

THE EFFECTS OF SEMANTIC MAPPING, THEMATIC CLUSTERING, AND NOTEBOOK KEEPING ON L2 VOCABULARY RECOGNITION AND PRODUCTION

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ABSTRACT

To investigate the effects of semantic mapping, thematic clustering, and notebook keeping on L2 vocabulary recognition and production, four groups of intermediate level learners in an EFL institute in Zanjan, Iran participated in the study. Three experimental groups consisted of semantic mapping, semantic feature analysis, and vocabulary notebook keeping. The fourth group served as the comparison group. During the treatment, the participants of the four groups were presented with the same vocabulary items but using different techniques. At the end of the experimental period, a multiple choice and a fill-in the-blanks posttest were administered. Data were analysed using two separate one-way ANOVA procedures. Results indicated that all three experimental conditions were more effective than the comparison condition on both vocabulary recognition and production. It also turned out that semantic feature analysis and vocabulary notebook keeping techniques were more effective than semantic mapping on Iranian EFL learners' vocabulary recognition. Results also showed that semantic feature analysis was more effective than semantic mapping, which in turn, was more effective than vocabulary notebook keeping on Iranian EFL learners' vocabulary production.

Keywords: Semantic Mapping, Thematic Clustering, Notebook Keeping, Vocabulary Recognition, Vocabulary Production.

INTRODUCTION

Various studies on the effectiveness of vocabulary teaching and learning techniques have been conducted (Cunningham, 1979; Shapiro & Walters, 2005; Schmitt, 2008). Some have focused more specifically on direct vocabulary instruction (Margosein, Pascarella & Pflaum, 1982, and Hippner-page, 2000).

Among the various techniques of direct vocabulary instruction, semantic mapping and semantic feature analysis are two techniques which are built upon the prior knowledge base of learners with an information-processing orientation. Both are based on the hierarchical nature of memory structure. They focus on categorically arranged conceptual frameworks to increase general vocabulary (Chu-Chang, Johnson, Pittelman, & Toms-Bronowski, 1982). These two techniques involve deep cognitive processes (Johnson, Levin, & Pittelman, 1985). Previous research (Graves, 1986; Barcroft, 2002) has mostly focused on these two techniques in comparison to other instructional

techniques in different contexts, and positive results have been reported. According to Chu-Chang, et al., (1982), there are advantages to these two techniques theoretically. Semantic mapping and semantic feature analysis help retrieval of known words or concepts in isolation and in context. Furthermore, Codesal (2000) believes that vocabulary notebook is an effective tool for exposing learners to a wide variety of vocabulary learning strategies as well as promoting learner independence in ways which are both meaningful for learners and manageable for teachers.

The relevant literature on the effectiveness of the three vocabulary instruction techniques on L2 vocabulary recognition and production is controversial. For instance, Riazi, Sadeghy and Zare (2005) report that prior knowledge techniques - semantic mapping and semantic feature analysis - are not commonly used by Iranian EFL learners because they require deep cognitive processing. Rather, they prefer using other techniques, mostly keeping

vocabulary notebook since notebook keeping makes it possible to write down the relevant word information and review them when they need. In an attempt to resolve part of this controversy, this study aims to investigate the effectiveness of three vocabulary learning strategies, semantic mapping, semantic feature analysis, and vocabulary notebook keeping on Iranian EFL learners' vocabulary recognition and production. More specifically, it addresses the following research questions:

(i). Are there any significant differences among the effects of vocabulary teaching techniques on L2 vocabulary recognition?

(ii). Are there any significant differences among the effects of vocabulary teaching techniques on L2 vocabulary production?

Review of Literature

In direct vocabulary instruction it is common to introduce words in groups. Words can be grouped semantically or thematically. When they are grouped semantically, they are called as 'semantic clusters or sets' in which words share certain semantic and syntactic similarities, e.g., eye, nose, mouth, chin, face. Words within a cluster are under a common super-ordinate or covering concept and are grouped as a result of shared semantic and syntactic characteristics (Tinkham, 1997). On the other hand, if words are grouped thematically, they are termed 'thematic clusters' in which words are grouped together on the basis of their psychological associations and shared thematic concepts, e.g., frog, green, hop, pond, slippery (Tinkham, *ibid.*).

