



Differential Semantic Mapping Modes and EFL Learners' Vocabulary Learning and Retention

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ABSTRACT

While teaching vocabulary, it is crucial to consider the facilitative role of various techniques that may intensify and promote memory strategies required for meaningful learning and long-term retention. The present study aimed to compare the effect of three semantic mapping strategies of Word Relationship (WR), Lexical Relations and Definition (LRD), and Personal Word Connections (PWC) on Iranian EFL learners' vocabulary learning and retention. To this end, 120 intermediate EFL learners were assigned to three contrast groups and a control group, each with 30 participants who were randomly assigned to three WR, LRDG, and PWC experimental groups and a control group who attended the treatment two sessions a week for four weeks in which the vocabulary was presented via the three semantic differential modes. The control group received no treatment regarding the target words and was only involved in merely reviewing and revising the words. Immediate and delayed parallel vocabulary posttests were deployed immediately after the treatment and at a two-week interval to detect the impact of the instructional interventions on the participants' vocabulary learning and retention, respectively. The results of three one-way ANOVA tests and four repeated-measure ANOVA tests showed significantly higher improvements in the experimental groups' learning compared to the control group with the UWR outperforming others and achieving higher levels of learning and retention. In terms of the two other contrast groups, the PWC ranked second and the LRD ranked last. The findings underscore WR as an effective technique, the pedagogical implications of which will be discussed.

Keywords: Lexical Relations; Personal Word Connections; Semantic Mapping Strategies; Vocabulary Learning; Vocabulary Retention

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INTRODUCTION

Research findings in the last two decades have unraveled the multidimensional nature of second and foreign language learning which might be described as an intricately cognitive, affective, and social process, and the extent to which each of these characteristics may be accentuated relies heavily on the learning and teaching context. The distinctive characteristic of many EFL contexts is a relentless focus on vocabulary expansion and teaching. Zhang and Graham (2020) suggested that assisting learners

in expanding their vocabulary knowledge is a significant concern since it can adequately help learners improve their general knowledge of language proficiency. Numerous researchers and experts have envisaged vocabulary as the building blocks of language learning (Bogaards, 2001; Nation, 2005) whose contributions to learning and the final level of mastery achieved outweigh those of grammar (Celce-Murcia, 2001).

Regarding vocabulary learning, second language learners' pervasive problem is that they often cannot remember the word's meaning after some time. This problem



particularly applies to non-native language users who are often looking for words to express themselves orally or in writing (Ghalebi et al., 2020). One of the main areas of cognition on which most scholars have focused is memory. An underlying assumption in second language acquisition is that human beings suffer from a limited capacity for processing information. In this respect, what seems to be vital is the ability to process information, attend to, and organize new information. When an item is received, it enters primary memory with short-term storage. Rehearsal is essential for the item to be recalled, and if rehearsal is done regularly, the item is transferred to secondary memory which is long-term storage. This concept can be viewed from connectionist accounts of SLA as well.

According to the connectionism paradigm in cognitive SLA, language is represented in associations of varying strengths, derived from elements encountered in the input. Knowledge of an L2 is composed of the stored memories of already experienced elements (Ellis, 2019). Regarding the focus of this study, vocabulary processing involves turning on the labyrinth of interconnections between units, learning happens when the strength of the connections between units is modified, and vocabulary knowledge emerges gradually out of the network of the stored associations when certain connections become well-established. This study aims to investigate whether some specific vocabulary learning strategies are capable of establishing and/or strengthening the connections between units, consequently resulting in the acquisition of the target words.

With regard to strategy-based instruction and its definite advantages, it would be considerable to detect the effects of intentional strategy instruction on EFL learners. Griffiths and Parr (2001) argue that language learning has experienced a shift through which researchers emphasize strategies successful language learners should use to improve their learning. Regarding the cognitive theory framework, O'Malley and Chamot (1990) suggest a list of strategies divided into three categories i.e., metacognitive, cognitive, and social-affective.

Although some studies (e.g., Khoii & Sharififar, 2013) misinterpret this categorization and classify the semantic mapping (SM) under the cognitive strategy, Oxford's (1990) classification, SM is subsumed under the memory strategy and like grouping, using imagery, using keywords, etc., it is regarded as one of the sub-strategies of memory strategies. Following this line, the main issue of this study sets out to be "SM".

The theoretical basis of SM strategy goes back to schema theory according to which it is believed that the human brain organizes knowledge in units called schemata (Vakilifard et al., 2020). SM can be recognized under the terms of 'semantic networking', 'semantic webbing', and 'plot maps'. It is a visual framework for enhancing vocabulary knowledge by showing words related to one another. The conceptual relationship between vocabulary items is another detection that language learners can reach through the SM strategy. It is also argued that SM develops memory retention of vocabulary items. The essential foundation of SM (graphic organizing) is the theoretical construct that the diagram's visual and verbal systematic structure gets information together into a conceptual whole (Horton et al., 1990). However, learners do not create this conception that they are being taught as a set of unrelated and unknown terms, facts, or concepts. So paying attention to visual items seems to improve vocabulary retention (Sigueza, cited in Al-Hinnawi, 2012).

