The Effect of Semantic Clustering on Iranian Elementary EFL Learners' Vocabulary Retention

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Abstract: The present study with quasi-experimental design, set out to investigate the impact of semantic clustering on EFL learners' vocabulary retention. Participants were divided into two equal groups of 15 at elementary level, randomly assigned as experimental and control groups. They were all females, within the age range of 12-15, learning English at one of English Language Institutes in Shahroud, Iran. Four types of instruments were used to collect the research data. They were: 1) KET test; 2) a vocabulary pretest; 3) immediate recall posttests and 4) delayed recall posttest. The experimental group underwent semantic clustering vocabulary presentation in which the learners were provided with six lists containing ten semantically related words in sentences. On the other hand, the control group was provided with the same lists but the sentences were presented in a random way. Comparison of the results obtained from the delayed recall posttests revealed that the control group outperformed their peers in the experimental group and could retain a larger proportion of the words in long term. The results have some implications for teaching of second and foreign language vocabulary instruction.

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1. Introduction

One of the issues that students, teachers, material writers, and researchers have all agreement upon is that important part of mastering a second language is learning vocabulary (Groot, 2006). Although teaching vocabulary has always been a keystone in English Language Teaching (ELT), finding an effective method for vocabulary learning has always preoccupied curriculum developers in general and language teachers in particular (Bogaards & Laufer, 2004; Read, 2000; Richards & Renandya, 2002). In other words, there does not seem to be an agreement on whether new vocabulary should be presented in semantically related or unrelated sets.

At one end of this conflict, there are authors like Seal (1991), Grandy (1992), Haycraft (1993), Stoller and Grabe (1995), Wharton and Race (1999), and Hashemi and Gowdasiaei (2005), who speak in favor of presenting new words in semantic sets on the basis that it is an effective way of presenting new words, and possibly reflecting the natural organization of the mental lexicon (Aitchison, 1994, 1996). Among other advocates of presenting vocabulary in semantic clusters are Amer, 1986; Channell, 1981, 1988, 1990; Cornu, 1979; Liu and Zhong, 1999; and Maiguashca, 1984. To support their views they allude to a number of psychological studies which indirectly confirm their opinions. The most central supporting argument, however, is derived from the linguistic theory of *Semantic Fields* which is based on the assumption that rather than being organized in lists of random words, vocabulary is cognitively organized by interrelationships and networks between words, i.e., the mind classifies vocabulary by making connections in meaning; these connections in meaning are Semantic Fields (Channell, 1981).

On the other hand, there are those researchers (Higa, 1963; Laufer, 1989; Tinkham, 1993, 1997; Waring, 1997; Nation, 2000; Finkbeiner & Nicol, 2003), who maintain that if similar words that share numerous common elements and a super-ordinate concept are introduced at the same time, these words will interfere with each other and have a negative impact on their retention due to cross-association and possible overloading in the short term memory. Research delineated that learning new words in semantic sets required more learning trials to be learned completely (Finkbeiner & Nicol, 2003; Tinkham, 1993, 1997; Waring, 1997). To support the idea, based on the psychological *Theory of Interference* and the *Distinctive Hypothesis*, to be discussed further, the researchers hold that contrary to popular beliefs the semantic cluster treatment might be harmful for L2 vocabulary learning and it makes learning more difficult and interferes with the learning of similar words.

English textbooks in public schools in Iran, present vocabulary items grouped in semantic clusters. Curriculum writers select the new English words that fit specific situations and tasks or express different notions, and they present these words in semantic clusters. For example, in a lesson titled "organs of the face", the following words are introduced: *forehead, nose, chin, mustache, beard, mouth, ear,* and *eye*.

English books which are taught in English private institutes also, provide words in semantic clusters.

The aim of the present study is to examine which manner of L2 vocabulary presentation either in semantically related sets or unrelated ones is more helpful for the elementary EFL learners' vocabulary retention in Iran.

To the knowledge of the researcher, few studies in Iranian context have focused on the above-mentioned issue (Khayef & Khoshnevis, 2012; Marashi & Azarmi (n.d.); Mirjalili, Jabbari, & Rezaei, 2012), and none has studied the effects of semantic clustering on elementary EFL learners in Iran and the relationship between the presentation of words in semantically related or unrelated sets and the learners' vocabulary retention. So, this study can be of great importance to the literature.

1.1 Research questions and hypotheses

This study addressed the following research questions:

1) Do presenting new words in semantic clusters affect Iranian elementary EFL learners' vocabulary retention?

2) To what extent does presentation of words in semantically related or unrelated sets facilitate Iranian elementary EFL learners' vocabulary learning?

2. Review of the related literature

2.1 Supporting theoretical and empirical background for semantic clustering: Semantic Fields

The Semantic Field Theory was brought into its puberty by German scholar J. Trier in the 1930s, whose work is credited with having "opened a new phase in the history of semantics" (Ullmann, 1957). The semantic field is a set of lexical items in which words applicable to a conceptual domain are organized by a number of relationships. In terms of affinity and contrast, two defining characteristics of semantic fields (Kittay & Lehrer, 1992), the relationships of synonymy, antonymic, and hyponymy are easily understood.

Numerous SLA theorists and practitioners implicitly or explicitly defend the position that teaching new L2 vocabulary in semantically grouped sets is an effective method of vocabulary instruction. Much of the support for this position comes from studies of the organization of the mental lexicon in L1.