There are a number of studies on the effectiveness of word clusters on L2 vocabulary learning. Waring (1997) studied the effect of learning words in semantic and thematic sets in two experimental groups. The first one included presenting groups of students with six word-pairs. The word-pairs were Japanese nouns matched with imaginary words. Three of them were related and the other three were unrelated word-pairs. In the second one, he presented students with two sets of three word-pairs. One set consisted of related words but the other consisted of unrelated words. In both experiments, related word-pairs shared a common super-ordinate concept. The result of both experiments

showed that presenting new L2 words in a set has negative effects.

Tinkham (1997) put one step further and attempted to group words in different ways to enhance vocabulary learning. He believes that semantic clusters such as eye, hand and ear are linguistically grouped, whereas thematic sets such as frog, green and hop are cognitively grouped, which may facilitate the learning of new words. He hypothesized that thematic clustering of words in which words are grouped on the basis of their psychological associations and shared thematic concepts should facilitate learning and be beneficial for students (Tinkham, *ibid.*). He conducted his study on 48 sophomore university students and found that thematically related sets were learned more easily than artificial words which were paired with English words comprising unassociated sets. He also found that sets of artificial words paired with semantically related English words were learned with more difficulty in comparison to sets of artificial words paired with unrelated English words.

Hippner-page (2000) combined qualitative and quantitative components in his study, which made his study more useful. The participants learned vocabulary in word clusters. Results showed that both kinds of word groupings are beneficial. Also, Gowdasiei and Hashemi (2005) studied the effectiveness of Lexical-Sets (LS) and semantically unrelated (UL) vocabulary instruction for lower and higher proficiency level learners. Although higher level LS were better than lower level LS, both higher and lower level students gained more than UL students. They found that it is more beneficial to teach new L2 vocabulary in lexical sets.

Thus we can conclude that presenting words in clusters or sets is beneficial, but one point should be kept in mind. Too many semantic and syntactic similarities inhibit learning since they cause interference with each other and with previous words in mind.

The present study focuses on semantic mapping and semantic feature analysis as techniques of direct vocabulary instruction which involve presenting words in sets. Several studies have been conducted to evaluate semantic mapping and semantic feature analysis as

instructional techniques for general vocabulary acquisition (Chu-Chang, et al., 1982; Johnson, Levin, Pittelman, & Toms-Bronowski, 1984; Johnson, & Pittelman, 1985).

Margosein, et. al., (1982, p. 186) compared the effect of two direct vocabulary teaching strategies, semantic mapping and the use of context, on word learning of 44 seventh and eighth grade students. The semantic mapping treatment involved the study of words as follows: the target word solitude, for example, was taught in relation to the more familiar words alone, lonely and quiet. The learners in the treatment group discussed the similarities and differences in the meaning of the known words with the teacher. They found that semantic mapping had a greater positive impact on both specific and generalized vocabulary acquisition than did the context clue approach. Specifically, students reacted positively to the focus of attention on similarities and differences among items in a category.

Chu-Chang, et al. (1982) conducted two parallel studies to provide cross-cultural comparison of vocabulary instruction techniques in the United States and The Republic of China. The two studies compared the effect of three vocabulary instructional techniques: the two prior knowledge techniques of semantic mapping and semantic feature analysis and a conventional method. In the United States, the conventional treatment was contextual analysis, and in the Republic of China the traditional Chinese method (general method) was used. Test scores indicated that all three vocabulary techniques employed in both studies had a positive impact on vocabulary acquisition. In the Republic of China, the conventional Chinese approach was the most effective while in the United States the two prior knowledge approaches were more effective.