Mnemonic devices include memory strategies helping language learners to transfer items to long-term memory to store and retrieve them from long-term when needed. Most memory strategies using mnemonic devices include relating the new words with some already learned knowledge with the help of some form of visual images and grouping. So, researchers have an eye on the effect of using strategy for taking in new words for longer period which may be a crucial part of learning.

According to An (2006) SM diagram can show visually and obviously how concepts join together. This strategy includes various memory strategies like grouping, associating, and elaborating.

SM has been subcategorized into three major types. Word Relationship SM is based on a “tightly related” grouping of vocabulary items that contains words that can be described by the other words in the group, whereas, in Lexical Relations and Definition SM, each word can be learned/kept in mind by providing synonyms, antonyms, meaning, and examples for each (Nation, 2013). In addition, the purpose of SM might be involvement in relating the target words and examples to their personal lives and experiences, which is referred to as Personal Word Connections SM (Brown, 2015).

LITERATURE REVIEW

Several studies have been carried out concerning the effect of SM strategy instruction on learning vocabulary (e.g., Al-Hinnawi, 2012; Khoii & Sharififar, 2013; Morin & Goebel, 2001; Saeidi & Atmani, 2010; Zaid, 1995). In the last decade of the 20th century, Kaelin (1991) investigated the effect of SM on beginning and advanced learners’ vocabulary learning and found it significantly effective with beginners. Moreover, semantic maps were found to promote native English speakers’ vocabulary learning in regular classrooms and those who had got some learning disabilities (Zaid, 1995) and on English-speaking university students’ recognition and learning of vocabulary (Morin & Goebel, 2001).

In an attempt to investigate the effect of SM on vocabulary learning and incremental vocabulary growth of university students, Al-Hinnawi (2012) divided one hundred and two students into an experimental group and a control group. The former was taught the new L2 words using SM and the latter was taught the same items using traditional instruction. The results showed that the experimental group outperformed the control group regarding vocabulary learning and incremental growth. Khoii and Sharififar (2013) compared the effectiveness of two cognitive strategies, rote memorization (RM) and SM, on L2 vocabulary learning. One group used RM and the other used SM for vocabulary learning. Although both groups had improved their vocabulary knowledge, the results showed that none of the

techniques was superior to the other in helping the participants expand their vocabulary.

Zarei et al. (2015) compared the effects of explicit and implicit use of three presentation techniques (glossing, SM, and imagery) on Iranian EFL learners’ vocabulary comprehension and production. Considering explicit techniques of vocabulary teaching, SM and imagery was found to be the most effective techniques for teaching vocabulary comprehension and production, respectively. Glossing was reported as the least effective technique for both vocabulary comprehension and production. Implicit use of these techniques was found to affect only vocabulary comprehension.

More recently, Badr and Abu-Ayyash (2019) compared the effect of SM and rote memorization on students’ vocabulary retention. They found out that the participants’ retrieval of the target words improved due to the execution of both strategies, with the SM group outperforming the rote memorization one. SM has also been found in promoting midwifery students’ learning of technical words (Saragih, 2019). Vakilifard et al. (2020) examined the effect of cooperative learning and SM on the L2 Persian vocabulary acquisition. The results revealed that in comparison to direct translation, SM leads to better vocabulary learning. Accordingly, they concluded that alternative approaches to teaching vocabulary as the cooperative learning approach or SM strategy can lead to better vocabulary learning.

As can be seen from the literature re-review the bulk of the studies regarding SM and vocabulary acquisition has focused on comparing this memory strategy with other memory or cognitive strategies of vocabulary learning and, to the best of researchers’ knowledge, almost no study to date has been conducted to compare the three types of SM strategies in vocabulary learning. Moreover, the current works are mainly after short term effects of SM strategy and its possible long-term effect or the degree of its effectiveness on vocabulary retention has not been dealt with thoroughly. Furthermore, the effects of different strategies of SM on vocabulary knowledge have not been scrutinized in depth.

To bridge these gaps, the present study aimed to examine the differential impacts of word relationship (WR), lexical relations and definition (LRD), and personal word connections (PWC) on Iranian EFL learners' vocabulary learning and retention. To serve this purpose, the following research questions were proposed:

1. Does SM through word relationship have a significant effect on EFL learners' vocabulary learning and retention?

2. Does SM through lexical relations and definition have a significant effect on EFL learners' vocabulary learning and retention?

3. Does SM through personal word connection influence have a significant effect on EFL learners' vocabulary learning and retention?

4. Do the three SM strategies have differential effects on Iranian EFL learners' vocabulary learning and retention?

METHOD

Participants

A sample of 120 intermediate English learners (males and females) from Rezvan and Khan-e-Zaban Language Institutes in Ardabil was the final participants of the study. The participants were selected out of 320 students based on their performance on a Preliminary English Test (PET). To assure their homogeneity, the measures of central tendency and variability of the participants' scores on the PET were computed. Then, those scoring more than one standard deviation away from the mean score were excluded from the study. The participants were classified into four groups including three experimental groups, *the Word Relationship Group (WRG)*, *Lexical Relations and Definition Group (LRDG)*, and *Personal Word Connections group (PWCG)*, receiving instruction compatible with SM strategies and a control group (CG) who received the placebo, as explained in the 'Procedure' section.