They claim that this method is in compliance with various brain theories which suggest that there is a good organization of semantic fields in the human brain (Aitchison, 1994; Carter & McCarthy, 1988; Grandy, 1992; Lewis, 1997; McCarthy, 1990; Rogers, 1996). Furthermore, evidence has been provided for the view that words are semantically organized in the human brain and that individuals tend to recall words on the basis of the semantic field in which they are conceptually mapped (Aitchison, 1994, 1996). Therefore, it is held that teaching a large number of words in an unrelated way can be likened to imagining a tree with no trunk and branches, but only leaves (Haycraft, 1993). Haycraft goes on to maintain that it is easier to teach vocabulary items that belong to the same semantic field because the learner will be able to form a pattern of interrelated words in his mind. This is because such an approach would have several advantages, one of which is that by learning items in sets, the learning of one item can be reinforced by the learning of another (Seal, 1991; Wharton & Race, 1999).

Crow and Quigley (1985) investigated effectiveness of semantic field approach to passive vocabulary acquisition, comparing it to the traditional method of vocabulary instruction. In their study, four classes of students (n=42) enrolled in level 5 (of 6 levels) at the North Texas State University intensive English language institute comprised two groups taking part in the experiment. Group 1 served as the control group and group 2 as experimental for the first two units (units 1 and 2) of the experiment. This arrangement was reversed in the second half (units 3 and 4) of the study. A pretest on the vocabulary covered in units 1 and 2 did not reveal statistically significant differences in the lexical knowledge between the two groups. The two posttests given immediately after completion of the respective halves of the experimental treatment (units 1, 2 and units 3, 4) were designed to assess short-term retention of the target vocabulary. The first follow-up test administrated four weeks after the experiment and the second follow-up test given only to those students, who after completing intensive English study were accepted into university and studied there for two month as the full-time students (n=10), were designed to examine long-term retention of the presented material. The treatment procedures in the control group did not allow covering the same number of words as in the experimental group in the same amount of time. Therefore, only half of the words in each unit were selected for presentation to the control group and were subsequently tested on the immediate posttests. The results of the immediate posttests revealed that the control group which received the traditional vocabulary treatment scored significantly higher than the experimental group. The outcomes of the first follow-up test showed no significant difference in recall between the words learnt experimentally and the words learnt traditionally. The second follow-up test utilized the same tasks as in treatment procedures received by the experimental semantic field condition and compared performance of the subjects from group 2 on the materials they were exposed to (in units 1 and 2) and the materials which were not presented to them (in units 3 and 4). As might be naturally expected, subjects' performance on the experimentally presented vocabulary was significantly better than their

performance on vocabulary on which they did not receive any treatment. On the basis of these experimental data researchers concluded that a semantic field approach is a more effective and efficient builder of L2 passive vocabulary.

The second study reporting significant vocabulary gains due to the semantic set grouping of L2 target vocabulary was conducted by Hashemi and Gowdasiaei (2005). In their quasi-experimental investigation the researchers compared performance of 60 Foreign Language (FL) learners of English who were taught one hundred L2 target words belonging 13 lexical sets. One academic group of the students (n=30) comprised lexical set (LS) condition and received target lexical items grouped in clusters of semantically related words. The other academic group of learners (n=30) was presented with L2 target vocabulary in sporadic manner and was designated as semantically unrelated (SU) condition. Subjects in both experimental conditions received four 45 minute sessions of treatment distributed evenly within the period of two weeks. Students in LS condition on each session were provided with a topic, followed by the vocabulary items belonging to the lexical set used in sentence context. After the teacher read each sentence, the students were encouraged to repeat the new word and try to guess its meaning. In addition the students were provided with a brief definition of each target word and its L1 translation. Students in SU condition went through the same experimental procedures; however, measures were taken to avoid presenting vocabulary items of the same lexical sets at once. The results of the experiment showed statistically significant gains in L2 vocabulary knowledge in both experimental conditions, with learners in LS condition significantly outperforming subjects who studied L2 target words under SU condition. The researchers explained these findings as the ones that suggest beneficial effect of presenting L2 vocabulary in semantic sets. In this way, they concluded that vocabulary learning can be enhanced using some conceptual framework in which words are embedded in the meaningful context.

Schneider, Healy, and Bourne (2002) found that only in a very specific circumstance, did learners show an advantage with semantically related vocabulary. Sixty-four native-English speaking college students participated in two experiments which compared semantic (blocked category) versus non-semantic (mixed) presentation methods as well as tested the effects of the methods on vocabulary retention and transfer. Participants were tested, in both translation directions, at intervals on pairs of French and English words that were presented in either a blocked category or mixed fashion. On the initial day of the experiment participants were given three training trials which were followed by an immediate test. The results indicate that participants had more difficulty learning the mixed sets of words and producing the L2 vocabulary initially, but that the groups presented with mixed sets or that were asked to produce an L2 response retained better over time.

2.2 Opposing theoretical and empirical background for semantic clustering

Having discussed the justifications to present the vocabulary in semantically related sets, in this section, the researcher will introduce the Distinctiveness Hypothesis and the Interference Theory as the supporting theoretical background against presenting words in semantic clusters which will be followed by the pertinent review of the literature.

The Interference Theory, formulated by McGeoch (1942), can be evoked to argue that presenting L2 learners with vocabulary items grouped in semantic clusters actually impedes vocabulary learning rather than acting as a support to learning. The theory appeared initially under the literature of psychological studies of learning in the behaviorist theories of learning (Gass & Selinker, 2008) and has been the dominant theory of forgetting for much of the 19th century. It is traceable to the work of Muller and Plizecker (1900, cited in McGeoch, 1942) to refer to the decrease in retention because of a learning activity that interpolates between original learning and later recall. Behaviorists define interference as "[t]he use of the first language (or other languages known) in a second language context when the resulting second language form is incorrect" (p.455). Furthermore, it assumes also any other language learned earlier can affect the learning of a new language. Therefore, Gass and Selinker (2008) defined it in simple terms as "the learning of task a will affect the subsequent learning of task b" (p.93). In other words, the theory's hypothesis is that new knowledge loss or retention is influenced by the nature of the subsequently acquired knowledge. Its main goal is to explain why people forget information they knew.

