Research paper

The Comparative Effects of Note-Taking and Semantic Mapping on EFL Learners' Vocabulary Learning and Vocabulary Retention

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Abstract

Vocabulary is one of the language components with which many learners have problems. The present study compared the effects of note-taking and semantic mapping on vocabulary learning and retention of intermediate Iranian EFL learners. A total number of 98 learners took a proficiency test and based on its scores, 74 more homogeneous learners were selected as the participants of the study. The participants were then non-randomly assigned to two experimental groups and a control group. Note-taking and semantic mapping were used each in one of the experimental groups while the control group used none of the strategies. A pre-test, a posttest, and a delayed posttest were employed to assess the efficiency of the strategies. The collected data were analyzed using descriptive statistics and one-way ANOVAs. The results showed that note-taking and semantic mapping strategies had no significantly different effects on the participants' vocabulary learning and vocabulary retention. However, note-taking showed to be significantly more effective than no strategy on the posttest although this difference was not seen on the delayed posttest. The findings of the study have implication for both language teachers and learners which are discussed in the paper.

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Introduction

Language learning strategies (LLS) have been discussed as effective ways to improve learners' learning outcomes. Based on these strategies, vocabulary learning strategies (VLS) have found significance as strategies users can benefit from in enhancing their development of

vocabulary. Due to their significance, VLS have been the foci of quite a large number of studies, ranging from those centering on the types of VLS used by learners (e.g., Cohen, 1990, Nation, 2001, Hatch & Brown, 1995) to the use of VLS across proficiency level (e.g., Lawson & Hogben, 1996; Sanaoui, 1995) to the role of environmental factors in the efficacy of VLS (e.g., Nakamura, 2002).

Two of the VLS supposed to influence learners' progress are note-taking and semantic mapping. Some studies have examined how learners do note-taking (e.g., Cohen & Aphek, 1981) and some have revealed positive effects for note-taking on various aspects of language learning, including reading comprehension (e.g., Faber, Morris, & Lieberman, 2000). A number of studies have compared note-taking with other learning strategies (e.g., Gu, & Johnson, 1996; Mokhtar et al., 2017; Nakamura, 2002). However, despite the great importance teachers distinctively assign to the role of note-taking, studies on the effects of note-taking on vocabulary learning are quite rare (Gu, 2003). Similarly, some empirical studies have reported positive effects for semantic mapping on vocabulary learning (e.g., Abdollahzadeh & Amiri, 2009; Saeidi & Atmani, 2011) and some have addressed the role of semantic mapping in developing other language components, such as reading comprehension (e.g., Amoush, 2012). Nonetheless, no study was found to have compared the role of note-taking and semantic mapping in learners' vocabulary development. Thus, the present study pertained to examine the relative effects of these two strategies on learners' vocabulary learning and retention. Based on the stated objective, the questions which were investigated in this study were as follows:

1. Are there any statistically significant differences among the effects of note-taking, semantic mapping, and traditional vocabulary instruction techniques on the vocabulary learning of intermediate Iranian EFL learners?
2. Are there any statistically significant differences among the effects of note-taking, semantic mapping, and traditional vocabulary instruction techniques on the vocabulary retention of intermediate Iranian EFL learners?

Review of the Literature

Due to the high significance of lexical knowledge in language learners' effective perception and production in the target language, a large amount of research has addressed vocabulary development in learners. An issue of interest in a lot of these studies has been the role of strategies teachers use in teaching vocabulary and learners use in learning vocabulary. Some studies related to VLS have compared the effects of different VLSs, including note-taking or semantic mapping, on learners' lexical development. For instance, Ahmed (1989) used a triangulation of data, including think-aloud, observation, and interview methods to collect data from 300 Sudanese EFL learners and the results showed that note-taking strategy was highly frequently used by these learners. Faber et al (2000) studied the effect of note-taking on reading comprehension of 115 ninth graders from a junior high school. The results indicated that note-taking had a significant effect on the participating students' reading comprehension and that this effect was more for low-interest passages than high-interest ones. Moreover, Zhang (2009) found note-taking as the third most commonly used strategy following dictionary use and guessing the meaning. Zhang (2009) also found a noticeable difference between English and

non-English majors in their use of vocabulary learning strategies. Based on Zhang (2009), three of the studied vocabulary strategies positively correlated with vocabulary size and one of these three was noting down the usage. Liu, Huang, and Chien (2019) compared the effects of two methods of note-taking, that is, nonlinear associations method and linear outline method. The findings revealed positive effects on learners' vocabulary retention for both methods though the nonlinear associations method showed to be significantly more effective than the outline method. The results, moreover, indicated that learners in the associations note-taking group improved more in forming meaningful word association while taking notes. On the other hand, Hashemi and Hadavi (2015) examined the use and preferences of seven language learning strategies among nursing students at Rafsanjan University of Medical Sciences using a questionnaire. Based on the results, the order of the strategies from the most frequently used ones was study preference strategies, social strategies, guessing, dictionary use, memory, selective attention, note taking, and autonomy. Note-taking was thus one of the least frequently used strategies by these students. In their study, Alahmadi and Foltz (2020) observed that note-taking influenced learners' vocabulary knowledge.

