.) without losing the sense.

Example: The book was abridged for children.

Mnemonic Technique:

a+bridge. Well bridges are meant to reduce the gap between something. So, abridging. Something means reducing or shortening something.

*Figure 1.* Abridged versions of dictionaries

Contagious: (Of a disease) spread from one person or organism to another, typically by direct contact.

Example: It is a relatively new disease and very contagious.

Mnemonic Technique:

 Contag+ious CONTAG (contact) +ious something that SPREADS when comes in CONTACT with body or something; so, something that SPREADS.

Figure 2. Example of the word contagious
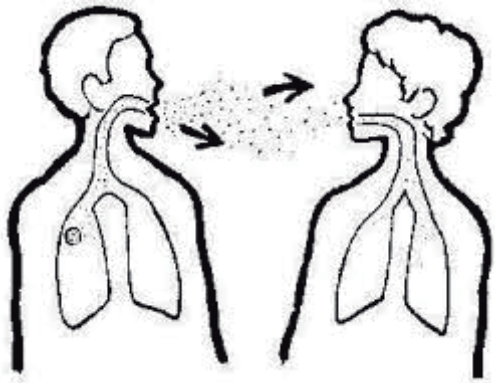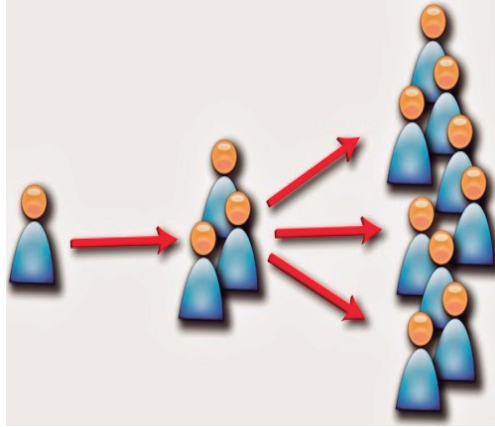
Yoke: A wooden crosspiece that is fastened over the necks of two animals and attached to the plough or cart that they are to pull.
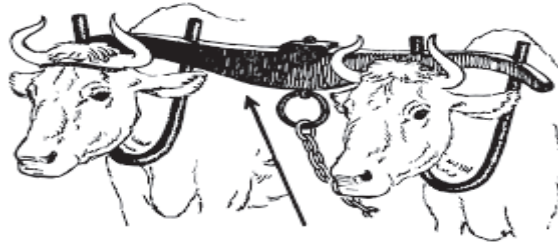
Example: The only noise was the snorting of oxen as they pulled against the yoke.

Mnemonic Technique:

Sounds like "yolk" which is egg-yolk and which joins the parts of egg (egg white, yellow yolk, white yolk) together.

Figure 3. Example of yoke

During the semester, the students in all groups learned 80 pre-intermediate words of the books *English Vocabulary in Use Pre-Intermediate* (Redman, 2017) and The *World of Words* (Richek, 2010). After the treatment, the post-test was taken to measure students' progress. The results of this research were analyzed quantitatively. It was mentioned that learners took the vocabulary test as both the pre-test and the post-test.

Results

First, the reliability of the vocabulary tests was estimated through running Cronbach's Alpha to the results of the vocabulary tests in a pilot study with (n= 8) participants. The results of the reliability analyses are presented in Table 1:

Table 1. Reliability Statistics for the Vocabulary Tests

	Cronbach's Alpha	**N of Items**	**N of sample**
Vocabulary Test (pre-test)	.74	20	8
Vocabulary Test (post-test)	.76	20	8

Moreover, the values of reliability were interpreted based on the reliability standards suggested by Barker, Pistrang, and Elliott (1994).