The theory of interference works both ways: 1. Retroactive interference/inhibition and 2.Proactive interference / inhibition. Retroactive interference refers to the type of interference when newly-learned information inhibits previously-learned information, while the second one refers to the type of interference that occurs when previously-learned information disrupts the learning or recall of subsequent material (Gass & Selinker, 2008).

Besides the interference theory, the other evidence against providing words in semantic clusters is the Distinctiveness Hypothesis. The Interference Theory discussed earlier, presents clear indication that similarity can cause difficulties in learning.

Consequently, the Distinctiveness Hypothesis as a result of studies in interference suggests that variation within information facilitates learning. Although the behaviorist approach to learning no longer dominates the field, the effect of the similarity of stimuli on learning is still a matter of concern for many psychologists (Al-Jabri, 2005). The Distinctiveness Hypothesis was developed as an alternative to the depth of processing theory developed by Craik and Lockhart (1972). According to Craik and Lockhart's theory, there are series of processing stages, and information semantically processed is better remembered than information processed without attention to meaning (e.g. orthographically or phonetically) because of the greater depth of semantic processing. The Distinctiveness Hypothesis considers the ease with which distinctive information is learned (Al-Jabri, 2005). It states that the most important factor in recognition memory is the extent to which the test-trial encoding contains information that is unique to the study- trial encoding. In the case of an item that is phonemically encoded at input and at test, there would appear to be substantial encoding overlap (Eysenck, 1979).The claim is that people remember distinct items better than they remember those that are non-distinct. Hunt and Mitchell (1982) believe that the distinctiveness hypothesis focuses on the utility of encoding information in reconstructing to-be-remembered information. In general, information will be more useful in reconstruction or retrieval if it is unique to the to-be-remembered item.

To discuss empirically, there is some experimental evidence against the presentation of semantically related vocabulary in sets. Tinkham (1993) conducted study investigating the effect of presenting L2 students with new lexis grouped together in sets of semantically and syntactically similar words on learning second language vocabulary. In the first experiment of the study, three semantically related words (shirt, jacket, and sweater) and three unrelated words (rain, car, and frog) were paired with artificial (L2) words (i.e. Moshee, umau, blaikel, achen, nalo, kawvas). The constructed list consisting of the six word-pairs was presented to a group of 20 subjects who were required to learn it in a succession of trials. The experimental task was administered individually and orally. Subjects first heard an initial modeling of the artificial word coupled with its corresponding English word. The result of the experiments showed that subjects learnt six word set of artificial words paired with semantically related English words more slowly than they learnt a set of artificial words paired with unrelated English words.

A replication of Tinkham's (1993) study was carried out by Waring (1997). Japanese students participated in activities in which they were presented with pairs of words: the original words Tinkham used, translated into Japanese, and an artificial word created under the same guidelines as in Tinkham's study. In two experiments, Waring provided native-speaking Japanese subjects with six Japanese word-pairs, including three semantically related words sharing a common concept of "clothes" and three unrelated words as stimuli. Responses were Japanese artificial words. In the second experiment, subjects were required to learn two separate sets of six Japanese word-pairs; semantically related words (types of fruit) and semantically unrelated words (such as mountain, television, sky, mouse). Results of trials-to-criterion showed that subjects learned the related word-pairs more slowly than they learned the unrelated word-pairs and that "presenting new words that share a common super-ordinate in a set of words to learn does interfere with learning" (p. 267).

The finding of a study by Schneider, Healy, and Bourne (1998) that used natural L2 words rather than artificial ones, initially appeared to suggest that learning related words together (for example, parts of the body) was easier than learning unrelated words. However, when a test of long term (LT) retention was administered, the researchers found that the participants in the mixed-order acquisition condition (presented with unrelated vocabulary) were faster and made fewer errors than those in the grouped-order acquisition condition (presented with related vocabulary).

Finkbeiner and Nicol (2003) carried out their experiment by utilizing four categorize of eight pseudo word-picture pairs, which were presented in either semantically related or unrelated sets. Both groups were presented the words orally and then they saw the picture depicting the meaning of the word, after which they repeated the new label for the word twice. Once the participants had been trained in this way, they completed oral L1-L2 and L2-L1 translation tasks, for which translation latencies were measured. The results showed that the semantically related group was slower than the unrelated group, which seems to confirm the inhibitory effect that presenting vocabulary in semantically related sets can have on vocabulary learning.

Erten and Tekin (2008) conducted a research using two intact groups of participants, all of whom were fourth grade students with a similar proficiency level. The participants were asked to match vocabulary items, semantic sets and semantically unrelated sets, to corresponding pictures. The word list was in the form of picture-word matching all concrete to avoid any possible difficulties in comprehension. The result of the study demonstrated that presenting new words in semantic sets, rather than in semantically unrelated word groups, can interfere with learning.

Papathanasiou (2009) compared learning of sets of the semantically related and semantically unrelated vocabulary by young intermediate learners of English (n=31), and the novice adult English learners (n=32). Half of the subjects on each fl proficiency level were presented with L2 vocabulary in the semantic sets, and the other half learnt semantically unrelated words. The results of the immediate and delayed posttests showed that the semantic set treatment caused additional difficulties for the adult beginners but had no effect on the young English learners who had attained intermediate foreign language proficiency. Interpreting the experimental findings, the researcher concluded that presenting words in the semantic sets impedes L2 vocabulary learning at the beginner's level but has smaller impact on more advanced foreign language learners.