Johnson, et al., (1984) compared semantic mapping and semantic feature analysis with a modified basal approach for effectiveness as pre-reading instructional treatment for both vocabulary acquisition and passage comprehension. In the basal approach, the teacher explained the story and students discussed the important words used in the story. Pointing to the list of target words on the chalkboard, he told students that they would be doing

several activities in order to learn the words. Results of the study not only confirmed that all three pre-reading treatments were effective in teaching the target words but also showed a strong relationship between prior knowledge and reading comprehension.

Semantic mapping has also been found to be effective for poor readers. Johnson, et.al, (1985) conducted a study on poor readers who were from eleven fourth-grade classrooms from eight schools. They categorized the students into three groups. In the first group, there were low or low-average level students with regard to their reading proficiency. In the second group, there were low or low-average students mixed with other levels; and group three included normal classes. Groups one and two were taught using the semantic mapping technique and group three, acting as the control group, received usual vocabulary instruction. They expected that in the semantic mapping technique, poor readers would learn more when taught as members of a large heterogeneous group. Their reason was that poor readers would benefit from the rich discussion that would occur in the large group as a result of the participation of the more able students. It was also expected that poor readers would learn more when instructed in a smaller group with other less able readers. But the results of the study were contrary to their expectations. Poor readers performed as well when instructed in the homogeneous small group as when instructed in the heterogeneous large group. So, group size was not a factor to influence the effectiveness of semantic mapping as an instructional technique for vocabulary development. Although it was supposed that this skill oriented technique (semantic mapping) was difficult for poor readers, the results of the study revealed that they benefited from instruction.

Johnson and Pittelman's (1985) studies also confirmed that semantic mapping and semantic feature analysis are effective techniques for general vocabulary development and are better than traditional instructional activities.

Jiang (2002) conducted a study on eighteen Chinese-English bilingual speakers and eighteen native speakers of English to find out about the effectiveness of form-meaning mapping in vocabulary acquisition in second language.

His study showed that L2 word pairs of comparable semantic-relatedness will produce differential semantic-relatedness rating scores and reaction time in L2 speakers, depending on whether the words share the same L1 translations. Based on the findings, it was concluded that semantic mapping can be helpful and facilitative in lexical acquisition and recall.

Furthermore, Sanchez (2004) investigated the effect of semantic mapping on EFL vocabulary learning. Thirty linguistically homogeneous participants were divided into an experimental and a control group. The experimental group (semantic mapping) showed several changes in the organization of information in different stages of learning. The students' semantic maps in the post test were more similar to the one produced with the expert data. So, he concluded that learning lexicon with this kind of instruction causes changes in learners' cognitive structures in their mind.

Contrary to the above studies, Riazi, et. al., (2005) discovered that semantic mapping strategy is not commonly used by Iranian EFL learners. A questionnaire which was completed by 213 students indicated that the most frequently used strategies were shallower cognitive strategies, and the less commonly used strategies were those that involved deeper cognitive processing, such as, keyword technique and semantic mapping. The results also showed that language learners make more use of traditional vocabulary learning strategies such as taking notes in class, and using new words in sentences.

Another technique which this study focuses on is vocabulary notebook. Barcroft (2009, p.75) refers to a taxonomy of vocabulary learning strategies which divides 50 different strategies into two main groups: strategies used to infer meaning of new words and strategies used to consolidate words. In addition, the system further classifies whether strategies are determination, social, memory, cognitive or metacognitive. Based on this taxonomy, keeping a vocabulary notebook is a cognitive strategy which is used to consolidate the words and their meanings in the learners' minds. Codesal (2000) points out that keeping written record of new vocabulary is quite an important part of language learning. The act of writing a

word down often helps to fix it in memory. He proposes two forms of written records: Card-index files and vocabulary notebook. The latter is probably the most common form of written student record. Small notebooks can be carried around easily, added to and studied at any time. He believes that teachers can learn a lot by looking at learners' written records. Students' notebooks offer insight into the individual learning styles and can make the teacher aware of the possible learning problems e.g. spelling problems, mistranslation, and over-reliance on translation which might not be revealed otherwise. Similarly, Bromley (2007) holds that keeping vocabulary notebook provides a record for review before a test and it is a source for the correct spelling of context terms.