Materials and Instruments

The research data were gleaned based on a Preliminary English Test, employed to assess the participants' initial homogeneity, and two multiple-choice vocabulary tests deployed at

the end of the study to assess the participants learning and retention of vocabulary.

Preliminary English Test (PET)

The first instrument was a modified version of the Preliminary English Test (PET), comprising a 30-item reading comprehension test, administered to verify the groups' initial reading comprehension homogeneity closely associated with vocabulary knowledge. Since it was used in the new context of this study, its reliability was re-estimated using the KR-21 formula. The reliability index turned out to be 0.88.

Multiple-Choice Vocabulary Test

Another instrument was a researcher-made multiple-choice vocabulary test with three versions. Eighty vocabulary test items were developed based on the target words selected from the intermediate level of *4000 Essential Words* (Nation, 2009). Forty items were randomly selected as the pretest and the other forty items as the posttest. For the delayed posttest, 40 items were randomly selected from among the items used in the pretest and the immediate posttest. The test items were piloted before the actual implementation and were revised for content appropriateness three times by two experienced language instructors. Moreover, to estimate the reliability of the multiple-choice vocabulary test, a KR-21 procedure was used, as a result, the reliability index of the pretest, immediate posttest, and delayed posttest were found to be .91, .89, and .87, respectively.

4000 Essential Words

Another instrument was *4000 Essential Words 2* (Nation, 2009). It is designed to focus on appropriate frequently used vocabulary to improve the vocabulary of EFL students from high beginner to advanced levels. The book covers a large portion of the words found in many spoken or written texts. The target words have been already contextualized in reading texts.

Procedure

Having sampled the intermediate participants based on their performance on the reading and vocabulary pre-tests, the four intact classes received the instruction that comprised a 14-

session course, eight sessions devoted to the treatment, and the placebo. All groups received instruction based on 8 chapters of *4000 Essential Words 2*. Putting a focus on 10 target words each session, the participants attended the treatment class two sessions a week for four weeks.

All in all, 80 words were selected to be presented in the four groups at the teaching pre-reading. The groups, however, received different instructional interventions based on the independent variables involved: *Using Word Relationships* (UWR), *Lexical Relations and Definition* (LRD), and *Personal Word Connections* (PWC), respectively. The first session was devoted to explicitly presenting the relevant vocabulary and familiarizing the participants with the classroom procedure in all groups.

In the UWRG, since the words were unknown to the learners, the teacher himself initiated writing the first keyword related to the target word on the board each session. The teacher wrote the target words one by one on the center of the board. Then, the participants with the teacher's help brainstormed and collaboratively proposed as many keywords as possible, related to each target word. The rationale behind this was to familiarize students with the meaning of the individual target words. Meanwhile, the learners were given a chance to work collaboratively in small groups to achieve a shared goal.

As for the brainstorming stage, the participants detected some words directly related to the keywords and indirectly to the target word as the central theme. The participants in the LRDG were required to review the words as the previous group did with a notable difference that in this group the teacher wrote the target words one by one on the board in such a way that the participants using the scaffolding technique could associate themselves with synonyms, antonyms, meaning, and example.

In each session, the teacher provided the students with two comprehensible and straightforward sentence examples of the target words to give them a chance to guess the meaning of words and provide synonyms and

antonyms followed by an activity of asking students to provide their example definitions for the target words.

In the third group receiving *Personal Word Connections*, the teacher presented both the target words and their meaning and example sentences. Then, the students answered the following questions to facilitate and make personal connections with words. According to Brown (2001), the purpose of the questions is to bring up *experiential learning* which can be defined as involving the students in relating the target words and examples to their personal lives and experiences:

What does this word remind me of in my life?

What is this word similar to in my life?

How is this word different from my life?

Has something like this word ever happened to me?

How does this word relate to my life?

What are my feelings when I read this word?

And finally, the control group was not taught how to use the SM strategy and the students were exposed only to conventional vocabulary instruction activities. Expressly stated, they read the passages, did the exercise and activities, and new words were introduced through contexts and exercises.

To clarify the techniques, some common elicitations for the word *secure* are presented as provided by the participants in each group. In UWRG, the students provided related words or phrases such as *feel secure, lock, guard, emotionally secure, password, protect, robust, and become secure*. LRDG supplied common antonyms, synonyms, and equivalents, including *safe, sheltered, insecure, fixed, protected, and insecure*. In PWCG, a sample answer set provided by one of the participants was as follows: This word reminds me of my private life.

It is similar to peace in life for me. My life is secure in our own country. While I read this word, it brings me feelings of safety. An immediate posttest consisting of 40 vocabulary items other than the items in the pretest was used to counteract the memory effect (Baddeley, 1999). This was done to determine whether or not the SM strategies were

instrumental in improving learners' vocabulary knowledge. To measure the possible impacts of the three different strategies of SM on the participants' retention, they sat for a delayed posttest that was parallel to the immediate posttest. To control the practice effect, it was administered at a two-week interval after the immediate one. The 40 items in the delayed posttest were randomly drawn from among the 80 items used in the pretest and the immediate posttest.