In Iranian context, Marashi and Azarmi (2012) conducted a study among 120 female EFL learners who were selected among a total number of 180 based on their performance on a piloted Cambridge Key English Test (KET) and randomly put into four experimental groups. The same content was taught to all four groups throughout the fifteen-session treatment; the only difference was over the mechanism of teaching vocabulary to the four groups. In the first group, vocabulary was taught in semantically related sets and in an incidental learning mode. The second group received them in the same sets but in an intentional learning mode. The third experimental group experienced semantically unrelated sets and in an intentional learning mode, while the fourth group was taught the vocabulary in semantically unrelated sets but in an incidental learning mode. A vocabulary achievement test within the content area was given to the students in all groups at the end of the instruction and the mean scores of all groups on this posttest were compared through a two-way ANOVA. The results revealed that presenting words in semantically unrelated sets and in an intentional learning mode was more effective on students' vocabulary achievement compared to the other modes.

Similarly, Mirjalili, Jabbari, and Rezaei (2012) studied the effects of semantic, thematic and unrelated clustering of words as well as the effects of two instructional approaches, namely isolation and context on vocabulary learning. The subjects of the study constituted 90 learners at three proficiency levels, i.e. (1) elementary, (2) pre-intermediate and (3) intermediate. Each cluster was presented in both isolation and context. Tests were given immediately after each exposure. A three-way ANOVA was used to analyze the data inferentially. The results demonstrated that when the words were presented to the subjects in isolation, they generally recalled the highest number of words from the unrelated set whereas they could recall the highest number of words from the thematic clustering in context. Additionally, the effect of proficiency level did not turn out to be significant.

3. Methodology

3.1 Participants

The participants in this study included 30 EFL learners within the age range of 12-15, learning English at elementary level at one of language institutes in Shahroud, Iran. All participants had started studying English from the *Interchange* series. They had taken a placement test at the beginning before sitting at proper classes. They were attending from two intact which were randomly assigned as the experimental group and the control group. Each group included 15 female participants. Although the placement test proved the initial homogeneity of the groups, a KET test including writing assessment as well as reading skill was given to them to confirm the homogeneity statistically, to do so, all 15 students in each group participated in the study. Both classes were taught by the same instructor who had an M.A. in TEFL. The classes met three times a week, 90 minutes each session, approximately one month and a half.

3.2 Design of the study

The study had a quasi-experimental design in which there were both a control group and an experimental group. Also, the independent variables of the study were presentation of new words in semantically related and unrelated sets and the dependent variable was the vocabulary retention of the EFL learners in Iran at elementary level.

3.3 Teaching materials

As a tool to reach the goals of this study and to help learners to remember the words easily, a list of words with their equivalent translations in Farsi were gathered to see which list results to better retrieval of the words. To be more specific, the researcher provided six lists for the experimental group of the elementary level containing semantic clusters, words which share the same semantic and syntactic characteristics, grouped under a common concept, most of which were selected from the Vocabulary Builder series by Seal (1990). Each list included ten semantically related words in detached sentences accompanied by their Farsi equivalents that the researcher added. The control group also, had similar lists of words in sentences the only difference being that the semantically related words were taught haphazardly in six different sessions in form of the unrelated sets, words that do not share semantic and syntactic characteristics. To be more specific, two sentences containing two semantically related words (not ten like the experimental group) from the first list of the experimental group, two other

sentences from the second one and so on were chosen to make 10 unrelated words in sentences for each session of the control group. Participants did not know the meaning of the English words in the Farsi language, nor had they established connections between the English words and their equivalents.

3.4 Instruments

In this study, four types of instruments were used to collect the research data. They were as follows: 1) Key English Test (KET) test; 2) vocabulary pretest; 3) immediate recall posttests, and 4) delayed recall posttest.

3.5 Procedure

Having analyzed the results of the KET test to ascertain the homogeneity of two groups at both levels, the researcher selected one of them as the experimental, and the other as the control group. *Key English Test (KET)* is an international qualification in English for teenagers and adults which recognize the ability to deal with everyday written and spoken English in basic level. In the present study, the speaking and listening parts of the test were excluded and the remaining parts were administered for the purpose of the study. The participants in both the experimental and control groups took Lucantoni's (2003) KET test which took 70 minutes including 56 questions in 9 parts.

After the KET test was administered, all 30 learners were asked to take a vocabulary test which included the new words to be taught in either semantically related or unrelated sets. These words were selected meticulously from the words pertinent to the level which were left unanswered or chosen incorrectly by the pilot group. In other words, the correctly responded items by the pilot group were excluded from the words which were meant to be taught in classes and just the vocabularies which were unknown for the learners were selected for the actual classes. The test included 63 multiple-choice items with their equivalent Farsi translations, three of which were excluded again because of being answered by the learners either by chance or personal background knowledge. The validity of the tests was also verified by four experts in English testing who were fluent in Farsi language as well.

At the end of each session after teaching the selected words in both the experimental and the control group with different techniques, the researcher asked all participants to take a short quiz as an immediate recall posttest to analyze the amount of the vocabulary retrieval among the learners which was relevant to their short term memory. It is worth mentioning that all immediate recall tests included the words which had been taught the every session of the test administration and the internal consistency of all had been verified by four experts in English testing. It is also noteworthy that there were six immediate recall posttests each including 10 words with Farsi translation of the words in multiple-choice or matching format.

