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Research Article

The Impacts of Drawing, Visualization and Rote Memorization on Iranian EFL Students' English Vocabulary Recall and Retention

Seyed Amir Hossein Sarkeshikian[1*], Seyed Abdol-Majid Tabatabaee[2], Lotfi Saeede Hosseini[3]
1,2,3 Department of English Language, Qom Branch, Islamic Azad University, Qom, Iran
*Corresponding author: amir.sarkeshikian@iau.ac.ir
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Abstract

Given the role of lexical knowledge in language learning, strategies for vocabulary learning should be paid more attention in the literature. This study investigated the effects of visualization, drawing, and memorization on Iranian EFL learners' recall and retention of second language vocabulary using a quasi-experimental comparison design. To that end, three intact classes, incorporating sixty students in total, were randomly selected as the experimental groups of this study. Nation's (2006) vocabulary size test was administered to them to homogenize them in terms of English lexical knowledge. The results of one-way ANOVA demonstrated that there were no significant differences among the three groups in terms of vocabulary knowledge. A piloted researcher-made vocabulary test was administered to the participants as the pretest and post-tests. The one-way ANOVA results showed that there were no significant between-group differences among the groups' performances on the immediate and delayed posttests. However, the results of a repeated-measures ANOVA indicated that the three strategies had a significant within-group effect on the three groups' vocabulary recall, while their vocabulary retention was found to have dropped significantly from immediate to the delayed posttest. All the same, the drawing group had the best performance from the pretest to the immediate posttest, and the control group was the weakest on delayed posttest. Finally, the findings are discussed, and implications are offered for EFL teachers and learners.

Keywords: drawing, memorization, visualization, vocabulary recall, vocabulary retention

Introduction

Given the role of vocabulary knowledge in language learning, it is important to help EFL learners develop their mental lexicon; vocabulary is vital to language learning since one cannot understand others or express ideas without sufficient lexical knowledge (Nation, 2001). Schmitt (1997) claimed that the first step for all teachers to get familiar with the challenges facing the vocabulary learning process before designing any vocabulary teaching program is to determine what word knowledge means. For Schmitt (1997), there are some other factors such as word part, grammatical function, use, associations, and collocation, which are involved in knowing a word in addition to what it is assumed by the layperson that knowing a lexical item is to recognize its semantic, morphological, and phonetic aspects. Moreover, Schmitt (2008) highlighted the necessity of knowing a large number of those items and a great deal about them in language use.

As Schmitt (2000) stated, the nature of vocabulary learning is rather complex, but what is evident is that it does not occur instantaneously and has a gradual process from receptive mode to expressive mode. Taking this, there are different processes involved in second language (L2) vocabulary learning. One of the most common dichotomies involves the difference between natural and deliberate learning. In many aspects, the former is like implicit learning in which vocabulary learning is the secondary product of other receptive activities like reading in which the focus is not vocabulary learning, and the latter shares features with consciousness involved in the learning process (Nation, 2001).

In the same vein, Oxford (2003) mentioned that learning strategies are the tools that may help know how a second or foreign language is learnt; although most learners use vocabulary learning strategies, many of them are not conscious of this fact, and a good teacher can help them get familiar with other strategies and use them appropriately (Oxford, 2003). Hence, it is important to identify the vocabulary strategy types which are more commonly used by language learners. According to Schmitt (1997), when teachers decide to choose and recommend a strategy to their students, they should consider such factors as proficiency level, background knowledge, target language, and culture. Moreover, it seems that language learners largely favor the more mechanical strategies (e.g., repetition, note taking, writing notes on the margin of the books, etc.) over more complex strategies (e.g. imagery, inferencing, keyword method) (Schmitt, 1997).

Moreover, Schmitt (2008) opined that explicit and implicit learning are approaches that effectively complement each other. However, it seems the teachers do not try to teach vocabulary learning strategies to their students,

like the teachers in traditional language teaching classrooms (Yu-Ling, 2005). Hence, traditional methods of teaching vocabulary could not suit the students' needs after a few hours or even days, they forget what they have learned despite the time students dedicate to memorizing vocabulary items. Due to the shortcomings of traditional methods of vocabulary learning and teaching, one of the challenges facing teachers and learners in traditional systems of language education is related to vocabulary acquisition.