Table 2. Standards for the Reliability Index (Adapted from Barker, Pistrang, and Elliott, 1994)

Interpretation	**Reliability indices**
Good	.80
Acceptable	.70
Marginal	.60
Poor	.50

The estimated indices of Cronbach's Alpha for the vocabulary tests came to (α pre-test = .74; α post-test= .76) which were considered acceptable values according to the reliability standards suggested by Barker, Pistrang, and Elliott (1994). Table 3 presented descriptive information for the participants regarding their performance on QPT. The QPT was given to 60 EFL learners. The objective was to select a homogeneous sample. The participants took three parts that included items related to structure, vocabulary, and reading comprehension with a maximum possible score of (60) points. A cut-point of one standard deviation above and below the mean was set and 48 EFL learners (four groups each consisting of 12 students) whose proficiency scores were within this range (+ 1 SD from the mean) were selected as the main participants of the present study. Descriptive statistics for the QPT test is available in Table 3.

Table 3. Statistics for QPT scores

N	Valid	60
	Missing	0
Mean		32
Median		31
Mode		29
Std. Deviation		4
Variance		17
Skewness		1
Std. Error of Skewness		.30
Kurtosis		1.18
Std. Error of Kurtosis		.60
Range		17
Minimum		27
Maximum		44
Sum		1932.00

Table 3 delineated the findings of group statistics for the QPT test scores that was given to pick out homogeneous subjects with regard to their general foreign language proficiency. Measures of central tendency including mean, median, and the mode together with measures of dispersion such as range, variance, and standard deviation as well as measures of distribution, i.e., Skewness & Kurtosis were computed for the QPT test. Thus, the cut-point of (32+ 4) was set and (n=48) EFL learners whose proficiency scores were within this range (28 to 36) were selected as the main participants of the present study.

Before running the Two-way ANOVA, tests of the underlying assumptions were done. Tests of normality were produced to test whether the levels of the vocabulary scores were statistically normal. The following table highlighted the relationship between these distributions and showed the normal distribution of these variables, too.

Table 4. Statistics for the Vocabulary Tests

		Mean	95% Confidence Interval for Mean Lower Bound	Upper Bound	5% Trimmed Mean	Skewness	Kurtosis
Pre-test scores	Adult control group	8.50	7.99	9.00	8.50	.00	.23
	Young control group	7.83	6.86	8.80	7.81	.15	-1.57
	Adult experimental group	8.50	7.58	9.41	8.50	.00	-.47
	Young experimental group	8.16	7.23	9.09	8.18	-.13	-1.22
Post-test scores	Adult control group	8.75	7.76	9.73	8.77	-.74	.06
	Young control group	8.08	7.39	8.77	8.03	.32	-1.38
	Adult experimental group	12.58	11.58	13.57	12.59	.15	-.61
	Young experimental group	12.91	12.17	13.65	12.90	.18	-.66

To examine the normality assumption, first, 5 percent of the highest and lowest cases were removed and a new mean score was calculated. Then, the first mean values and the new trimmed means were compared to inspect the possible differences between the two means for the vocabulary test. Since the trimmed means were similar to the original means, the scores for the levels of the vocabulary tests were considered to be normally distributed. Moreover, the values of the Skewness and Kurtosis were within the range of (+2) indicating the uniformity of the distributions (see also the following plot for examining the homogeneity of the variances assumption).

Figure 4. Error bars for examining the Homogeneity of Variances assumption (pre and posttests)