To teach the relevant vocabulary, the researcher presented the words in sentences in each of which the new words were used, then by using different strategies like repetition and asking the learners to make other sentences, ascertained that the learners had no problem and had learned the words properly. On the other hand, the control group did not receive such semantically related words in sentences in each session, instead, the teacher taught the same words and sentences in a random way. This strategy was used to evaluate the effect of the presenting words in unrelated sets to be compared with the experimental group to find the dominant way of word presentation. Like the experimental group, the control group received the same instructional activities and equivalent word translations and the immediate recall posttests.

At the end of the term, all participants were asked to sit an exam as the delayed recall posttest which was being administered in one month interval from the last session of presenting words in either semantically related or unrelated sets. During this interval, the words had not been reviewed or tested in the class to ascertain the presumption and retention from long term memory. The test included all 60 words which had been taught at the beginning of the term in six successive sessions and like the immediate recall test, its internal consistency and validity had been verified by four testing experts, the only difference being that the format was just multiple-choice items with equivalent Farsi meaning of the words. Matching format was not used to reduce puzzling in long list of the words.

It is noteworthy that the total sum of scores given to the immediate recall posttest was out of 60 (six tests each 10 scores), and the full score of the delayed recall posttest was also out of 60 consisting of 60 semantically related words.

3.6 Data analysis

For the purpose of the study, the collected data were analyzed using SPSS software program. To initiate, the researcher analyzed the scores of the KET test by applying the *t*-test analysis to compare the means of the experimental and the control groups to ascertain the homogeneity of the groups. Then, by comparing the mean scores of the groups obtained from their pretest performances, the researcher recorded the initial knowledge of the learners which was done by using *t*-test analysis. After that, the mean score of each of six immediate recall posttests was analyzed to see how much the learners could remember the words taught the every session which was the manifestation of

their short-term memory. Likewise, the mean score of the delayed recall posttest which was administered on the twentieth session of the term and as an indicator of the long-term memory, was analyzed to compare how deeply the learners learnt the words presented at the beginning of the term taught either in semantically related sets for the experimental groups or in unrelated sets for the control groups. To come to a conclusion, the researcher, used the mean score of all immediate recall posttests of the experimental group to compare with those of the control group' to assess the performance of each group based on the short-term memory as well as the scores obtained from the delayed recall posttest to compare the learners' performances between the experimental and the control groups as the final indicator of the amount of their vocabulary retrieval.

4. Data Analysis and Discussion

The analysis will be presented in the following order:

a. The KET test analysis
b. Pretest analysis
c. Immediate recall posttests
d. Delayed recall posttest
e. Discussion of the findings

4.1 KET Test analysis

Table 4.1 shows the descriptive statistics related to the data obtained from the KET test of the experimental and the control groups of the elementary level. According to the conducted *t*-test, the overall mean of the experimental group was 29.73 (SD=4.52) and the mean of the control group was 30.06 (SD=4.65).

Accordingly, the results of the Levene's test for equality of variances as a requirement for *t*-test and the independent samples *t*-test analysis of the KET of the experimental and the control groups are shown in the table. According to Levene's test and considering P-value that was 0.785> 0.05, then it was concluded that the two variances were not significantly different; that is, the two variances were approximately equal and the assumption for *t*-test was met. According to *t*-test and P-value which was 0.844, the difference between the two groups was not significant (0.844>0.05). In other words, the experimental and the control group were almost alike and homogeneous at the beginning of the course.

Table 4.1 *Results of the T-test Analysis of the KET Test of the Elementary y Level*

GROUP1 ELEMENTARY		N	MEAN	STD. DEVIATION	STD. ERROR MEAN
KET	EXPERIMENTAL	15	29.7333	4.52717	1.16891
	CONTROL	15	30.0667	4.65168	1.20106

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS						
		F	SIG.	T	DF	SIG. (2-TAILED)	MEAN DIFFERENCE	STD. ERROR DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
									LOWER	UPPER
KET	EQUAL VARIANCES ASSUMED	.076	.785	-.199	28	.844	-.3333	1.67597	-3.76641	3.09974
	EQUAL VARIANCES NOT ASSUMED			-.199	27.979	.844	-.3333	1.67597	-3.76652	3.09986

4.2 Pretest analysis

According to table 4.2, descriptive statistics of pretest analysis of the experimental group of the elementary level shows that their mean score was 0.26 with standard deviations of 0.59. As it is obvious, maximum score was 2 meaning that only two words (0.41% of all) were known to the learners which were eliminated from the list of the words to be taught during the course. Although some other words were removed from the pilot study, still there were few words which were familiar to the learners in the experimental group which can be considered as the individual differences or their background knowledge.

Table 4.2 *Descriptive Statistics of the Pretest of the Experimental Group*

N	VALID	15
	MISSING	0
MEAN		.2667
STD. ERROR OF MEAN		.15327
STD. DEVIATION		.59362
MINIMUM		.00
MAXIMUM		2.00
PERCENTILES	25	.0000
	50	.0000
	75	.0000

GROUP1 = ELEMENTARY, EXPERIMENTAL, PRETEST

Table 4.3 shows descriptive statistics of the pretest scores of the control group at the elementary level. Based on the analysis, the mean score was 0.20 (SD=0.56) with maximum score of 2. Like the experimental group, the same two items (0.41% of all) could be answered correctly by the control group which were removed from the list as well.

Table 4.3 *Descriptive Statistics of the Pretest of the Control Group*

N	VALID	15
	MISSING	0
MEAN		.2000
STD. ERROR OF MEAN		.14475
STD. DEVIATION		.56061
MINIMUM		.00
MAXIMUM		2.00
PERCENTILES	25	.0000
	50	.0000
	75	.0000

GROUP1=ELEMENTARY, CONTROL, PRETEST

According to Table 4.4, descriptive statistics of pretest analysis shows that the mean scores of the experimental and the control groups were 0.26 and 0.20 with standard deviations of 0.59 and 0.56, respectively.