Tomlinson (1998) has considered visualization as a neglected strategy and defined it as the conversion of the lexical knowledge on a sheet of paper into mental pictures, stating that most people use visualization to understand and think about what they have heard or read in their first language, but the vividness, the frequency of use and the effects are not same for all. Visual images help language learners convey information to the mental repertoire and are powerful tools to help with the recall of stored information.

In the past decades, vocabulary researchers have focused on vocabulary learning strategies. As Oxford (1990) stated, a good way to remember what a learner hears or reads is to make mental images of it. According to Tomlinson (2011), visualization may help readers to increase comprehension of a text, achieve interaction between old and new information, achieve tolerance of ambiguity, personalize a text, and process the salient features in writing at a deeper mental level. According to Tomlinson (1998), most readers do not seemingly visualize while they read. When L2 learners visualize, they rarely make default inferences like first language readers and mostly they are dependent on the text and writer for visualization as child first language readers do, and they visualize what the writer has said and described. Moreover, there are gaps in the images that L2 readers create and they usually stick to their original images despite the new information the text gives them (Tomlinson, 1998). Accordingly, it is needed to delay reading activities until achieving a linguistic threshold level and in such a situation they can be effectively encouraged to visualize through L2 reading activities to help learners transfer their visualization skills from their first language to their second one (Tomlinson, 2011).

Tomlinson (1998) also mentioned that drawing before, whilst, and after reading allows the learners to draw images that can activate their schemata or their understanding of the world; these drawings help learners read interactively, rather than relying on the data from the text. Drawing helps learners to use their pictures in their minds which results in making a connection between their mind and the text and subsequently leads to a greater understanding of it; therefore, if the learners are informed that they

are going to draw their understanding of the text, they are more motivated to focus on the text and comprehend it (Tomlinson, 2011).

To address the need to conduct studies into visualization strategies, several studies have been done. Weerasinghe et al., (2020) evaluated the effect of the visualization of the keywords in augmented-reality (AR) and non-AR contexts. The participants were assigned to one of the two groups (AR or NON-AR). Next, they randomly decided which instruction mode would be used first (keyword or keyword plus visualization) in a counterbalanced design. They found that the AR participants outperformed the other group regarding immediate recall, mental effort, and task-completion time. Additionally, the visualization approach scored significantly higher than showing only the written keyword regarding immediate and delayed recall and learning efficiency, mental effort, and task-completion time. Moreover, Zohrabi, Tadayyon, and Dobakhti (2018) conducted a quasi-experimental study into the effects of rote memorization and contextualized memorization on Iranian intermediate EFL learners' vocabulary learning. They found that the contextualized strategy group outperformed the rote memorization and control groups.

Saffarian, Gorjian, and Bavizadeh (2013) explored the effects of using pictures on the retention of idiomatic expressions by Iranian EFL learners. Eighty male and female pre-intermediate EFL learners took part in this research. They were divided into an experimental and a control group. 60 body idioms were taught to the participants in both groups in a ten-session period. The only difference between the teaching procedure in the two groups was that in the former the English idioms were taught using their related pictures, and in the latter class, the target idioms were educated to the learners only by their definitions in English and whenever they were difficult to understand, their Persian equivalents were provided. After ten days, a posttest was given to both classes to meter their retention. The researchers realized that the experimental group had a significantly better performance on the delayed posttest.

Khoii and Sharififar (2013) explored the impacts of memorization and semantic mapping, as two cognitive strategies, on vocabulary learning in Iran. The participants were 38 intermediate-level first-year students, majoring in English translation. Once the treatment sessions were over, a recognition-type vocabulary posttest was administered to both groups. The t-test result showed there was not a statistically significant difference between the two groups despite the improvement in the performance of both groups from the pretest to the posttest. They concluded that semantic mapping has no superiority to rote memorization in L2 vocabulary learning and teaching although more energy and time was spent on the preparation of such maps.