Error Bars: 95% CI
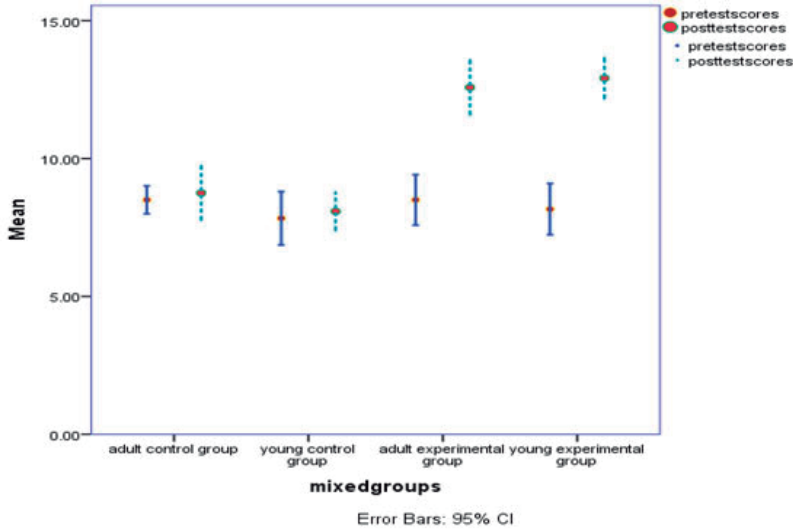
As it was displayed in the above figure, the average performance was nearly the same for the four groups at the beginning of the study. Moreover, the degree of variation in the participants' performance was similar at the same time both for pre- and post-test scores. After verifying the uniformity of variance across the groups, descriptive statistics of the four groups for the pre-test scores were computed. Levene's test of equality of error variances was used. This test presented a test of the second assumption underlying analysis of variance. The Sig. level was greater than (.05) and therefore not significant suggesting that the variance of the dependent variable (vocabulary scores) across the four groups was equal.

Table 5. Test of Homogeneity of Variances for the Pre and posttests

Levene's Test of Equality of Error Variances a

Dependent Variable: pretest scores

F	df1	df2	Sig.
2.338	3	44	.087
.565	3	44	.641

Tests the null hypothesis that the error variance of the dependent variable is equal across groups

a. Design: Intercept + groups + Age level + groups * Age level

As it was displayed in Table 5, The Levene's statistics confirmed the hypotheses that the group variances were the same for the vocabulary scores both in pre-test and post-test.

The results of the analyses for the pre-test scores of vocabulary

The descriptive table provided descriptive statistics including group size, mean, and standard deviation for the four groups on the dependent variable that was vocabulary scores before introducing the specific treatment for the experimental groups. The results are available in Table 6.

Table 6. Descriptive Statistics for the Pre- Test Scores

Dependent Variable: Pre-test scores				
Groups	Age level	Mean	Std. Deviation	N
Control	Adult	8.5000	.79772	12
	Young	7.8333	1.52753	12
	Total	8.1667	1.23945	24
Experimental	Adult	8.5000	1.44600	12
	Young	8.1667	1.46680	12
	Total	8.3333	1.43456	24
Total	Adult	8.5000	1.14208	24
	Young	8.0000	1.47442	24
	Total	8.2500	1.32889	48

For the vocabulary scores in the pre-test, the means for the adult control group, young control group, adult experimental group and young experimental groups were (X- Adult control group = 8.50), (X- Young control group = 7.83), (X- Adult experimental group = 8.50), and (X- Young experimental group =8.33), respectively. They differed some points around their average on pre-test of vocabulary. For the vocabulary test, the total mean score of the 'control group' was (.09) points lower than that of the 'experimental.' Two–way analysis of variance was run to see if the differences among the four groups were statistically significant at the beginning of the study.

Table7. Two – Way Analysis of Variance for the Pre- Tests Scores

Source	df	F	Sig.	Partial Eta Squared
Groups (Control & experimental)	1	.18	.66	.004
Age level (Young & adults)	1	1.66	.20	.036
Groups *Age level	1	.18	.66	.004
Total	48			
a.	R Squared = .044 (Adjusted R Squared = -.021)			

A two-way between-groups analysis of variance was conducted to explore the possible differences among the four groups in terms of their vocabulary achievement at the beginning of the study. There were no significant differences between the control and experimental groups F (1, 48) = .18, p = .66. Moreover, there were no significant differences among the age groups F (1, 48) = 1.66, p = .20. In addition, the interaction effect between types of instruction and age group was not statistically significant, too F (1, 48) = .18, p = .66. The effect size was small (partial eta squared four groups= .004; partial eta squared age level= .036; partial eta squared Groups * Age level = .004).