According to Levene's test for equality of the variances as an assumption of the *t*-test as shown in table 4.4 and considering P-value that was 0.60 > 0.05, it was concluded that the two variances were not significantly different which means the two variances were approximately equal and the assumption for *t*-test was met. According to *t*-test and P-value which was 0.754, the difference between the two groups was not significant (0.754>0.05) confirming the homogeneity of the groups on the pretest.

Table 4.4 *Results of the T-test Analysis of Pretest*

GROUP1 ELEMENTARY		N	MEAN	STD. DEVIATION	STD. ERROR MEAN
PRE	EXPERIMENTAL	15	.2667	.59362	.15327
	CONTROL	15	.2000	.56061	.14475

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS						
		F	SIG.	T	DF	SIG. (2-TAILED)	MEAN DIFFERENCE	STD. ERROR DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
									LOWER	UPPER
PRE	EQUAL VARIANCES ASSUMED	.280	.601	.316	28	.754	.0667	.21082	-.36518	.49851
	EQUAL VARIANCES NOT ASSUMED			.316	27.909	.754	.0667	.21082	-.36524	.49857

4.3 Immediate recall posttests analysis

Having analyzed the results of the pretest and ascertained the homogeneity of the groups, the researcher analyzed the scores obtained from the six immediate recall posttests and recorded the mean score of each test which is shown in Table 4.5. Accordingly, the experimental group received the mean scores of 8.6, 9.1, 8.7, 8.06, 8.2, and 8.1 in six immediate posttests and the control group had slightly different scores like 8.7, 9, 8, 8.8, 8.6, and 8.2 in each test.

Table 4.5 *Mean Scores of Immediate Recall Posttests of the Experimental and Control Group at Elementary Level*

ELEMENTARY	IMMEDIATE RECALL POSTTESTS						
	1	2	3	4	5	6	TOTAL MEAN
EXPERIMENTAL	8.6	9.1	8.7	8.06	8.2	8.1	8.48
CONTROL	8.7	9	8	8.8	8.6	8.2	8.58

Table 4.6 shows the total mean score of six immediate recall posttests of the experimental and control group. Accordingly, the total mean score was 8.48 (SD=1.13, 84.8% of all the questions), min=7, and max=10. In other words, the experimental group was successful in their immediate recall posttest performances and had an overall high mean score. At least seven words could be answered correctly right after the presentation of the words in each session. Similar to the experimental group, control group had an overall mean score of 8.58 (SD=1.02, 85.8% of all), with the same minimum and maximum score of the experimental group's.

Table 4.6 *Total Mean Score of Immediate Recall Posttests of the Experimental and Control Group at Elementary Level*

N, EXPERIMENTAL	VALID	15	N, CONTROL	VALID	15
	MISSING	0		MISSING	0
MEAN		8.4867	MEAN		8.5860
STD. ERROR OF MEAN		.29340	STD. ERROR OF MEAN		.26465
MEDIAN		8.5000	MEDIAN		8.6600
STD. DEVIATION		1.13633	STD. DEVIATION		1.02498
MINIMUM		7.00	MINIMUM		7.16
MAXIMUM		10.00	MAXIMUM		10.00
PERCENTILES	25	7.5000	PERCENTILES	25	7.6600
	50	8.5000		50	8.6600
	75	9.6600		75	9.5000

Table 4.7 which shows *t*-test analysis for total mean score of immediate recall posttests of the experimental and control groups at elementary level, reveals that the mean score of the experimental group was 8.48 out of 10 with standard deviation of 1.13 and the control group had the mean of 8.58 (SD=1.02).

According to Levene's test and considering P-value that was 0.582 > 0.05, it was concluded that the two variances were not significantly different; that is, the two variances were approximately equal and the assumption for *t*-test was met. Based on independent samples *t*-test shown in table 4.7 and considering t=2.51 and P=0.80>0.05, it was concluded that the difference between the scores of the immediate recall posttests was not significant and the learners in the experimental group who were provided with the presentation of the words in semantic clusters did not perform better than their peers in the control group. As immediate recall posttests were administered right after the presentation of the words either in semantically related or unrelated set at the end of each session and considering that the scores show the power of the learners' short-term memory, it cannot be surely concluded that the scores show the actual learning of the words regardless of the way of presentation and the scores of the delayed recall posttest can confirm the results.

Table 4.7 *T-test Analysis for Total Mean Score of Immediate Recall Posttests of the Experimental and Control Group at Elementary Level*

GROUP1 ELEMENTARY		N	MEAN	STD. DEVIATION	STD. ERROR MEAN
IM.RE.PO	EXPERIMENTAL	15	8.4867	1.13633	.29340
	CONTROL	15	8.5860	1.02498	.26465

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS						
									95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
		F	SIG.	T	DF	SIG. (2-TAILED)	MEAN DIFFERENCE	STD. ERROR DIFFERENCE	LOWER	UPPER
IM.RE.PO	EQUAL VARIANCES ASSUMED	.310	.582	-.251	28	.803	-.0993	.39512	-.90871	.71004
	EQUAL VARIANCES NOT ASSUMED			-.251	27.707	.803	-.0993	.39512	-.90909	.71043

4.4 Delayed recall posttest analysis

Having analyzed the scores obtained from the immediate recall posttests, the researcher examined the learners' performances on their final test as delayed recall posttest to evaluate the long-term impact of presentation of words in semantic clusters. Table 4.8 shows the descriptive statistics related to the scores obtained from the delayed recall posttest of the experimental and control group in elementary level. Accordingly, the experimental group had a mean score of 45.6 (SD=3.99) out of 60 with minimum score of 40 and maximum score of 52 and could answer 76% of all the questions. On the other hand, the control group had a far higher mean score being 55.2 (SD=2.14) where the highest score was 58 and the lowest one was 52 and could answer 92% of all the words correctly.