Leeke and Shaw (2000) conducted a study on the learners' independent vocabulary records. They asked 121 overseas postgraduate students at Newcastle University to answer a multiple-choice questionnaire. Then, they interviewed 54 different graduate students in various fields to investigate learners' actual vocabulary recording practices in relation to their beliefs, personal characteristics and learning situations. They concluded that records made in class under teacher direction were likely to be much more elaborated than autonomously made lists.

In their study, Moir and Nation (2002) examined the vocabulary-learning strategy of ten adult language learners in an intensive ESL course. The informants were interviewed to find out about their strategy use and beliefs about vocabulary learning. Based on the results, nine out of ten spent a considerable amount of time reading over the information recorded in vocabulary learning notebooks, or copying it out several times into larger notebooks.

Fowle (2002) believes that vocabulary notebook is an effective tool for exposing learners to a wide variety of vocabulary learning techniques as well as promoting learner independence in ways which are both meaningful for learners and manageable for teachers. Another attractive feature is that they are not dependant on high technology or expensive resources, thus they are accessible to all language teachers.

As it can be seen in the literature, few studies have

examined the contribution of the two prior knowledge techniques (semantic mapping and semantic feature analysis) on EFL learners in Iran. Additionally, the vocabulary notebook keeping technique has rarely been compared with the two prior knowledge techniques. Therefore, the primary aim of the present study is to see which of the three techniques of vocabulary instruction is more effective on Iranian EFL learners' vocabulary recognition and production.

Method

Participants

This study was conducted with 123 intermediate level learners in an EFL institute in Zanjan. All participants had already passed the Oxford placement test, undergone an oral interview, and were homogeneous. The participants were in four groups each of which was randomly assigned into one of the conditions. Three experimental groups consisted of semantic mapping group with 33 members, semantic feature analysis group with 27 members, and vocabulary notebook keeping group with 30 members. The fourth group with 33 participants served as the comparison group.

Instruments

The materials and data collection instruments utilized in this study included the following: the main course book at Intermediate level introduced by the institute was 'Top notch'. Supplementary materials for teaching vocabulary were chosen by considering the criteria of difficulty and relevance. To stimulate the participants and to increase their motivation, attempt was made to select interesting and appropriate vocabulary items from standard books such as 'The words you need' and 'English vocabulary in use' (Intermediate). A total number of 100 words were chosen from the above-mentioned sources. Every session, in accordance with the appointed techniques, ten words were taught.

To check the homogeneity of the participants in terms of their vocabulary knowledge, the vocabulary subtest of a standard general proficiency test, Michigan English Language Proficiency Test (MELPT) was used which contained 35 items in multiple-choice format. To make sure that the participants had no prior knowledge of the

target words, a pretest was also administered. It contained 110 items in which learners were required to translate underlined words into Persian. A receptive word knowledge was used to determine the effect of three vocabulary teaching techniques on learners' vocabulary recognition. It was a 30-item test in multiple-choice format. In order to measure students' productive knowledge of words, a 30-item fill-in-the-blank test was used.

Since the vocabulary recognition and production tests were designed by the researchers based on the words taught in classes, their validity and reliability had to be established. To this end, (KR-21) method was used to estimate the reliability of the tests. The reliability index of the receptive and productive tests turned out to be (0.76) and, (0.83) receptively. To check validity, a correlation procedure was used during which the scores of the participants on the receptive and productive post tests were correlated with the learners' performance on the vocabulary subtest of the Michigan test. The validity index of the receptive and productive tests turned out to be (0.72) and (0.70), respectively.