Munsakorn (2012) explored the effects of imagery strategy on the lexical enhancement of 40 university juniors. In the first session, they were asked to memorize forty lexical items without any strategy training and then applied a pre-test on the target words. In the next session, the imagery strategy was introduced to the students and they were encouraged to create and share mental images of those words which they encountered in lexical exercises. In the last session, the participants were asked to practice a new forty-word list of vocabulary using imagery strategy, and then the second vocabulary test, measuring the learning of these new items, was administered. The results showed the positive role of imagery and visualization strategy in vocabulary learning.

Azimi Amoli and Karbalaei (2012) examined the influence of visualization on EFL vocabulary learning. For that purpose, they selected eighty-one male and female first-year university students from Iranian universities. After homogenization, the experimental group was taught lexical items through imagery. The teacher asked them to visualize the word meanings and relate them to their mental images. The control group was requested to practice the same target words with the conventional method. The results manifested that the experimental group outperformed the control group on immediate and delayed post-tests.

Gerami and Tavakoli (2012) also studied how two mnemonics strategies affected vocabulary learning and retention. To that end, sixty female EFL learners of elementary level were selected from an Iranian language school, and assigned to three groups. In the keyword group, the association was made between L2 lexical items and an equal/relevant word in their first language. In the picture group, this association was made between the lexical item and an image or its visual representation. Those in the control group were requested to memorize the same words with their first-language equivalents. The post-test data analysis disclosed that the learners who used the keyword method outperformed those who used the picture group and control group. However, the performances of both groups on the posttest were not significantly different.

Ghazanfari (2009) investigated how the visualization strategy affected reading comprehension and vocabulary recall. Fifty students of English literature voluntarily participated in this study and were placed in an experimental and control group. The former was asked to visualize and create mental images of the story elements like the characters' faces, the scenes, the interaction between the characters, etc. They were also asked to draw pictures of some parts of stories to summarize them for themselves. The latter group was asked to make use of conventional techniques, like looking up new words in the dictionaries and

explaining the story elements. The analysis of the data showed that the experimental group was significantly better on the vocabulary posttest.

Yoshii and Flaitz (2002) investigated the influence of annotations with texts and pictures on incidental vocabulary learning of elementary and intermediate adult ESL learners. The sample included the students of English language in a collegiate context in three groups. The first group encountered text-only annotation, in which the meanings of the words were given by verbal definition in the passage annotation. In the second experimental group, the annotation type was picture-only. The third group was given a web reading activity, in which the word meanings were given in the form of textual and pictorial annotations. The target vocabulary was the same for all groups and they were not informed about vocabulary measurement. After the treatment phase, an immediate post-test on combined reading comprehension and vocabulary acquisition was given to the participants and a delayed test containing only vocabulary questions was administered subsequently. The results revealed that the learners of the combined type annotation (i.e., picture and text) outperformed the other groups on both posttests. They reported that the change in the recall of target words over time was the same for all groups and the learners in all groups showed a decrease in vocabulary retention on delayed post-test. Overall, it was reported that implicit vocabulary learning depended on the type of information and type of input, and also the nature of the pictures and texts.

Maftoon and Hokmi (2002) investigated how the pictorial context influenced Iranian learners' vocabulary learning. The participants were sixty male students in a technical institute in Iran. The target concrete words were taught through technical texts to the two groups of the experiment in the treatment sessions with the difference that in the experimental group visual aids accompanied the taught texts and in the control group the mere text was presented without any visual aids. The results of a t-test showed that visual aids significantly affected vocabulary learning by Iranian learners. Hence, they found that the experimental group could extract and keep in mind the information better than the control group who used the ordinary situation.

According to Amiryousefi and Ketabi (2011), in traditional language classrooms, vocabulary is ignored in teaching programs and curricula, and EFL teachers and learners do not adopt viable strategies for teaching and learning English vocabulary. Hence, the present study was an attempt to investigate the effects of two conditions of visualization strategy on English vocabulary recall and retention by Iranian high school students.

RQ1: Are there any statistically significant differences among visualization, drawing, and rote memorization groups in their performance on the immediate posttest on vocabulary recall?