RESULTS

The research questions delved into the impact of the three instructional interventions on the learning and retention of a set of vocabulary items by four groups of Iranian intermediate EFL learners participating in the study. However, before the study, it was essential to check the normality of the scores and the homogeneity of the groups. Hence, first, the normality assumption was checked through Kolmogorov-Smirnov (KS) and Shapiro-Wilk (SW) tests, which are presented in Table 1.

Table 1
Tests of Normality for the Four Groups across Three Testing Periods

		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
UWRG	Pretest	.121	30	.200	.956	30	.247
	Posttest 1	.142	30	.124	.944	30	.118
	Posttest 2	.139	30	.146	.956	30	.241
LRDG	Pretest	.148	30	.093	.949	30	.161
	Posttest 1	.172	30	.053	.945	30	.125
	Posttest 2	.146	30	.062	.911	30	.056
PWCG	Pretest	.155	30	.064	.946	30	.400
	Posttest 1	.194	30	.055	.906	30	.222
	Posttest 2	.142	30	.127	.961	30	.326
CG	Pretest	.138	30	.151	.947	30	.141
	Posttest 1	.084	30	.200	.983	30	.898
	Posttest 2	.164	30	.093	.964	30	.382

As can be observed in Table 1, the p -value (Sig. column) is more significant than .05 for all groups over the three-time intervals. Consequently, it can be claimed that the scores obtained are normally distributed.

Therefore, it is safe to employ parametric statistics. To measure within-group differences across the three measurement times, one-way repeated measures ANOVAs were run for the three groups.

Table 2
Descriptive Statistics for the First Group

	Mean	Std. Deviation	N
Pretest	5.03	2.1	30
Posttest	31.26	2.28	30
Delayed	20.50	1.87	30

Table 2 shows the descriptive statistics for the scores of the first group over the three-time intervals, the pretest, the immediate posttest, and the delayed posttest. It is revealed that the first group's scores soared from the pretest to the immediate and delayed posttests but there was a decline from the immediate posttest to the delayed one. Table 3 shows the

results of the one-way repeated measures ANOVA for the first group over three-time intervals.

The results revealed that there is a significant difference in the performance of the participants in the first group over the three intervals (Wilks' Lambda = .003 with a probability value of .000, $F(2, 28) = 4.864$, $p <$

.0005, multivariate partial eta squared (η^2) = .997).

Table 3**One-Way Repeated Measures ANOVA for the First Group over Three Time Intervals**

Effect	Value	F	Hypothesis		Sig.	Partial Eta Squared
			df	Error df		
Time Pillai's Trace	.997	4.864E3a	2.000	28.000	.000	.997
Wilks' Lambda	.003	4.864E3a	2.000	28.000	.000	.997
Hotelling's Trace	347.448	4.864E3a	2.000	28.000	.000	.997
Roy's Largest Root	347.448	4.864E3a	2.000	28.000	.000	.997

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Time

Table 4**Pairwise Comparisons for the First Group across the Three Time Intervals**

Measure: MEASURE_1

(I)	(J)	Mean Difference			95% Confidence Interval for Difference	
		(I-J)	Std. Error	Sig. ^a	Lower Bound	Upper Bound
1	2	-26.233*	.274	.000	-26.930	-25.537
	3	-15.467*	.302	.000	-16.235	-14.699
	21	26.233*	.274	.000	25.537	26.930
3	3	10.767*	.207	.000	10.240	11.293
	1	15.467*	.302	.000	14.699	16.235
	2	-10.767*	.207	.000	-11.293	-10.240

Based on estimated marginal means

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

a. Adjustment for multiple comparisons: Bonferroni.

Based on the results of descriptive statistics (Table 2) coupled with the post-hoc Pairwise Comparisons for the first group (Table 4), it was revealed that the group made gains significantly from the pretest ($M = 5.03$, $SD = 2.1$) to the immediate posttest ($M = 31.26$, $SD = 2.28$) ($p = .000$) and the delayed posttest ($M = 20.5$, $SD = 1.87$) ($p = .000$). Moreover, the decline from the immediate posttest to the

delayed one was also significant ($p < .0005$). Lambda = .003 with a probability value of .000, comparisons are also required (Table 4). examine the possible effect of the second condition, i.e., using lexical relations and definition, the same procedures followed for the first research question have been executed the findings of which are presented in tables 5 through 7.

Table 5**Descriptive Statistics Obtained for the Second Group**

	Mean	Std. Deviation	N
Pretest	5.33	2.20	30
Posttest	27.03	2.32	30
Delayed	18.73	1.83	30

Based on Table 5, it is revealed that the second group's scores increased from the pretest to the immediate and delayed posttests but there was

a drop from the immediate posttest to the delayed one.

Table 6
One-Way Repeated Measures ANOVA for the Second Group over Three Time Intervals

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time Pillai's Trace	.995	2.984E3a	2.000	28.000	.000	.995
Wilks' Lambda	.005	2.984E3a	2.000	28.000	.000	.995
Hotelling's Trace	213.167	2.984E3a	2.000	28.000	.000	.995
Roy's Largest Root	213.167	2.984E3a	2.000	28.000	.000	.995

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Time

Based on the results of the one-way repeated measures ANOVA for the second group over the three-time intervals (Table 6), it was revealed that the difference in the performance of the participants in the second group over the

three-time intervals was significant (Wilks' Lambda = .005 with a probability value of .000, $F(2, 28) = 2.984$, $p < .0005$, multivariate partial eta squared (η^2) = .995).