Procedure

Initially, 123 Intermediate level learners with the aforementioned characteristics were selected. The participants were in four groups. Three groups were experimental groups and one group acted as the comparison group. In order to determine the homogeneity of the participants, a 35-item multiple-choice vocabulary subtest of a standard proficiency test (MELPT) was administered. It took 45 minutes. Results confirmed that the participants were more or less at the same level of vocabulary knowledge. Having determined the type of treatment to be given to each of the different groups, the treatment was given, which lasted over 10 sessions. The participants took part in their English class three times a week. Each session lasted about one and a half hour; about 30 minutes of each session was allocated to the treatment. Each group of participants received a different treatment. The treatment consisted of the three different techniques of vocabulary instruction: (i) Semantic Mapping Technique, (ii) Semantic Feature Analysis Technique, and (iii) Vocabulary notebook keeping technique.

The semantic mapping group was presented with 10 words every session. Since semantic mapping technique required the learners to relate new words to their previous experiences and prior knowledge, the teacher asked the participants to share their related information to activate their prior knowledge. Then, the teacher taught by drawing semantic maps and related words on the board with the help of the students. The Semantic feature analysis group was taught the same 10 words every session. Semantic feature analysis technique capitalizes on the categorial nature of memory and focuses on the similarity and difference of words within the category and relates them to the learners' prior knowledge. To activate the participants' prior knowledge, the teacher drew the categorial chart on the board and filled it with the participants' shared information. (A sample is given in the appendix). The third experimental group was the vocabulary notebook keeping group, the members of which had to have a separate notebook to write down lexical items. Every session, the teacher taught the same ten words and the participants had to write them on their vocabulary notebook. Then, they had to look up their exact meaning and pronunciation in their dictionary (Longman Intermediate) and write them in their notebook. They also wrote examples for words from dictionary. The comparison group did not receive any of the above-mentioned treatments. The participants were involved in their conventional class activities.

At the end of the experimental period, two post-tests were administered to investigate the effects of semantic mapping, semantic feature analysis and vocabulary notebook keeping on the learners' vocabulary recognition and production. The collected data were organized and submitted to statistical analysis.

Data were analysed using two separate one-way ANOVA procedures, one to investigate the effects of different techniques of vocabulary instruction on L2 vocabulary recognition, and the other to study the effects of the same instructional techniques on L2 vocabulary production.

Results and Discussions

Investigation of the First Question

The first research question sought to investigate the effects of vocabulary teaching techniques on L2 learners'

vocabulary recognition. A one-way ANOVA procedure was used to investigate the result of the participants' post-test. Descriptive and test statistics are presented in Table 1.

As Table 1 shows, the semantic feature analysis and vocabulary notebook keeping groups have the highest mean, followed by the semantic mapping group. The comparison group has the lowest mean. The graphic representation of the results shows the differences among the groups more conspicuously.

Moreover, the F-value is statistically significant ($F = 29.89$, $P < .01$), suggesting that there are significant differences among the groups. To locate the differences among the means, a post-hoc Scheffe' test procedure was run, which yielded the following results.

Based on Table 2, the mean difference between semantic feature analysis and semantic mapping groups is statistically significant, indicating that the semantic feature analysis group is better than semantic mapping group. Similarly, the difference between the vocabulary notebook keeping and the semantic mapping groups is statistically significant with the former being better than the latter. In addition, all the experimental groups have performed significantly better than the comparison group.

Investigation of the Second Question

The aim of the second question was to investigate the

Groups	N	Mean	Std. Deviation
semantic mapping	33	17.060	3.418
semantic feature analysis	27	20.333	3.075
notebook keeping	30	20.333	5.447
comparison group	33	11.969	3.795
F = 29.890		Sig. = .001	

Table 1. Descriptive Statistics for the ANOVA for Vocabulary Recognition

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.
semantic mapping	semantic feature analysis	-3.27273*	1.0481	.024
	notebook keeping	-3.27273*	1.0189	.019
semantic feature analysis	comparison group	5.09091*	.99439	.000
	notebook keeping	.000	1.0715	1.000
notebook keeping	comparison group	8.36364*	1.0481	.000
	comparison group	8.36364*	1.0189	.000