Table 4.8. *Descriptive Statistics of Delayed Recall Posttest of the Experimental and Control Group at Elementary Level*

N, EXPERIMENTAL	VALID	15	N, CONTROL	VALID	15
	MISSING	0		MISSING	0
MEAN		45.6000	MEAN		55.2000
STD. ERROR OF MEAN		1.03187	STD. ERROR OF MEAN		.55377
MEDIAN		47.0000	MEDIAN		55.0000
STD. DEVIATION		3.99643	STD. DEVIATION		2.14476
MINIMUM		40.00	MINIMUM		52.00
MAXIMUM		52.00	MAXIMUM		58.00
PERCENTILES	25	40.0000	PERCENTILES	25	53.0000
	50	47.0000		50	55.0000
	75	48.0000		75	57.0000

According to the conducted *t*-test in table 4.9, the mean of the experimental group on delayed recall posttest was 45.6 (SD=3.99) and the mean of the control group was 55.2 (SD=2.14).

Based on Levene's test and considering p-value that was *0.06 > 0.05,* it was concluded that the two variances were not significantly different; that is, the two variances were approximately equal and the assumption for *t*-test was met. Based on independent samples *t*-test shown in table 4.9 and considering *t*=8.198 and P=0.000<0.05, it was concluded that the difference between the scores of the learners' vocabulary retention on their delayed posttest was statistically significant. However, surprisingly the learners in the control group, whose vocabulary presentation was in unrelated word sets, outperformed their peers in the experimental group based on the meaningful improvements of their mean scores from pretest being 0.2 and to the posttest being 55.2. In other words, presenting words in semantic clusters for the experimental group did not help them remember the newly taught words better than the control group which proved that similar words were hard to retain in long term.

Table 4.9. *T-test Analysis of Delayed Recall Posttest of the Experimental and Control Group at Elementary Level*

GROUP1 ELEMENTARY		N	MEAN	STD. DEVIATION	STD. ERROR MEAN
DE.RE.PO	EXPERIMENTAL	15	45.6000	3.99643	1.03187
	CONTROL	15	55.2000	2.14476	.55377

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS						
		F	SIG.	T	DF	SIG. (2-TAILED)	MEAN DIFFERENCE	STD. ERROR DIFFERENCE	95% CONFIDENCE INTERVAL OF THE DIFFERENCE	
									LOWER	UPPER
DE.RE.PO	EQUAL VARIANCES ASSUMED	5.084	.062	-8.198	28	.000	-9.6000	1.17108	-11.99885	-7.20115
	EQUAL VARIANCES NOT ASSUMED			-8.198	21.447	.000	-9.6000	1.17108	-12.03231	-7.16769

4.5 Discussion of the findings

To sum up, the researcher first conducted a KET test to ascertain the homogeneity of groups to choose the experimental and control group randomly at elementary level. Then the pretest analysis showed that the groups had a similar performance and their mean score was close to zero meaning that almost all the words were unknown to the participants and the known words were eliminated from the lists to be taught. Six immediate recall posttests then revealed that both the experimental and control groups had a very high performance on the tests administered right after the presentation of words either in semantically related or unrelated sets and the difference between the performances of the experimental and the control groups were not statistically significant meaning that all participants could remember the words taught the very session very well. However, on the delayed recall posttest which was the indicator of the amount of their vocabulary retention in long term, the control group outperformed their peers in the experimental group and had a meaningful mean score differences. In other

words, the control group, whose vocabulary presentation was in unrelated sets presented in random sentences, could remember the words much better than the experimental groups whose vocabulary presentation was in semantic clusters sets.

The results of the present study are in line with the Interference Theory and Distinctiveness Hypothesis as the confirming theoretical backgrounds. It can be evoked to argue that presenting L2 learners with vocabulary items grouped in semantic clusters actually impedes vocabulary learning rather than acting as a support to learning. It refers to the decrease in retention because of a learning activity that interpolates between original learning and later recall. The theory's hypothesis is that new knowledge loss or retention is influenced by the nature of subsequently acquired knowledge.

Besides the Interference Theory, the other evidence against providing words in semantic clusters is the Distinctiveness Hypothesis which suggests that variation within information facilitates learning. The claim is that people remember distinct items better than they remember those that are non-distinct. Research demonstrates that, as this hypothesis predicts, distinctiveness of information facilitates memory.

To discuss thoroughly, there is some empirical evidence against the presentation of semantically related vocabulary in sets. The findings of this study are in line with what Tinkham (1993) found in his study investigating the effect of presenting L2 students with new lexis grouped together in sets of semantically and syntactically similar words on learning second language vocabulary. The present study also confirms the replication of Tinkham's (1993) study by Waring (1997) in whose research Japanese students participated in activities in which they were presented with pairs of words. The finding of a study by Schneider et al. (1998) was similar to the present study in use of natural L2 words rather than artificial ones. The test of Long Term (LT) retention as the delayed recall posttest of the present study, demonstrated that the participants in the mixed-order acquisition condition (presented with unrelated vocabulary) were faster and made fewer errors than those in the grouped-order acquisition condition (presented with related vocabulary).