Figure 5. The Comparison among the Means of the Four Groups on Pre- Test of Vocabulary
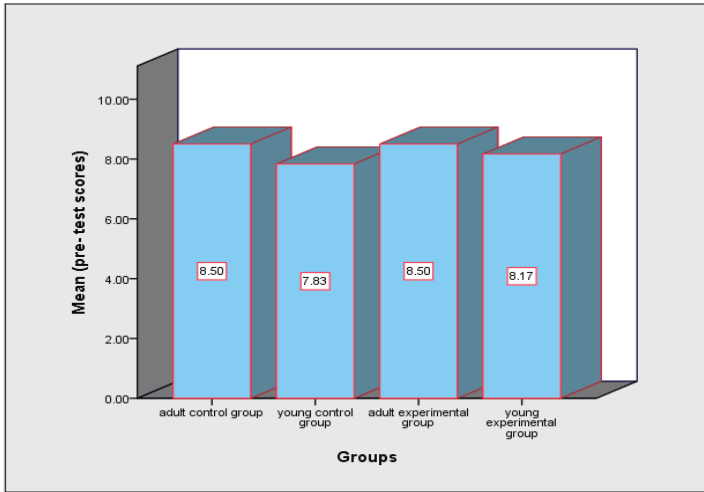
The results of the analyses for the posttest scores of vocabulary

Table 8 shows descriptive statistics including group size, mean, and standard deviation for the four groups on the dependent variable that was vocabulary scores after providing the specific treatment for the experimental groups at the end of the study.

Table 8. Descriptive Statistics for the Post- Test Scores

Dependent Variable: posttest scores

Groups	Age level	Mean	Std. Deviation	N
Control	Adult	8.75	1.544	12
	Young	8.08	1.083	12
	Total	8.41	1.348	24
Experimental	Adult	12.58	1.564	12
	Young	12.91	1.164	12
	Total	12.75	1.359	24
Total	Adult	10.66	2.478	24
	Young	10.50	2.702	24
	Total	10.58	2.566	48

For the vocabulary scores in the post-test, the means for the Adult control group, Young control group, Adult experimental group and Young experimental groups were (X- Adult control group = 8.75), (X- Young control group = 8.08), (X- Adult experimental group = 12.58), and (X- Young experimental group =12.91), respectively. Their average differed from each other on post-test of vocabulary. The total mean score of the 'control group' was (2.17) points lower than that of the 'experimental group.' Two–way analysis of variance was run to see if the differences among the four groups were statistically significant at the end of the study.

Table 9. Two – Way Analysis of Variance for the Post- Tests Scores

Source	Df	F	Sig.	Partial Eta Squared
Groups (control & experimental)	1	122.40	.000	.736
Age level (young & adults)	1	.181	.673	.004
Groups * Age level	1	1.63	.208	.036
Total	48			
Corrected Total	47			
*. R Squared = .738 (Adjusted R Squared = .721)				

The impact of types of instruction (visual mnemonic versus traditional teaching) on Iranian EFL learners' vocabulary learning was statistically significant F $(1,48)$ = 122.40, p = .000 with relatively high partial Eta squared (r= .736) indicating significant differences among the control (young & adults) and experimental (young & adults) groups. The participants in the experimental groups (both adults and young learners) performed higher compared to the participants in the control group in post-test of vocabulary. However, the interaction effect between types of instruction (visual mnemonic technique versus traditional teaching) and age level was not statistically significant, F $(1, 48)$ = 1.63, p = .208. In addition, there was not any statistically significant main effect for age, F $(1,48)$ = .181, p = .673; in addition, the effect size was small for the effects of age level and the interaction effect of age level and types of instruction (partial eta squared age level=.004; partial eta squared groups * Age level =.036). In other words, the main effect for age and interaction effect of age level and types of instruction did not reach statistical significance. Tukey Honestly Significant Difference (HSD) test was used to do the multiple comparisons as a common test suggested by Pallant (2008). The results of the post-hoc tests are provided in the following table in which Multiple Comparisons were made for the four independent groups.