RQ2: Are there any statistically significant differences among visualization, drawing, and rote memorization groups in their performance on the delayed posttest on vocabulary retention?

RQ3: Are there any statistically significant differences among the performances of visualization, drawing, and rote memorization groups on the pretest, immediate posttest, and delayed posttest?

Method

Participants

The sample of this study incorporated sixty first-grade female students from a high school in Qazvin, Iran. They were within the age range of 15-16. Students had already been assigned to three separate classes according to the curricular program of the school, each containing twenty participants. These classes were selected as two experimental groups (i.e., visualization and drawing groups) and a control group (i.e., memorization group). It is worthwhile to mention that none of these students had attended any language courses other than their high school language courses as surveyed by one of the researchers in the research site. All of them were native speakers of Farsi, and English was their second language. Hence, a decision was made to only homogenize them in terms of vocabulary knowledge. Accordingly, sixty students, who attained scores well within two standard deviations below or above the mean scores on the first 1000 English vocabulary size test, were selected as the participants.

Instruments and Materials

The first-grade English textbook of the Iranian high school curriculum was used for the research. The English textbook, titled Prospect 1 (Alavimoghadam, kheirabadi, Foroozandeh, Sharabyani, Anani Sarab, & Ghorbani, 2013) consists of eight lessons with six parts. The 27 target words were selected from among the new words of lessons six, seven, and eight. Each lesson has about forty new words and eight words from lesson six, eight words from lesson seven, and nine words from lesson eight were randomly chosen as the target words of the study. The chosen words were checked through online vocabulary profiler software to make sure that all the words were within the same frequency range.

1. The first 1000 English vocabulary size test (Nation & Beglar, 2007) was administered to check out the sample homogeneity in terms of English

vocabulary size. It is a receptive vocabulary test with ten multiple-choice items. This test estimates a test-taker's coverage power of the first 1,000 words, which normally covers 75% of words in texts (Nation & Waring, 1997).

2. A teacher-made multiple-choice test was developed and piloted, showing acceptable internal consistency (α=.82). It was used as the pretest and posttests of the study. Half of the items of the test were fillers to prevent the observer's effect (Dornyei, 2007). The same test was used as the posttest of the study with the difference that the items used as the fillers, were excluded and therefore the test had twenty-five items in order to measure vocabulary recall and retention.

3. The online vocabulary profiler was the third instrument used to analyze the frequency range of the words taught in this study. This online instrument is part of a larger online package. This package contains a frequency analysis module to identify the occurrence of the words in a text, a vocabulary profiler to identify words according to word frequency lists of English words, and a concordancer to show the usage of words in examples, or parts of words in a text.

Procedure

For fulfilling the purposes of this study, the forthcoming procedures were followed:

1. Initially, three classes were selected through convenience sampling technique from a secondary school in Qazvin, Iran. However, the decision as to which groups receive the treatments was made randomly.

2. To homogenize the sample in terms of vocabulary knowledge, the first 1000 vocabulary size test was administered to the students of three classes, who were the students of the first grade in a junior high school.

3. Afterward, sixty students whose scores on the vocabulary size test were within two standard deviations around the mean score on the test were selected as the research participants. The test which contained 25 multiple-choice items on the target words and 25 multiple-choice fillers, was given to the learners of all groups in order to ensure that they did not recognize the target words. They were allotted fifty minutes to answer the test, one minute for each item.

4. During the treatment phase, the first experimental group was taught the target words through a visualization strategy adopted from Tomlinson (2011). Accordingly, the participants were asked before they started reading a passage not to work on it or to make a rendition of it but to visualize pictures in their mind as they read it and to change those pictures after finding more information in the passage (Tomlinson, 2011). Moreover, they were asked to use those mental pictures to help them apprehend the unfamiliar information in the passage (Tomlinson, 2011).

5. The second experimental group was instructed on the same words through a drawing activity. Hence, the participants of this study were asked to draw the new vocabulary before reading the text based on their predictions. In addition, they were asked to draw pictures related to the passage they were reading so that they related the information from the passage to their mental knowledge (Tomlinson, 2011).