Regarding the role of concept maps, Stahl and Vancil (1986) compared three experimental groups to see what is important in semantic mapping and its effect on vocabulary learning. In one of the groups, the subjects had a physical map showing the relations among words. In the second one, they were guided to discuss the words in groups, but they didn't have a map. In the third one, the students had a map based on which they could discuss the words. The results showed that the two groups engaged in discussion (irrespective of having or not a physical map) outperformed the map only group. Mesrabadi, et al,. (2005) compared the role of prepared concept maps, concept maps developed by individual learners, and concept maps developed collaboratively in groups on elementary school teachers in an in-service course. The findings revealed significant effects for the three techniques, with the highest effect for individually developed concept maps and the least for the prepared ones. In addition, Keshavarz, Atai, and Mossahebi Mohammadi (2006) examined the effect of semantic mapping on intermediate EFL learners' vocabulary development across gender. They reported significant superiority of the experimental group over the control group with no interaction effect for gender. Furthermore, Khamesan and Baradaran Khaksar (2011) compared the effect of individual and collaborative concept mapping on intermediate EFL learners' vocabulary learning and found no significant differences between the two groups. Saragih, et al. (2019) carried out a study to see the effect of semantic mapping on vocabulary learning of 40 midwife students' at Universitas Prima Indonesia. This finding showed that the students in the experimental group significantly performed better that those in the control group. Thaledon (2020) studied the effects of semantic mapping on vocabulary comprehension of students from Vocational classes. The results showed higher performance for the semantic group than the control group. The findings also showed that the students had high attitudes toward the use of semantic mapping in learning words. Furthermore, Bouafia and Guerfi (2020) surveyed forty secondary school students and eight English teachers on their attitudes towards the role of semantic mapping on students' vocabulary retention. Based on the findings, most students and teachers have positive attitudes toward the use of this technique in vocabulary retention.

Among the comparative studies including semantic mapping as one of the VLSs, reference can be made to the study by Khoii and Sharififar (2013). They compared the effects of semantic mapping and rote memorization on intermediate learners' vocabulary learning and found no significant difference between the two techniques although both had positive influence on learners' vocabulary development. Vakilifard, Bahramlou and Mousavian (2020) studied the effects of semantic mapping and cooperative learning approach on learners' vocabulary learning. The results showed significant positive effects for the three experimental groups practicing semantic mapping, cooperative learning approach, and a combination of the two methods, but not for the control group. It was also revealed that the semantic mapping group had the highest performance. Seffar (2020) examined the effect of training in five VLS, that is, dictionary work, word cards, semantic mapping, word parts, and guessing from context, on 48 EFL upper-intermediate university students' vocabulary learning. The results showed that after training, the students in the experimental group used more VLS and had significantly better vocabulary scores.

Methodology

Participants

Initially, 98 male and female intermediate EFL learners from six intact classes in one of the language institutes in Poledokhtar, Lorestan took an English language proficiency test. Then, based on the results of this test (Mean = 15.13, SD = 3), 74 students whose scores fell between one standard deviation below and one standard deviation above the mean (i.e., between 12 and 18) were considered as the main participants of the study. The six classes were randomly assigned to three groups, two experimental and one control group. All the 98 students were present in the six classes during the study; however, only the performance of the 74 selected ones was taken as data for this study. Of these 74 learners, 50 were attending the two experimental groups, 25 in each, and 24 were in the control group.

Instrumentation

To gather the data needed to answer the questions of the study, four instruments were employed. These instruments included an English language proficiency test and three researcher-made vocabulary tests. More details about any of these instruments is as following.

English Language Proficiency Test

Although the learners in the six classes attending this study were at intermediate level based on the institute placement, a test was given to them to let the researchers find the more homogenous ones for the study. The test used for this purpose was the reading section of the Preliminary English Test (PET). The reading section of the test has 32 questions in six parts and since each item scores one, the scores on the test range from zero to 32. The test was administered in 45 minutes based on its manual. It was piloted first with 32 learners at the same level of the participating learners and the reliability showed to be .79. Then the test was used to check the homogeneity of the learners.