Table 7
Pairwise Comparisons for the Second Group across the Three Time Intervals

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-21.700*	.276	.000	-22.401	-20.999
	3	-13.400*	.373	.000	-14.348	-12.452
2	1	21.700*	.276	.000	20.999	22.401
	3	8.300*	.343	.000	7.429	9.171
3	1	13.400*	.373	.000	12.452	14.348
	2	-8.300*	.343	.000	-9.171	-7.429

Based on estimated marginal means

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

a. Adjustment for multiple comparisons: Bonferroni.

Merging the results of the descriptive statistics (Table 5) with the post-hoc Pairwise Comparisons for the second group (Table 7), it was revealed that the group made gains significantly from the pretest ($M = 5.33$, $SD = 2.2$) to the immediate posttest ($M = 27.03$, $SD = 2.32$) ($p = .000$) and the delayed posttest ($M = 18.73$, $SD = 1.83$) ($p = .000$). It was also revealed that, like the first group, the second group's decline from the immediate posttest to

the delayed one is significant ($p = .000$). The answer for the second research question, therefore, is affirmative. The results obtained from the third group across three-time intervals replicate those for the second group- that is, the third group's scores soared from the pretest to the immediate and delayed posttests but there was a decrease from the immediate posttest to the delayed one (Table 8). To ensure that these changes are statistically significant, the results

of the multivariate tests are displayed in Table 9. Table 11 summarizes the descriptive statistics of the study across the three exam

intervals of the vocabulary assessment for the three contrast and one control groups.

Table 8
Descriptive Statistics Obtained for the Third Group

	Mean	Std. Deviation	N
Pretest	5.36	2.32	30
Posttest	29.40	2.60	30
Delayed	23.13	2.14	30

Table 9
One-way repeated measures ANOVA for the Third Group over Three Time Intervals

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time Pillai's Trace	.995	3.035E3a	2.000	28.000	.000	.995
Wilks' Lambda	.005	3.035E3a	2.000	28.000	.000	.995
Hotelling's Trace	216.790	3.035E3a	2.000	28.000	.000	.995
Roy's Largest Root	216.790	3.035E3a	2.000	28.000	.000	.995

a. Exact statistic

b. Design: Intercept

Within Subjects Design: Time

Table 10
Pairwise Comparisons for the Third Group across the Three Time Intervals

(J) Time	Mean Difference (I-J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference	
				Lower Bound	Upper Bound
2	-24.033*	.305	.000	-24.808	-23.258
3	-17.767*	.425	.000	-18.847	-16.686
1	24.033*	.305	.000	23.258	24.808
3	6.267*	.404	.000	5.241	7.293
1	17.767*	.425	.000	16.686	18.847
2	-6.267*	.404	.000	-7.293	-5.241

Based on estimated marginal means

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

Based on the means of the groups in the pretest (5.03, 5.33, 5.37, and 5.80 for Using Word Relationships group, Lexical Relations and Definition group, Personal Word Connections group, and Control group, respectively), minor differences can be detected among the four groups in the pretest. To prove that these differences between the groups are not statistically significant, that is, the groups are not initially different in terms of the target items, a one-way ANOVA was run between the four groups. Based on the one-way ANOVA

(Table 12), the differences among the four groups on the pretest fell far short of significance ($F = .625$, $p = .601$). So it can be concluded that the four groups were equal in their initial proficiency regarding the target words.

According to the descriptive statistics, all four groups improved from the pretest to the posttest 1 and these gains were substantial for UWR, LRD, and PWC, but the control group showed a slight improvement from the pretest to the posttest 1. The story is not the same when

comparing the delayed posttest with the pretest and posttest 1. Specifically speaking, compared with their performance in the pretest, all groups sustained improvement in the delayed posttest. However, their performance declined from

posttest 1 to the delayed posttest. The one-way ANOVA revealed significant differences between groups in the posttest 1 ($F = 564.195$, $p = .000$) (Table 13).

Table 11

Descriptive Statistics across the Three Exam Intervals for the Four Groups

	Tests	Mean	SD	N
Pretest	Using Word Relationships	5.03	2.109	30
	Lexical Relations and Definition	5.33	2.202	30
	Personal Word Connections	5.37	2.327	30
	Control group	5.80	2.107	30
	Total	5.38	2.178	120
Posttest	Using Word Relationships	31.27	2.288	30
	Lexical Relations and Definition	27.03	2.327	30
	Personal Word Connections	29.40	2.608	30
	Control group	9.13	2.161	30
	Total	24.20	9.167	120
Delayed posttest	Using Word Relationships	20.50	1.871	30
	Lexical Relations and Definition	18.73	1.837	30
	Personal Word Connections	23.13	2.145	30
	Control group	7.56	2.079	30
	Total	17.48	6.275	120

Table 12

One-way ANOVA across Four Groups on the Pretest

Source	SS	df	MS	F	Sig.
Between Groups	8.967	3	2.989	.624	.601
Within groups	555.400	116	4.788		
Total	564.367	119			

Table 13

One-way ANOVA for the Immediate Posttest

Source	SS	df	MS	F	Sig.
Between Groups	9360.292	3	3120.097	564.195	.000***
Within groups	641.500	116	5.530		
Total	10001.792	119			

The post-doc test showed that the differences between groups were significant. More specifically, in posttest 1 the, UWR group outperformed all contrast and control groups, and the PWC group outperformed the LRD and the control groups (Table 15). Based on the results of the one-way ANOVA (Table 14), the between-groups differences in the posttest 2 were also significant ($F=356.774$, $p < .05$). These results coupled with the results obtained

from the post-hoc LSD test showed that in the posttest 2, like the posttest 1, the UWR group manifested significantly more significant gains than the contrast and control groups, and the PWC group outperformed both the LRD and the control groups (Table 15). Regarding all between-group differences, we can claim that three SM strategies have differential effects on Iranian EFL learners' vocabulary learning and retention.