6. Those in the control group were requested to memorize the very words through out-of-class rote memorization (Richards, Platt, & Platt, 1992). They did not have any chances to use the new vocabulary in a communicative context with their classmates.

7. After the treatment period, which lasted six weeks, one session a week, the teacher-made test, which contained only the main items questioning the newly taught words was given to all participants to check the target vocabulary recall. After a two-week interval from the post-test administration, a delayed test was run on the learners of the three groups to measure their lexical retention.

Results

Results for the Vocabulary Test

At the first step of the experiment, the first 1000 Vocabulary Size Test (VST) was given to all groups to ensure that the participants were the same in terms of their vocabulary knowledge and there were not any significant differences among them regarding their mental vocabulary size. Table 1 demonstrates the values of descriptive statistics for all groups. According to Table 1, the mean and standard deviation values for the visualization group (M =2.95, *SD* =1.63), drawing group (*M* =2.93, *SD* =1.43), and rote memorization group (*M* =2.80, *SD* =2.90) are very close to each other.

Table 1
Descriptive Statistics for Vocabulary Size Test

Group	Mean	SD
Visualization	2.95	1.63
drawing	2.93	1.43
rote memorization	2.80	1.47

Before running a one-way ANOVA, it was important to realize whether the collected data met the normality criterion (Table 2).

Table 2
Tests of Normality for Vocabulary Size Test

group	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig	Statistic	df	Sig
visualization	.16	20	.13	.90	20	.05
drawing	.16	20	.14	.92	20	.11
control	.15	20	.20	.91	20	.07

As indicated in Table 2, the sig value for the second test, which is used for samples smaller than 200, was higher than .05 for the VST scores of the visualization group (p=.13), drawing (p=.14), and rote memorization group (p=.20). Thus, the scores obtained from this test did not violate normality assumption for parametric statistics. Then, the Levene test was run. The sig value for the Levene statistic is larger than .05. It means that the second condition for running one-way ANOVA was met. The results of one-way ANOVA, shown in Table 3, depict that there were no differences among the groups in terms of their vocabulary knowledge, $F(2,57)=0.06$, $p>.001$.

Table 3
ANOVA for Vocabulary Size Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.30	2	.15	.06	.93
Within Groups	131.10	57	2.30		
Total	131.40	59			

Results for Pretest Scores

After administering the pretest to the participants, only the target vocabulary items were subjected to descriptive analysis. The mean scores of the three groups were very close to each other ($M_{visualization}$=4.6, $SD_{visualization}$=2.0; $M_{drawing}$=4.8, $SD_{drawing}$ =1.1; $M_{memorization}$ =4.5, $SD_{memorization}$ =1.4). Before running a one-way ANOVA, the normality of pretest data was checked. The p values of Shapiro-Wilk for the visualization (p=.33) and rote memorization groups (p=.34) were greater than .05. Before running one-way ANOVA, the homogeneity of variances among the three groups was checked. Hence, the variances among the three groups were homogenous because the p value was greater than 0.05 (p=0.22). Table 4 shows the results of one-way ANOVA.

Table 4
ANOVA for Pretest

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	1.30	2	.65	.25	.77
Within Groups	144.35	57	2.53		
Total	145.65	59			

As shown in Table 4, there is no significant difference among the performances of all groups on the pretest, $F(2,57)= .25$, $p= .77$.

Results for First and Second Research Questions

Table 5 shows the results of the descriptive statistics for the immediate and delayed posttests.

Table 5
Descriptive Statistics for Immediate and Delayed Posttests

	Immediate		Delayed	
	Mean	Std. Deviation	Mean	Std. Deviation
visualization	13.60	5.22	12.35	5.28
drawing	16.35	4.48	15.30	4.71
control	14.15	4.00	12.65	3.99

As Table 5 depicts, the mean and standard deviation of the immediate posttest for the drawing group (M=16.35, SD=4.48) stood top, followed by those of the rote memorization group (M=14.51, SD=4.00), while the visualization group (M=13.60, SD=5.22) gained the lowest mean score. Moreover, as shown in Table 5, the drawing group stayed the first group with the highest mean score (M=15.30, SD=4.71), followed by the rote memorization group (M=12.56, SD=3.99) and visualization group (M=12.35, SD=5.28). The normality of the data needs to be checked before running the parametric test of one-way ANOVA. Accordingly, the scores of the visualization, drawing, and rote memorization groups on the immediate and delayed posttests were normally distributed since all sig values were greater than 0.05.