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

Table 2. Multiple Comparisons of Means for the Learners' Vocabulary Recognition

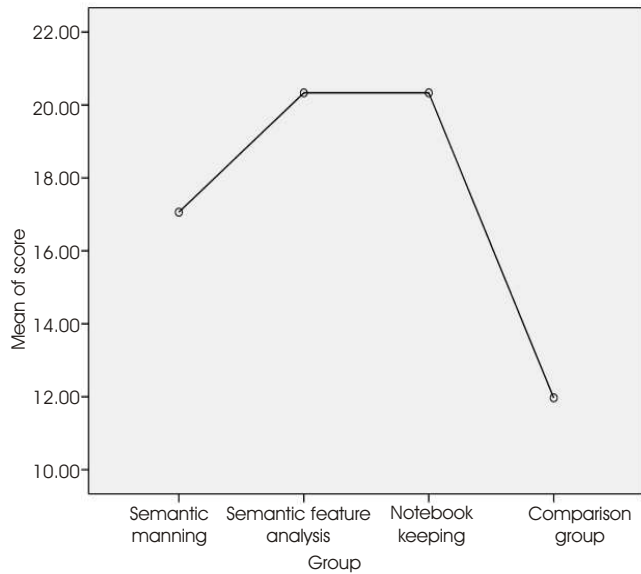


Figure 1. Performance of the Participants on the Vocabulary Recognition Test

effects of vocabulary teaching techniques on L2 vocabulary production. To this end, another one-way ANOVA procedure was used. Descriptive and test statistics are given in the following table:

As it can be seen in Table 3, the semantic feature analysis group participants have the highest mean, followed by the semantic mapping group, and the vocabulary notebook keeping group. The participants of the comparison group have the lowest mean. In the graphic representation of the results (Figure 2), the differences among the groups can be seen more clearly.

In addition, since the F-value is statistically significant ($F = 29.89, P < .01$) we can safely claim that there are significant differences among the groups. To locate the differences, a post-hoc Scheffe' test procedure was used, which produced the following results.

Based on Table 4, there are significant differences not only between each of the treatment groups and the comparison group, but also between each pair of the

	N	Mean	Std. Deviation
semantic mapping	33	15.87	5.66
semantic feature analysis	27	21.85	2.68
notebook keeping	30	12.80	3.98
comparison group	33	8.18	3.20

F = 29.89 Sig. = .001

Table 3. Descriptive Statistics for the ANOVA on Vocabulary Production

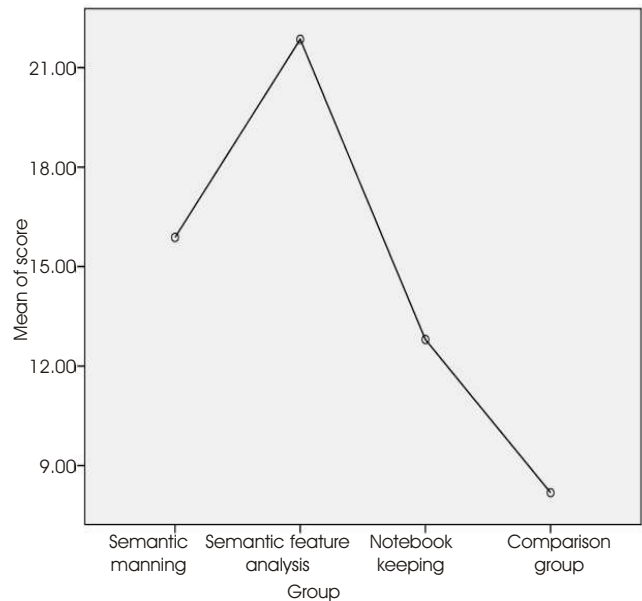


Figure 2. Performance of the Participants on the Vocabulary Production Test

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.
semantic mapping	semantic feature analysis	5.97306*	1.06454	.000
	notebook keeping	3.07879*	1.03486	.036
	comparison group	7.69697*	1.00992	.001
semantic feature analysis	notebook keeping	9.05185*	1.08823	.000
	comparison group	13.67003*	1.06454	.000
notebook keeping	comparison group	4.61818*	1.03486	.001