Table 14***One-way ANOVA across the Four Groups in the Delayed Posttest***

Source	SS	df	MS	F	Sig.
Between Groups	4227.767	3	1409.256	356.774	.000***
Within groups	458.200	116	3.950		
Total	4685.967	119			

Table 15***Summary of Between-Group Contrasts among Four Groups Detected by Post-Hoc Comparisons***

Posttest 1	UWR > Control *
	UWR > PWC *
	UWR > LRD *
	PWC > Control*
	PWC > LRD*
	LRD > Control*
Posttest 2	UWR > Control *
	UWR > PWC *
	UWR > LRD *
	PWC > Control*
	PWC > LRD*
	LRD > Control*

DISCUSSION

The present study investigated the effect of three different SM strategies on vocabulary learning and retention of Iranian intermediate EFL learners. First of all, it was found that SM significantly impacted EFL learners' vocabulary learning and retention through word relationship. This confirmed the findings of Dilec and Yuruk (2013) who reported that SM was significantly more conducive to vocabulary learning than traditional methods.

Likewise, Keshavarz et al. (2006) verified the positive effect of SM on Iranian EFL students' vocabulary learning who worked collaboratively in small groups to achieve a shared goal. Hence, the researchers attributed the facilitative effect of SM to the cooperation it elicited among the learners leading them to subdue their competitive propensities.

LRD group, too, improved from the pretest to the posttest 1 and, with a bit of decline, to the delayed posttest. Consequently, it is safe to argue that SM has a positive effect on Iranian intermediate EFL learners' vocabulary learning and retention through lexical relations and definition. This finding is in line with Brown and Perry (1991) who found that the students taught to use the semantic-keyword strategy

retained significantly more words than the students taught by the keyword strategy. Accordingly, they claimed that the strategies involving a greater 'depth of processing' would lead to better retention. Since the students were being scaffolded to achieve the desired goal, the finding can also be related to what Vygotsky (1978) termed the zone of proximal development (ZPD). In other words, the Lexical Relations and Definition type of SM can be used to assist a person to move through the zone of proximal development and help them achieve the level of potential and desired development.

Mapping through secret word connections had a significant effect on vocabulary learning and retention. This finding can be explicated in terms of the general merits of SM and based on experiential learning theory (Kolb, 2015). As Masilamani and Sundarsingh (2016) suggested, using this type of learning in teaching vocabulary makes the teaching-learning process much more interesting, helps learners get involved actively in the learning process, and provides the students with challenges to stretch themselves to answer the questions. The three strategy types had differential impacts both on vocabulary learning and retention. So,

it can be claimed that various SM techniques impact vocabulary learning and retention differently. More specifically, in terms of vocabulary learning, the UWR group ranked first among the three strategies, then came the PWC group, and the LRD ranked last. The same story makes sense in different SM strategy types regarding vocabulary retention.

It should be borne in mind that since no study to date has compared the three types of SM in focus, the superiority of the groups over each other cannot be compared and contrasted with previous research. However, the superiority of the UWRG over the other two groups might be corroborated by the principles of collaborative learning.

Collaborative learning is a successful educational approach to teaching and learning through which groups of learners work together to achieve a shared goal. The shared goal can be solving a problem, completing a task, or eliciting as many keywords as possible related to a target word, as in this study. PWCG ranked second. This group mainly used experiential learning and the participants tried to connect the words to their personal experiences. As Masilamani and Sundarsingh (2016) argued experiential learning can be used in teaching vocabulary to make the teaching-learning process much more exciting and fun. According to Brown (2000), experiential learning is constructivist learning, where students are active learners and construct their knowledge. Since it is active learning, the students more readily understand whatever words they are learning and thus retain the target words to a greater degree than when merely having information presented to them by another. The LRDG lagged behind the two other groups. The learners were encouraged to associate the words with their synonyms, antonyms, meaning, and examples in this group. This association was accomplished through the teacher's scaffolding. Unlike the two other groups, learning in this group was mainly teacher-centered and the students neither were actively involved in the learning process nor did they use their personal experience. Accordingly, in this study, experiential and collaborative learning resulted in better and

more durable learning than the one scaffolded by the teacher.

The positive effect of different SM strategies on vocabulary learning can socioculturally be explicated concerning the scaffolding function that the SM served in helping low-achieving students. All students bring an abundance of experiences to the classroom and through, for example, *Personal Word Connection*, teachers can tap the collective knowledge of their students and help them make specific connections between their personal experiences to the content.