Teacher-made Target Vocabulary Tests (Pretest, Posttest, and Delayed Posttest)

Three parallel target vocabulary tests each with 40 multiple-choice items were prepared by the first author and were used to test the EFL learners' ability concerning their target vocabulary knowledge at three stages in the study, that is, before the treatment, immediately after the treatment, and two weeks after the posttest. To pilot the three tests, they were administered to 35 learners with the same characteristics as those of the participants in three different sessions. The reliabilities of the tests were calculated using Kurder-Richardson formula and all the tests showed to be reliable (pretest: r = .85; posttest: r = .8; and delayed posttest: r = .87).

Design of the Study

The design of this research was Quasi-experimental pretest-posttest control group. The subjects received treatment, but they were not selected randomly. Learners were all at the same level of general English language and were non-randomly assigned to two experimental groups and a control group. After administering a pretest for checking the initial homogeneity, two posttests were administered to find out the differences between the performances of the groups on immediate and delayed posttests.

Data Collection Procedure

Initially, the proficiency test was selected and piloted and also the three vocabulary tests were made and piloted. Then, 98 learners in six intact classes were given the proficiency test and on the basis of scores on this test, the most homogeneous learners were chosen to be taken as the study participants. The six intact classes were randomly assigned to three groups, with two classes in each group. Two of these groups were the two experimental groups and the third one was the control group. All the three groups took the pretest and then entered the instruction phase. One of the experimental groups was instructed to use note-taking as a VLS and the other one was assisted to practice semantic mapping. The control group, however, attended the usual institute classes without using any VLS. The institute classes lasted for 16 sessions in eight weeks each semester and the whole study was run over 18 weeks. During the first week of the semester, the proficiency test and the pretest were administered in two sessions. Then for six weeks one of the experimental groups used note-taking and the other one semantic mapping for learning the new words and the control group just attended the class with the normal class practices. In week eight, the tree groups sat for the posttest and two weeks later which was the beginning of the next semester in the institute, the learners took the delayed posttest. Finally, the three tests for the three groups were scored in a similar way. Each of the tests had 40 items. Each correct answer was scored as .5 and the incorrect ones were scored zero. So the scores on each of the vocabulary tests ranged from zero to 20.

Data Analysis

The data were the scores obtained from the four tests which were subjected to SPSS 20 for analysis. First, descriptive statistics was run with the results of the proficiency test and based on the mean score and the standard deviation, a range was identified for the scores of the homogenous learners. Then, three one-way ANOVAs were used for comparing the means of

the three groups for the two questions. The first ANOVA was used to examine the initial vocabulary level of the learners in the three groups to ensure that they were at the same level to begin with. The second and the third ANOVAs examined the significance of the differences in the mean gain scores of the three groups on the posttest and on the delayed posttest, respectively.

Results

Effects of Note-Taking and Semantic Mapping on Vocabulary Learning

The two questions of the study were concerned with the differences among the effects of note-taking, semantic mapping, and no treatment on learners' vocabulary learning and their vocabulary retention. To make sure that the three groups participating in the study were at the same level regarding their vocabulary knowledge, their mean scores on the pretest were compared through a one-way ANOVA. Results of the related descriptive statistics and ANOVA are depicted in Table 1 and Table 2, respectively.

Table 1
Descriptive Statistics for Pretest Scores

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Note-taking	25	14.4400	3.52467	.70493	12.9851	15.8949	5.00	20.00
Semantic mapping	25	14.9200	3.71842	.74368	13.3851	16.4549	7.00	20.00
Control	24	13.2917	3.56894	.72851	11.7846	14.7987	7.00	20.00
Total	74	14.2297	3.62090	.42092	13.3908	15.0686	5.00	20.00

The analysis of descriptive statistics showed that the highest mean score belonged to the semantic mapping group and the lowest to the control group.

Table 2
ANOVA for Pretest Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.136	2	17.068	1.313	.275
Within Groups	922.958	71	12.999		
Total	957.095	73			

However, the ANOVA results showed no statistically significant difference among these three means (df: 2, 71; F = 1.3, sig = .275) which indicated that the three groups were at the same vocabulary level at the beginning of the study.

Next, to answer the first question which dealt with the effects of the VLSs on learners' vocabulary learning, the gain scores after the posttest were computed by subtracting pretest scores from posttest scores for each learner. Then a one-way ANOVA was employed to compare the mean gain scores. Table 3 and Table 4 show the results of descriptive statistics and ANOVA for the gain scores at this level.