Erten and Tekin (2008) conducted a research using two intact groups of participants, all of whom were fourth grade students with a similar proficiency level. The participants were asked to match vocabulary items, semantic sets and semantically unrelated sets, to corresponding pictures. The word list was in the form of picture-word matching all concrete. The main difference of their study and the present research was providing the L1 equivalent of the words rather than picture-matching. The result of the study demonstrated that presenting new words in semantic sets, rather than in semantically unrelated word groups, can interfere with learning.

Papathanasiou (2009) compared learning of sets of the semantically related and semantically unrelated vocabulary by young intermediate learners of English, and the novice adult English learners who were so similar to the participants of the present study. The results of the immediate and delayed posttests showed presenting words in the semantic sets impedes L2 vocabulary learning at the beginner's level but has smaller impact on more advanced foreign language learners. The present study confirms the negative impact of the presentation of the words in semantically related sets at the elementary level.

In Iranian context, Marashi and Azarmi (2012) conducted a study among 120 female EFL learners and randomly put them into four experimental groups the only difference being over the mechanism of teaching vocabulary to them. The results revealed that presenting words in semantically unrelated sets and in an intentional learning mode was more effective on students' vocabulary achievement compared to the other modes. The findings of the present study confirm their conclusion.

Similarly, Mirjalili et al. (2012) studied the effects of semantic, thematic and unrelated clustering of words as well as the effects of two instructional approaches, namely isolation and context on vocabulary learning. The results demonstrated that when the words were presented to the subjects in isolation, they generally recalled the highest number of words from the unrelated set which is in line with the findings of the present study.

These findings can be translated into an assertion which claims that semantically similar new words might have a "deleterious effect on learning" (Finkbeiner & Nicol, 2003, p. 376) and actually impede rather than facilitate the learning of new vocabulary items.

However, further investigation is clearly warranted in order to elucidate the effect of vocabulary presentation. Research that supports semantic clustering (Channell, 1981; Jullian, 2000; Schneider, Healy, & Bourne, 2002) consists mostly of case-studies, except for Schneider et al. (2002), whose finding for semantic clusters in L2-L1 word translations has yet to be corroborated. Tinkham's (1993, 1997) research strongly supports organizing words into nonrelated or thematically related groups, but the implications of his investigations along with those of Warring's (1997) and Finkbeiner and Nicol (2003) are limited since the words being tested were artificial. Furthermore, these authors did not test over the long term, which restricts the conclusions that can be drawn for L2 development. Papathanasiou (2009) presents a similar argument using English words as the L2 with adults. She found that adult beginning-level ESL students scored significantly higher in both the posttests and delayed posttests

containing unrelated vocabulary. However, further research probing into the effect of semantic clustering is certainly warranted in order to address the paucity of experimental research in this strand of investigation.

5. Conclusions

T-test analysis related to the data obtained from the pretest and posttest from the experimental and the control groups of the elementary level revealed that the experimental group who could just answer 0.41% of the questions on the pretest, succeeded in answering 84.8% of immediate recall posttests, and 76% of the delayed recall posttest. Similarly, the control group improved from their performance on the pretest from 0.41% to 85.8% correct answers on the immediate recall posttests and finally reaching 92% on the delayed recall posttest.

Overall, the differences in mean scores of the experimental and control groups on their delayed recall posttest performances were statistically significant and the control group outperformed their peers in the experimental group which confirmed the negative impact of the semantic clustering on vocabulary retention of the learners in the experimental groups at elementary level.

So, the answer to the research question 1, which subjected the impact of semantic clustering on vocabulary retention of the learners at elementary level, was positive and improvement on the mean scores obtained from the immediate and delayed recall posttests confirms it. Consequently, null hypothesis 1 was rejected meaning that presentation of the words in semantic clusters had positive impact on vocabulary retention of elementary learners.

Research question 2 subjected the facilitative extent of presentation of words in semantically related or unrelated sets among Iranian elementary EFL learners' vocabulary learning. Presentation of the words in semantic clusters could help learners improve their performance from remembering 0.41% of the words on the pretest to 76% on the delayed recall posttest. Likewise, presenting words in unrelated sets to the control group improved their vocabulary retention from 0.41% to 92% which is far higher than the percentage of the experimental group's. So, presenting words in unrelated sets facilitated the vocabulary retention of the elementary learners more, which confirms null hypothesis 2.

5.1 Pedagogical implications

The implications of the present study are twofold. The first one involves material developers and course book writers while the second one involves classroom procedures. Principles set for producing course books need to be based upon research findings (Richards, 2006). The findings of this particular study do not support presenting semantically related vocabulary together. Although further research to validate these results is still necessary, it can be suggested that rather than presenting semantically related new vocabulary together, it would be better if words in the same semantic group were presented separately. The findings of this research can also help syllabus designers and course book writers to design more effective textbooks for elementary learners. Also, it is recommended to design a teacher's guide with the focus on how to present and instruct vocabularies for the content being used in different systems clearly, because not having a guide can lead to controversial issues faced by different teachers.

Findings of this study also indicate that semantic organization in our mental lexicons does not justify integration of such relationships in teaching vocabulary. New strategies may need to be developed to present and recycle new vocabulary items so that semantic relations cause minimal confusion (Nation, 2001). Learners themselves may often want to learn vocabulary in semantic sets, as Nation (2000) suggests, but they should be encouraged to avoid this practice. According to Nation, semantic sets should be associated only after the items have been learned in isolation and without paying attention to the semantic relations between them.

However, as already pointed out, this study focused on young learners, whose L2 was still in a more developmental state. Therefore, it would be informative to replicate this study with adults for a better elucidation of the phenomena.

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