Table 10. Multiple Comparisons among the Four Groups (Post-test Scores)

Dependent Variable: post-test scores
Tukey HSD

(I) Groups	(J) Groups	Mean Difference (I-J)	Sig.	95% Interval Confidence Lower Bound	Upper Bound
Adult control group	Young control group	.666	.628	-.81	2.14
	Adult experimental	-3.833*	.000	-5.31	-2.35
	Young experimental	-4.166*	.000	-5.64	-2.68
Young control group	Adult control group	-.666	.628	-2.14	.81
	Adult experimental	-4.500*	.000	-5.97	-3.02
	Young experimental	-4.833*	.000	-6.31	-3.35
Adult experimental group	Adult control group	3.833*	.000	2.35	5.31
	Young control group	4.500*	.000	3.02	5.97
	Young experimental	-.333	.931	-1.81	1.14
Young experimental group	Adult control group	4.166*	.000	2.68	5.64
	Young control	4.833*	.000	3.35	6.31
	Adult experimental	.333	.931	-1.14	1.81

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the adult control group (M = 8.75, SD = 1.54) was significantly different (α = .00) from the adult experimental group (M = 12.58, SD = 1.56). Moreover, the mean score for the adult control group (M = 8.75, SD = 1.54) was significantly different (α = .00) from the young experimental group (M = 12.91, SD = 1.16). Besides, the mean score for the young control group (M = 8.08, SD = 1.08) was significantly different (α = .00) from the adult experimental group (M = 12.58, SD = 1.56). Moreover, the mean score for the young control group (M = 8.08, SD = 1.08) was significantly different (α = .00) from the young experimental group (M = 12.91, SD = 1.16). The results of the multiple comparisons rejected the first null hypothesis suggesting that visual mnemonic technique significantly affects learning the target language vocabularies by young and adult EFL learners. However, there was not statistically significant differences (α = .28) between adult control group (M = 8.75, SD = 1.54) and young control group (M = 8.08, SD = 1.08). Additionally, the adult experimental group (M = 12.58, SD = 1.56) did not differ significantly (α = .931) from the young experimental group (M = 12.91, SD = 1.16). Therefore, the second null hypothesis was supported implying that there

was not statistically significant difference between the final achievement of the young and adult learners who learned the target language vocabularies through the visual mnemonic technique.

Figure 6. The Comparison among the Means of the Four Groups on Post- Test of Vocabulary
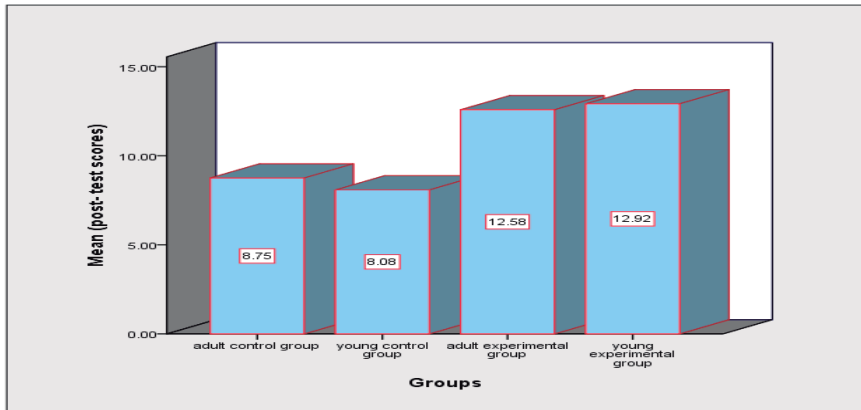
Discussion