To check the homogeneity of the variances of the three groups for immediate and delayed posttest data, Levene's test was run. Accordingly, the sig value for Levene's test for the immediate and delayed posttests was larger than .05. It means that the assumption of the homogeneity of the variances for running one-way ANOVA was met. Accordingly, one-way ANOVA was run to answer the first two research questions (Table 6).

V Table 6
Results of One-way ANOVA for Posttest Data

		Sum of Squares	df	Mean Square	F	Sig.
Immediate posttest	Between Groups	84.70	2	42.35	2.00	.14
	Within Groups	1205.90	57	21.15		
	Total	1290.60	59			
Delayed posttest	Between Groups	105.43	2	52.71	2.39	.10
	Within Groups	1255.30	57	22.02		
	Total	1360.73	59			

As Table 6 shows, the results of one-way ANOVA, run on the immediate and delayed posttest data, show no statistically significant differences among the performances of the three groups on the immediate posttest, $F(2,57)=2.00$, $p=.14$, and delayed posttests, $F(2,57)=2.39$, $p=.10$. Therefore, the first and second null hypotheses are not rejected.

Results for Third Research Question

The repeated-measures ANOVA was conducted to check whether there were significant differences among the three groups' performances across the three tests. Table 7 shows the results of multivariate tests of the within-subjects effects for three groups.

Table 7
Multivariate Tests for Three Groups

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Visualization	Pillai's Trace	.87	60.84[a]	2.00	18.00	.000	.87
	Wilks' Lambda	.12	60.844[a]	2.00	18.00	.000	.87
	Hotelling's Trace	6.76	60.84[a]	2.00	18.000	.000	.87
	Roy's Largest Root	6.76	60.84[a]	2.00	18.000	.000	.87
Drawing	Pillai's Trace	.91	98.11[a]	2.00	18.00	.000	.91
	Wilks' Lambda	.08	98.11[a]	2.00	18.00	.000	.91
	Hotelling's Trace	10.90	98.11[a]	2.00	18.00	.000	.91
	Roy's Largest Root	10.90	98.11[a]	2.00	18.00	.000	.91
Rote Memorization	Pillai's Trace	.91	92.06[a]	2.00	18.00	.000	.91
	Wilks' Lambda	.08	92.06[a]	2.00	18.00	.000	.91
	Hotelling's Trace	10.23	92.06[a]	2.00	18.00	.000	.91
	Roy's Largest Root	10.23	92.06[a]	2.00	18.00	.000	.91

As shown in Table 7, all multivariate tests of the within-subjects effects were statistically significant, indicating that there was a difference in how the three groups performed on the pretest, immediate posttest, and delayed posttest. Then, the sphericity assumption of the univariate approach to repeated measures analysis of variance was checked.

The results of the Mauchly test of sphericity showed that the data violated the assumption of sphericity because it turned out to be significant. Hence, as recommended by Leech, Barrett, and Morgan (2005), Greenhouse-Geisser F-test was used to correct the univariate approach to the within-subject effects (Table 8).

Table 8
Results of Greenhouse-Geisser F-test of Within-subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Visualization	Sphericity Assumed	950.83	2	475.41	99.35	.000	.83
	Greenhouse-Geisser	950.83	1.177	808.06	99.35	.000	.83
Error (Visualization)	Sphericity Assumed	181.83	38	4.78			
	Greenhouse-Geisser	181.83	22.35	8.13			
Drawing	Sphericity Assumed	1617.03	2	808.51	162.01	.000	.89
	Greenhouse-Geisser	1617.03	1.126	1436.16	162.01	.000	.89
Error (Drawing)	Sphericity Assumed	189.63	38	4.99			
	Greenhouse-Geisser	189.63	21.39	8.86			
Rote memorization	Sphericity Assumed	1078.63	2	539.31	147.05	.000	.88
	Greenhouse-Geisser	1078.63	1.353	797.50	147.05	.000	.88
Error (Rote memorization)	Sphericity Assumed	139.36	38	3.66			
	Greenhouse-Geisser	139.36	25.69	5.42			

alpha = .05.