The results of the current study might be corroborated in terms of VanPatten's Processing Instruction (2002) in which input manipulation is suggested as an alternative to output treatment and negative evidence as a way of promoting learners' noticing of enhanced elements (Gass et al., 2013). This manipulation can be executed through scaffolding aiming at promoting learners' recognition and comprehension of the input. Three features of this manipulation and "input processing", as he suggests, include providing learners with information about a structure, informing learners about a particular processing strategy they might encounter in the process of input comprehension, and structuring input so that learners must rely on form/structure to get the meaning (VanPatten, 2007). As can be seen, these three features are shared in the three SM strategies.

The findings can be discussed from the psycholinguistic accounts of L2 development in general and Schmidt's (1994) theory of attention in particular. Based on Schmidt's (1994) distinction, there are four senses of consciousness, namely consciousness as intentionality, consciousness as attention, consciousness as awareness, and consciousness as control. According to the second sense, even though acquisition may take place either intentionally or incidentally, paying conscious attention to form is the essential ingredient of learning.

This sense of consciousness and Schmidt's (1990) Noticing Hypothesis necessitate using some tools to involve learners in such activities

as semantic mapping activities to draw their attention to what is supposed to be learned.

Another perspective based on which the value of SM is justified is the role the memory strategies (Oxford, 1990) or cognitive strategies (O'Malley & Chamot, 1990) play in second language acquisition. From this vantage point, learning strategies in general and SM, in particular, help move learners from controlled processing to automatized ones. As Mitchell and Myles (2004), drawing on O'Malley and Chamot (1990), argued “learning strategies parallel theoretically derived cognitive processes and have the potential to influence learning outcomes positively” (p. 107). The positive effect of SM on vocabulary retention can be cognitively explained concerning the Involvement Load Hypothesis (Hulstijn & Laufers, 2001) which is directly related to the long-term effect of some straightforward ways of vocabulary instruction including SM. SM plays a crucial role in elaborately processing vocabulary and transferring the information to long-term memory, leading to retention. In other words, the greater the involvement load, the better and more prolonged the retention because the degree of involvement determines the extent to which an unfamiliar word or item might be retained in memory (Hulstijn & Laufers, 2001).

The long-term effect of SM on vocabulary knowledge can be linked to connectionist accounts of SLA in a way that learning new words transpire through the strengthening and weakening of the interconnections of networks in response to examples encountered in the input which in turn were provided by SM strategies. This process allows newly learned words to be retrieved and processed by transforming activity among large assemblies of neurons (Joanisse & McClelland, 2015). Differently stated, SM strategies serve as “correlated activities”, as Elman et al. (1996) extracted from Hebbian learning, through which the pathways between nodes are strengthened and result in a kind of weighting between the nodes. This weighting mechanism is the means through which vocabulary knowledge is incrementally developed in the network.

CONCLUSION

The present study suffered from some common limitations and delimitations, such as a small sample size, a short length of the treatment, and overlooking individual differences like gender and proficiency level as moderator variables, which might restrict the scope of generalizability of the findings emerging from the present study. However, based on the findings of this study, it can be claimed that SM can be considered a practical way of creating a cooperative learning atmosphere in which learners may interact in groups to relieve the burden of tediously looking for new words and anxiously competing with each other. Hence, teachers are recommended to rely on SM to tap their learners' personal experiences to personalize and localize the words they teach and make learning more meaningful. Of course, this entails some investment in strategy training and requires the teachers to integrate mini-lessons devoted to strategy training in their lesson plans. The need for SM and strategic training are pretty compatible with the principles of post-method language pedagogy and should be acknowledged by textbook writers and syllabus designers who may enrich the teaching materials by including some relevant exercises.

REFERENCES

- Al-Hinnawi, A. N. (2012). The effect of the graphic organizer strategy on university students' English vocabulary building. *English Language Teaching*, 5(12), 62–69.
- An, S. C. (2006). *A study on English vocabulary learning strategies* (Unpublished master's thesis). National Chiayi University, Taiwan.
- Baddeley, A. (1999). *Human memory*. London: Lawrence Erlbaum Associates.
- Badr, H. M., & Abu-Ayyash, E. A. S. (2019). Semantic mapping or rote memorization: Which strategy is more effective for students' acquisition and memorization of 12 vocabulary? *Journal of Education and Learning*, 8(3), 158–174
- Bogaards, P. (2001). Lexical units and the learning of foreign language vocabulary.