Table 3
Descriptive Statistics for Gain Scores After the Posttest

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Note-taking	25	1.8800	4.94402	.98880	-.1608	3.9208	-6.00	15.00
Semantic mapping	25	1.2000	5.07445	1.01489	-.8946	3.2946	-7.00	12.00
Control	24	-1.4583	3.94505	.80528	-3.1242	.2075	-11.00	4.00
Total	74	.5676	4.84579	.56331	-.5551	1.6902	-11.00	15.00

Based on Table 3, the mean gain scores for the two experimental groups were positive (Note-taking group: Mean = 1.88, SD = 4.94 & Semantic mapping group: Mean = 1.2, SD = 5.07) showing that their vocabulary scores improved after the treatment while the gain score for the control group was negative (Mean = -1.46, SD = 3.94) indicating a decrease in their score on the posttest.

Table 4
ANOVA for Gain Scores After the Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	151.564	2	75.782	3.443	.037
Within Groups	1562.598	71	22.008		
Total	1714.162	73			

The ANOVA results indicated a significant difference among the mean gain scores (df: 2, 71; F = 3.44, sig = .037). To locate the difference, the results of post hoc tests as represented in Table 5 and Table 6 were considered.

Table 5
Tukey HSD; Multiple Comparisons for Gain Scores After the Posttest

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Note-taking	Semantic mapping	.68000	1.32690	.866	-2.4964	3.8564
	Control	3.33833*	1.34065	.040	.1290	6.5476
Semantic mapping	Note-taking	-.68000	1.32690	.866	-3.8564	2.4964
	Control	2.65833	1.34065	.124	-.5510	5.8676
Control	Note-taking	-3.33833*	1.34065	.040	-6.5476	-.1290
	Semantic mapping	-2.65833	1.34065	.124	-5.8676	.5510

*. The mean difference is significant at the 0.05 level.

Table 6

Tukey HSD; Homogeneous Subsets Based on Gain Scores After the Posttest

Group	N	Subset for alpha = 0.05	
		1	2
Control	24	-1.4583	
Semantic mapping	25	1.2000	1.2000
Note-taking	25		1.8800
Sig.		.122	.867

Means for groups in homogeneous subsets are displayed.
a. Uses Harmonic Mean Sample Size = 24.658.
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

As shown in Table 6, there are two homogeneous subsets after the posttest: control group and semantic mapping group constitute one of the subsets and the other one consists of semantic mapping and note-taking groups. Thus, the control group and note-taking group are different from each other. This difference is evidenced in Table 5 based on which the only pairs that are statistically significantly different at this level are the control group and the note-taking group (sig. = .04).

Effects of Note-Taking and Semantic Mapping on Vocabulary Retention

The second question centered on the difference in effects of the two treatment types and no treatment on the learners' vocabulary retention. Similar to the analyses for the previous question, gain scores from the pretest to the delayed posttest were computed and then the significance of the differences in the mean gain scores among the three groups was examined using a one-way ANOVA. The results are shown in Table 7 and Table 8.

Table 7

Descriptive Statistics for Gain Scores After the Delayed Posttest

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Note-taking	25	1.6000	5.07445	1.01489	-.4946	3.6946	-8.00	11.00
Semantic mapping	25	1.9200	3.94673	.78935	.2909	3.5491	-5.00	10.00
Control	24	-.9167	4.90711	1.00166	-2.9888	1.1554	-11.00	6.00
Total	74	.8919	4.77312	.55486	-.2140	1.9977	-11.00	11.00

Table 7 indicated that the mean gain scores for the note-taking and semantic mapping groups were still positive after the delayed posttest (Note-taking group: Mean = 1.6, SD = 5.07 & Semantic mapping group: Mean = 1.92, SD = 3.95) which showed that their vocabulary improvement after the treatment had lasted for two weeks after the posttest. However, for the control group the gain score was negative (Mean = -.92, SD = 4.91) which indicated a decrease in their scores on the delayed posttest. Table 8 presents the result of ANOVA to see if the differences among the three groups are statistically significant.

Table 8
ANOVA for Gain Scores After the Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	117.462	2	58.731	2.698	.074
Within Groups	1545.673	71	21.770		
Total	1663.135	73			

According to Table 8, the difference among the three groups on the delayed posttest was not significant (df: 2, 71; F = 2.7, sig = .074). The ANOVA results, thus, showed that after two weeks, there was no significant difference between the two experimental groups and that these groups were not significantly different from the control group.