As shown in Table 8, even with Greenhouse-Geisser correction, the within-subjects effects were significant for visualization group, $F(2,38)=99.35$, $p<.001$, $\eta^2=.83$, drawing group, $F(2,38)=162.01$, $p<.001$, $\eta^2=.89$, and rote memorization group as well, $F(2,38)=147.05$, $p<.001$, $\eta^2=.88$. Accordingly, the third null hypothesis is rejected. However, since these tests do not spot the location of difference between the performance of these groups on three testing occasions, the LSD test of pairwise comparisons was run (Table 9).

Table 9
Pairwise Comparisons

	(I)	(J)	Mean Difference (I-J)	Std. Error	Sig[a]	95% Confidence Interval for Difference [a]	
						Lower Bound	Upper Bound
Visualization	pretest	immediate	-9.00*	.82	.000	-10.71	-7.28
		Delayed	-7.75*	.82	.000	-9.48	-6.02
	Immediate	Delayed	1.25*	.28	.000	.66	1.83
Drawing	pretest	immediate	-11.50*	.83	.000	-13.24	-9.75
		Delayed	-10.45*	.86	.000	-12.25	-8.64
	Immediate	Delayed	1.05*	.24	.000	.53	1.56
Rote memorization	pretest	immediate	-9.65*	.69	.000	-11.10	-8.19
		Delayed	-8.15*	.70	.000	-9.63	-6.66
	Immediate	Delayed	1.50*	.33	.000	.79	2.20

*. The mean difference is significant at the .05 level.

As illustrated in Table 9, post-hoc comparisons using the LSD test indicate that the visualization group's performance on the pretest (*M*=4.60, *SD*=2.03) was significantly different from their performance on the immediate posttest (*M*=13.60, *SD*=5.22) and delayed posttest (*M*=12.35, *SD*=5.28). Additionally, they performed differently from immediate to delayed posttest. Concerning the drawing group, Table 9 shows that their performance on pretest (*M*=2.80, *SD*=1.47) was significantly different from their performance on immediate (*M*=16.35, *SD*=4.48) and delayed posttest (*M*=15.30, *SD*=4.71).

In addition, their performance from immediate to delayed posttest was significantly different. Moreover, the rote memorization group's performances from the pretest (*M*=4.50, *SD*=1.46) to the immediate (*M*=14.15, *SD*=4.00) posttest and delayed posttest (*M*=12.65, *SD*=3.99) were statistically different, besides performing differently from the immediate to delayed posttest. Overall, the drawing group had the greatest mean differences from pretest to immediate posttest (Mean difference= 11.50,

p<.05) and delayed posttest (Mean difference=10.45, *p*<.05). Concerning the performance of all three groups from immediate to delayed posttest, drawing group had the least mean difference (Mean difference=1.05, *p*<.05) as compared to visualization (Mean difference=1.25, *p*<.05) and rote memorization group (Mean difference=1.50, *p*<.05).

Discussion

This study attempted to explore the effects of two visualization strategies (i.e., visualization and drawing) on English vocabulary recall and retention by Iranian high school students. The results for the first two research questions showed that there were no significant differences among the three groups on both posttests. There may be some justifications for this finding. First, mental visualization, drawing, and rote memorization, as three cognitive strategies (O'Malley & Chamot, 1990), may involve the same "depth of processing" (Lockhart & Craik, 1990). Another reason for the lack of any significant differences may be an upcoming test, for which test-takers may do their best and use a set of memory techniques to activate words in memory" (Laufer, 2010). Third, although the rote memorization group seems to be a simple task and visualization strategies more complex ones, these cognitive strategies may have engaged the participants' working memory to the same extent because of the same amount of task-induced involvement (see Hulstijn & Laufer, 2001).