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

Table 4. Multiple Comparisons of Means for the Learners' Vocabulary Production

treatment groups. The mean difference between the semantic mapping group and semantic feature analysis group is statistically significant, which means that the semantic feature analysis group performed better on the vocabulary production post-test than the semantic mapping group, which in turn, did better than the vocabulary notebook keeping group. The comparison group was significantly worse than each of the experimental groups. Also, the differences between the means show that the semantic feature analysis group acted better in comparison to vocabulary notebook keeping group. The vocabulary notebook keeping group is only better than the comparison group.

Therefore, it can be claimed that vocabulary teaching techniques (semantic mapping, semantic feature analysis, vocabulary notebook keeping) have positive effect on L2 learners' both vocabulary recognition and

production but, semantic feature analysis has a greater positive impact.

The findings of the present study support Margosein, et. al., (1982), who found that semantic mapping is effective on learners' vocabulary knowledge. These findings also partially corroborate those of Chu-Chang, et al., (1982). They reported that the semantic feature analysis and semantic mapping are effective on Elementary learners' vocabulary knowledge and vocabulary retention in the United States, but a general method (the conventional approach) is more effective in China. The findings of the present study are in line with their findings in the United States with the difference that this study investigated the effectiveness of the two prior knowledge techniques in comparison to vocabulary notebook keeping technique on the learners' vocabulary recognition and production. In China, the general method was more effective than the semantic mapping group and semantic mapping group was more effective than semantic feature analysis.

Johnson, et al., (1984) also studied the effects of semantic mapping and semantic feature analysis in comparison to a modified basal approach and a control group as a pre-reading vocabulary instruction on fourth-grade students' vocabulary production and passage comprehension. Similar to the results of the present study, all the treatment groups did better than the control group on vocabulary production post-test. These findings are further supported by the results of the present study in which vocabulary instruction techniques, especially the two prior knowledge techniques were found to be effective on learners' vocabulary knowledge. The difference is that Johnson, et al., (1984) found the two prior knowledge techniques effectiveness on learners' passage comprehension, too.

Johnson, et. al., (1985) reported the effectiveness of using semantic feature analysis and semantic mapping on low-level readers' vocabulary development in comparison to a control group containing students with mixed reading ability. In contrast to the present study, which investigated the semantic mapping and semantic feature analysis techniques as separate treatments, they considered them as one treatment and used both of them together. These findings are further supported by Johnson, et al.'s (1985)

findings suggesting that the semantic mapping and semantic feature analysis techniques are not only powerful techniques for general vocabulary development, but are good alternatives to traditional instruction.

Vocabulary notebook keeping treatment, like semantic feature analysis treatment turned out to be more effective than semantic mapping treatment in vocabulary recognition. This lends support to Codesal (2000), who concluded that keeping written record of new vocabulary helps to fix them in memory. This finding also supports Leeke and Shaw's (2000) finding that keeping vocabulary notebook has positive effect on EFL learners' vocabulary retention and recall. Moreover, it confirms Jia's (2006) finding in a SWOT analysis (strengths, weaknesses, opportunities, and threats) that keeping vocabulary notebook was effective on EFL learners' vocabulary knowledge.

At the same time, the results of the present study are different from those of a number of studies. The present study revealed that there are significant differences between the effects of semantic mapping, semantic feature analysis, and vocabulary notebook keeping on Iranian EFL learners' vocabulary production with semantic feature analysis being the most effective. But Barcroft (2002) concluded that increased semantic elaboration, the process which is used in semantic mapping and semantic feature analysis, had inhibitory effect on L2 learners' productive word knowledge. Also, Riazi, et. al., (2005) found that using traditional learning techniques which need shallower cognitive processes such as taking notes in class, keeping vocabulary notebook, and using new words in sentences were more effective on Iranian EFL learners than deeper cognitive techniques such as semantic mapping, and semantic feature analysis. Such results are in contrast with the present study, especially when it comes to the effect of semantic feature analysis, which was the most effective treatment. In fact, this study indicated that all three vocabulary instruction techniques are significantly better than the comparison group.