- Studies in Second Language Acquisition*, 23(3), 321–343.
- Brown, H. D. (2001). *Teaching by principles: An interactive approach to language pedagogy* (2nd ed.). New York: Pearson Education.
- Brown, H. D. (2015). *Teaching by principles: An interactive approach to language pedagogy* (4th ed.). New York: Pearson Education.
- Brown, T. S., & Perry, F. L. (1991). A comparison of three learning strategies for ESL vocabulary acquisition. *TESOL Quarterly*, 25(4), 655–773.
- Celce-Murcia, M. (2001). *Teaching English as a second or foreign language* (3rd ed.). Heinle & Heinle.
- Dilek, Y., & Yürük, N. (2013). Using semantic mapping technique in vocabulary teaching at pre-intermediate level. *Procedia - Social and Behavioral Sciences*, 70, 1531–1544.
- Ellis, R. (2019). *Understanding second language acquisition* (2nd ed.). Oxford: Oxford University Press.
- Elman, J., Bates, A., Johnson, M., Karmiloff-Smith, A., Parisi, D., & Plunkett, K. (1996). *Rethinking innateness: A connectionist perspective on development*. Cambridge, MA: The MIT Press.
- Gass, S. M., Behney, J., & Plonsky, L. (2013). *Second language acquisition: An introductory course* (4th ed.). Mahwah, NJ: L. Erlbaum Associates.
- Ghalebi, R., Sadighi, F., & Bagheri, M. S. (2020). Vocabulary learning strategies: A comparative study of EFL learners. *Cogent Psychology*, 7(1), 1–12.
- Griffiths, C., & Parr, J. M. (2001). Language-learning strategies: Theory and perception. *ELT*, 55(3), 247–254.
- Horton, S., Lovitt, T., & Bergerud, D. (1990). The effectiveness of graphic organizers for three classifications of secondary students in content area classes. *Journal of Learning Disabilities*, 23(1), 12–22.
- Hulstijn, J. (2005). Theoretical and empirical issues in the study of implicit and explicit second-language learning: Introduction. *Studies in Second Language Acquisition*, 27, 129–140.
- Hulstijn, J. H., & Laufer, B. (2001). Some empirical evidence for the involvement load hypothesis in vocabulary acquisition. *Language Learning*, 51(3), 539–558.
- Joanisse, M., & McClelland, J. (2015). Connectionist perspectives on language learning, representation, and processing. *WIREs Cogn Sci*, 6(3), 235–247.
- Kaelin, A. M. (1991). *The effects of instruction using a mnemonic Graphic organizer on vocabulary acquisition among adult English as a second language students* (Unpublished master's thesis). California State University, Sacramento.
- Keshavarz, M. H., Atai, M. R., & Mossahebi Mohammadi, S. (2006). The effect of semantic mapping strategy instruction on vocabulary learning of intermediate EFL students. *Journal of Faculty of Letters and Humanities*, 49(198), 149–176.
- Khoi, R., & Sharififar, S. (2013). Memorization versus semantic mapping in L2 vocabulary acquisition. *ELT*, 67(2), 199–209.
- Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development*. Upper Saddle River, NJ: Pearson Education.
- Masilamani, J., & Sundarsingh, J. (2016). Learning Style and Preference: Enriching Vocabulary through Experiential Learning in Engineering Classroom. *International Journal of Engineering Science and Computing*, 6(4), 3402–3406.
- Mitchell, R., & Myles, F. (2004). *Second language learning theories* (2nd ed.). London: Hodder Arnold.
- Morin, R., & Goebel, J. (2001). Basic vocabulary instruction teaching strategies or words? *Foreign Language Annals*, 34(1), 8–17.
- Nation, I. S. P. (2005) Teaching and learning vocabulary. In E. Hinkel (Ed.) *Handbook of research in second language teaching and learning* (pp. 581–595). Mahwah, N.J.: Lawrence Erlbaum.

- Nation, I. S. P. (2009). *4000 essential English words*. Santa Fe Springs, Ca.: Compass Pub.
- Nation, I. S. P. (2013). *Learning vocabulary in another language* (2nd ed.). Cambridge: Cambridge University Press.
- O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge: Cambridge University Press.
- Oxford, R. L., (1990). *Language learning strategies: What every teacher should know*. Boston: Newbury House.
- Saeidi, M., & Atmani, S. (2010). Teaching vocabulary through semantic mapping as a pre-reading activity across genders. *Journal of English Studies*, 1(1), 51–64.
- Saragih, E. (2019). The effect of Semantic Mapping Technique on technical vocabulary mastery for midwifery students. *Studies in English Language and Education*, 6(2), 333–342.
- Schmidt, R. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3–32). Cambridge: Cambridge University Press.
- Vakilifard, A., Bahramlou, K., & Mousavian, M. (2020). The effect of cooperative learning approach and semantic MAPPING strategy on the acquisition of L2 Persian vocabulary. *Cogent Education*, 7(1), 1–14.
- VanPatten, B. (2002). Processing instruction: An update. *Language Learning*, 52(4), 755–803.
- VanPatten, B. (2007). Processing instruction. In C. Sanz (Ed.), *Mind and context in adult second language acquisition* (pp. 267–281). Washington D.C.: Georgetown University Press.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Zahedi, Y., & Abdi, M. (2012). The effect of semantic mapping strategy on EFL learners' vocabulary learning. *Social and Behavioral Sciences*, 69, 2273–2280.
- Zarei, A. A., & Sepahian, S. (2015). The effects of explicit and implicit instructional techniques (glossing semantic mapping, and imagery) on L2 vocabulary comprehension and production. *Academie Royale Des Sciences D Outre-Mer Bulletin Des Seances*, 4(3), 30–40.
- Zaid, M. (1995). Semantic mapping in communicative language teaching. *English Teaching Forum*, 33(3), 6–11.
- Zhang, P., & Graham, S. (2020). Learning vocabulary through listening: The role of vocabulary knowledge and listening proficiency. *Language Learning*, 70(4), 1017–1053.

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