Discussion

The aim of the study was to compare note-taking and semantic mapping as two VLSs concerning their effects on intermediate EFL learners' vocabulary learning and vocabulary retention. Based on the finding, note-taking was significantly different from using no VLSs, but semantic mapping was not. The results also showed that this difference between the note-taking and the control group was not lasting as it was not found significant on the delayed posttest.

The findings of the study imply that using note-taking is better than using no VLSs when the purpose is learning new lexical items needed for short term uses, such as passing an exam or performing a certain task requiring the knowledge of particular words. However, retention of words does not differ among groups using note-taking, using semantic mapping, and not using any VLSs. As far as the results of note-taking on vocabulary learning are concerned, the finding of the study corroborates with those by Alahmadi and Foltz (2020), Faber et al. (2000), Liu, Huang, and Chien (2019), and Zhang (2009) which showed a significant effect for this strategy.

However, with regard to the role of semantic mapping, the results contrast the findings of studies by Keshavarz et al. (2006), Saragih et al. (2019), Thaledon (2020), and Vakilifard, Bahramlou and Mousavian (2020). This difference in results can be interpreted in terms of the role of other moderating variables. For instance, Zhang (2009) found significant differences in learners' use of VLSs based on their grades and majors. In addition, Gu (2010) found time a determining factor in the use and effectiveness of VLSs. Studying the change in learning styles of 100 Chinese EFL students over six months, Gu found that at the end of the period, the students were using more frequently a variety of the VLSs and that at the end the learners' use of the strategies was more congruent with their beliefs.

Regarding the comparison of the two strategies, as previously mentioned in review of the literature, no study was found to have addressed the two strategies and make a comparison of their effects on vocabulary learning and/or retention. It is hoped that future studies make similar comparisons to shed more light on the findings of this study.

Conclusion

Developing sufficient knowledge of vocabulary, as an essential component of a language, is one of the main concerns of both language teachers and language learners. To develop this knowledge more quickly and more effectively, teachers and learners might think of using the best VLSs. This study compared two of these strategies with each other and with no use of VLS regarding their influence on learners' vocabulary learning and retention. The results showed that note-taking was more effective than semantic mapping and no use of VLSs on the posttest. It was also revealed that note-taking and semantic mapping strategies do not lead to higher performance of learners on vocabulary tests in the long run.

It can be suggested that teachers should try to develop their learners' awareness of VLSs and of using suitable strategies as stressed by Zhang (2009) rather than recommending the use of certain strategies by the learners. Although previous studies have shown that VLSs have helped groups of learners in learning vocabulary, this study and a few others have found no significant effect of some strategies, at least on vocabulary retention. The contrasting results might indicate that the effectiveness of VLS can be related to some other factors, including learners' cognitive styles, their perceptions, or even their way of employing the strategies. For example, Liu, Huang, and Chien (2019) reported that learners' performance on note-taking was dependent on their cognitive styles. This can imply that raising learners' awareness about implementing VLSs based on their own personal attributes may result in more successful vocabulary learning. Still, another implication of the study is that teachers should not look at learners' use of VLSs as a factor determining their success in lexical development because as Ahmed (1989) showed about note-taking, frequent use of VLSs might not be distinguishing good learners from bad ones.

This study suffers a few shortcomings. First, the sample was chosen from intact classes because of the limitation of the researchers in selecting the participants and assigning them to groups randomly. Second, the number of the participants in each group did not let the researchers to examine the role of gender in the results of the study. Third, no standardized vocabulary test could be used for the pretest, posttest, and delayed posttest since this study was conducted based on the materials the participants were supposed to read in the institute and the researchers did not have the freedom to change them.

Based on the shortcomings of this study, a few suggestions can be made. First, as no other study comparing the two VLSs of note-taking and semantic mapping was found, it is suggested that other similar studies examine these two strategies to evaluate the findings of this study. Second, as the findings of this study have some discrepancies with those of other studies, future studies comparing the strategies across proficiency levels and other moderating variables to see their probable contribution to the differences are welcomed. Third, this study was conducted over a semester while studies (e.g., Gu, 2010) have shown change in learners' use of VLSs over longer periods (e.g., six months), so other studies can look at the change in the use of VLSs in the long run. Fourth, the vocabulary knowledge of concern in the study was

learners' passive knowledge, while the results might be different with active vocabulary knowledge; therefore, more studies can address the effects of using VLSs on both active and passive vocabulary. Fifth, nowadays technology is used in every aspect of human life, including their language learning. Using technology in employing VLSs (e.g., the role of mobile photo note-taking vocabulary development by Anzai, Funada, & Akahori, 2013) can be an interesting study topic for further related studies.

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