One of the possible reasons for such differences may be partially attributable to the proficiency level of the participants. The participants of the present study were

Intermediate learners of English. There is intuitive support for the claim that learners' level of proficiency may influence the degree of their dependence on the teacher. So, the lower the proficiency level of the learners, the greater their need to be supported by the teacher. Semantic mapping and semantic feature analysis are conceptual techniques which are based on learners' prior word knowledge. Low proficiency level learners do not have a rich reservoir of vocabulary to collaborate with teacher in the process of completing the map in semantic mapping and filling the chart in semantic feature analysis. So, they are fully dependent on the teacher. They would just copy what the teacher said. In addition, they may not be able to process effectively the procedures of relating new words to their prior word knowledge and visualize the relationships between the new and the learned words in their minds.

These findings could also be related to the age of the learners. As learners' age increases, so does their ability to employ deeper cognitive techniques. Moreover, they prefer to involve more effectively in what and how they learn. Mature Intermediate EFL learners in this study benefited more from semantic mapping and semantic feature analysis partially due to the fact that these are two conceptual techniques based on cognitive structure.

Another reason could be related to the linguistic differences of the participants in different studies. In Barcroft's (2002) study, semantic mapping technique had an inhibitory effect on English speaking lower-intermediate L2 Spanish learners' vocabulary knowledge. Based on the strong version of the contrastive analysis, the more the similarities between the native and the target languages, the more interference would occur in target language learning. Since, vocabulary learning is an important part of language learning and Spanish language is more similar to English both in spoken and written mode, interference from the native language might have caused difficulty in the process of semantic mapping. But since Persian does not have much in common with English, EFL learners in the present study may have benefited from semantic mapping and semantic feature analysis techniques without suffering from the inhibitory effect on their vocabulary knowledge.

Conclusion

Based on the findings of the present study, it can be concluded that semantic feature analysis and vocabulary notebook keeping techniques are more effective than semantic mapping technique on Iranian EFL learners' vocabulary recognition. It may also be concluded that semantic feature analysis and semantic mapping are more effective than vocabulary notebook keeping technique on Iranian EFL learners' vocabulary production. In short, all the three vocabulary instruction techniques which were used in the present study were effective on learners' vocabulary recognition and production, but since semantic feature analysis treatment had the most positive effect, it can be concluded that it is the most effective technique on Iranian EFL learners' receptive and productive vocabulary knowledge.

The findings of the present study can have implications for teachers and learners. They help students to learn about the interrelationships of words. Also, they help learners to discover that words can be related to each other in a variety of ways, and they may help them develop increasingly sophisticated lexicon. These findings also allow teachers to assess and interpret what students know as well as to make judgments on the appropriateness of instruction needed. These judgments are based on the students' exposition of what they already know about a topic, rather than the teacher's supposition of what the students know.

Summary

This paper investigates the effects of semantic mapping, thematic clustering, and notebook keeping on L2 vocabulary recognition and production, among four

Appendix : Semantic feature analysis

	Assess	estimate	evaluate	rate	Value
Somebody's income for tax purposes	+				
Damages	+	+			
The cost of something (at)	+	+			
The importance of something	+	+	+		(+)
The evidence	+		+		
Somebody's performance	+		+	+	
Somebody's ability	+				(+)
Somebody's property (at)					+
Somebody as a leader				+	+

groups of intermediate level learners in an EFL institute in Zanjan, Iran. Results showed that semantic feature analysis was more effective than semantic mapping, which in turn, was more effective than vocabulary notebook keeping on Iranian EFL learners' vocabulary production.

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