The first finding, indicative of lack of any significant difference among the three groups, corresponds with the findings of Khoii and Sharififar (2013), who concluded that two cognitive strategies (i.e., concept-mapping and rote memorization) share the same involvement load; however, it does not agree with other studies, which comparatively studied the effect of picture and definition (e.g., Saffarian, Gorjian, & Bavizadeh, 2013), visualization and dictionary use (e.g., Ghazanfari, 2009), picture, keyword, and memorization (e.g., Gerami & Tavakoli, 2012), visual aid and text-only input (e.g., Maftoon & Hokmi, 2002), as well as visualization and translation (e.g., Azimi Amoli & Karbalaei, 2012), which found a significant difference between groups.

The finding of the third question was that the visualization group's performance significantly improved from the pretest to the first posttest; however, their mean score on the delayed posttest was significantly lower than theirs on the immediate posttest. Concerning the drawing group, it was found that their performance significantly rose from the pretest to the first posttest, but it then significantly decreased on the delayed posttest. The same was the case with the control group's performances; there was a significant increase from the pretest to the immediate posttest, but a significant drop from

the first posttest to the second posttest. Overall, this pattern was the same for the mean scores of all groups, lending support to the use of rote memorization as traditional vocabulary learning strategy.

This finding about the pattern of within-group differences in the performance of these groups may be justified because the involvement load of these cognitive strategies may not be engaging enough; the three components of the motivational-cognitive construct of involvement must have been too moderate to influence long-term retention of lexical items on delayed posttest; the need factor was at moderate degree since these strategies were imposed and not intrinsically motivated, the search component was absent in all three strategies, and no evaluation was present in the three conditions of this study (Hulstijn & Laufer, 2001). This is in line with Yoshii and Flaitz (2002), who found that the performance of all three groups significantly decreased from immediate to delayed posttest.

Based on the findings, the following conclusions may be drawn. Initially, these cognitive strategies showed to have almost the same amount of task-induced involvement, with commensurate effectiveness; drawing contributes to vocabulary recall more than mere mental visualization and rote memorization. The other conclusion drawn from the insignificant difference between the performances of the groups was that in state-led high school learners are required to pass EFL courses, it may not make much difference what and how EFL instruction is provided, because they may mostly study by themselves to pass the exam and go to a higher grade. Thus, the effectiveness of learning strategy training in such contexts is not as much as when they are instructed in private language institute courses where learners are not required to pass compulsory formal courses assigned by the curriculum. To conclude, these three cognitive strategies improved vocabulary recall from the pretest to the immediate posttest, but not vocabulary retention as measured by delayed posttest by dint of the low indices of involvement.

An implication of this study for EFL students is that they can take advantage of the cognitive strategies to recall and retrieve the lexical items more efficiently. Moreover, language teachers should engage their EFL learners in the strategies that help them cope with the limitations of traditional vocabulary learning techniques. A question that remains for future studies is whether the long-term use of cognitive vocabulary learning strategies can increase the capacity of memory in retaining vocabulary knowledge in the long run. Another strand of research can investigate the combined effect of different cognitive strategies for vocabulary learning.

Declaration of interest: none

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Biodata

Amir Hossein Sarkeshikian is an assistant professor in TEFL. He has published book chapters, edited by Tomlinson and Maley (2017), and *Bouckaert*, Konings and van Winkelhof (2018). He has also contributed to *Psychology of language and Communication* and *Cogent Art and Humanities*. Most recently, he reviewed for some accredited journals, such as Applied Research in Higher Education, International Journal of Leadership in Education, and Sage Open.

Seyed Abdol-Majid Tabatabaee Lotfi is an assistant professor in TEFL and a faculty member at IAU, Qom branch, Iran. He has published and presented a number of papers in different international journals and conferences. His main areas of interest are language teaching methods, advanced writing, and sociolinguistics. He has authored numerous papers in national and international journals.

Saeede Hosseini holds an MA in TEFL. She is interested in language teaching issues, and works as an EFL teacher in Iranian schools.