The main purpose of the present study was to investigate empirically the possible effects of visual mnemonic techniques on young and adult Iranian EFL learners' vocabulary learning. The results affirmed that images significantly affected Iranian pre- intermediate EFL learners' vocabulary leaning. The study exhibited that the experimental groups who received instruction on visual mnemonic technique outperformed their counterparts in the post-test of vocabulary. However, the differences between the effects of visual mnemonic techniques for young and adult learners who received the specific treatment were not statistically significant (P≥ .05). Therefore, learners can enhance their retention of new words if they employ visual mnemonic device.

The results of this study are in line with Ashouri and Moghadam (2015). In their research, they found that words learned via image and imagery instruction were retrieved well both in the process of immediate and delayed retention. But the current research was bound to utilize image while instructing vocabulary. The experimental groups outperformed the control groups on the post-test because they linked the new words with images in their minds in a meaningful way.

The findings obtained regarding the effect of visual mnemonic device on retention emphasize the discussion by Wright's (1999) that non-verbal memory storage is more stable than verbal over intervals of hours to days and meaning can also be derived from non-verbal language. The outcomes of the current study confirm Gians and Redman's (2001) assertion that pictures and objects can facilitate recall and images provide direct retrieval paths back to the language.

The advancement which was seen from the pre-test to the post-test in experimental groups who received visual mnemonic treatment, uncovered that non-verbal mnemonic devices such as images are effective aids for the acquisition and retention of vocabulary in foreign language learning, that is opposite to Atay and Ozbulgan s (2007) research. Since they reported verbal mnemonic strategies are more effective than non-verbal. Furthermore, a second key finding of this scrutiny, which can make it different from similar ones, is that results of analysis made clear that the differences between the effects of visual mnemonic techniques on young and adult learners vocabulary development who received the specific treatment were not statistically significant ($P \geq .05$), therefore, it can be concluded that images can be used for learners of any age. This is against Hatch and Brown's (1995) argument that images are helpful for children rather than adult learners.

Conclusion

The results of this study showed that the subjects who were instructed through the visual mnemonic technique proved to be more successful in retaining the meaning of the items in their long-term memory. Additionally, it can be concluded that images should be given prime attention by both material developers and instructors as a potentially efficient aid for vocabulary instruction and long-term retention in foreign language learning. The findings may encourage teachers who still use the traditional verbal method in their teaching to change their viewpoint in favor of a non-verbal method of teaching vocabulary.

Acknowledgments

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Authors

***Parisa Farrokh** Assistant professor, Department of English Language, Lahijan Branch, Islamic Azad University, Lahijan, Iran. She has published and presented some articles in different national and international journals and conferences. Her areas of interest include learning strategy, applied linguistics and psycholinguistics.

ORCID: https://orcid.org/0000-0002-6454-9305

Hengameh Vaezi Assistant professor, Department of English Language, Rasht Branch, Islamic Azad University, Rasht, Iran. Holds a PhD in linguistics; interested in theoretical and applied linguistics as well; has taught different courses in English Teaching and Linguistics at post graduate levels & is an assistant professor in faculty English Language and Linguistics Department, Islamic Azad University, Rasht branch, Guilan, Iran. Тнe author of over 17 scientific publications in different majors like Linguistics; Linguistic in teaching and translation; Teaching & Learning; Cross linguistic studies.

ORCID: https://orcid.org/0000-0002-8078-5084

Hamed Ghadimi Department of English Language, Rasht Branch, Islamic Azad University, Rasht, Iran. Has received his M.A. in TEFL. He has graduated from Islamic Azad University, Rasht Branch, Iran. He has received his B.A. in English translation , from Islamic Azad University, Lahijan Branch. He teaches English in different institutes. He is interested in learning strategies and psycholinguistics

ORCID: https://orcid.org/0000-0002-3911-8669